IUPAC-NIST Solubility Data Series. 72. Nitromethane with Water or Organic Solvents: Ternary and Quaternary Systems

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The mutual solubilities and liquid–liquid equilibria of nitromethane ternary and quaternary systems with liquid solvents are reviewed. The solvents include water, inorganic compounds, and a variety of organic compounds such as hydrocarbons, halogenated hydrocarbons, alcohols, acids, esters, and nitrogen compounds. A total of 107 ternary and eight quaternary systems whose properties were described in the chemical literature through 1998 are compiled. For 22 systems, sufficient data were available to allow critical evaluation. All data are expressed as mass and mole fractions as well as the originally reported units. Similar reviews of gas, liquid, and solid solubilities for other systems have been published in the frame of Solubility Data Series. This is the 72 volume of this series. © *2001 American Institute of Physics.* [S0047-2689(00)00106-9]

Key words: aqueous solution; liquid–liquid equilibrium; nitromethane; organic solvents; quaternary systems; solubility; ternary systems.

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1. Preface

1.1. Scope of the Volume

This volume presents a review of experimentally determined solubility data for well-defined ternary and quaternary systems in which one component is nitromethane. Others components for which data was found in the chemical literature include water, organic substances of various classes (hydrocarbons of several structural types, halogenated hydrocarbons, mono and polyhydroxy alcohols, acids, ethers, esters), rare gases, and inorganic substances. An exhaustive search of the chemical literature published prior to 1998 found solubility data for 107 ternary and eight quaternary systems. From these, 140 Compilations were prepared. Most Compilations present the solubility data for one system as reported in one publication. For some original publications, which report very limited data for several systems, those data are grouped into a single Compilation. Where two or more reliable Com-

pilations were found for a system, a Critical Evaluation was prepared. This was possible for only 22 systems, reflecting the sparseness of study of many nitromethane systems. The systems are ordered on the basis of the chemical formula according to the Hill system (described in the Introduction), except for those Compilations where more than one system is treated.

To the extent allowed by the available data, this volume considers mutual solubility and liquid–liquid equilibrium of ternary and quaternary systems. That is, data for both the solubility of nitromethane in other components and the solubility of these components in nitromethane are compiled and evaluated when available. Other solubility data, which are compiled when available, include the distribution of *i* component between coexistent liquid phases of ternary systems. Numerical data reported in the primary sources were used for preparation of compilations. When data were presented only in graphical form, the compilers attempted to obtain numerical data from the original investigators. In some cases where numerical data could not be obtained in this way, the compilers extracted the numerical data from published diagrams.

This volume is the result of an exhaustive search of the chemical literature using both Chemical Abstracts and Russian Abstract Journal for Chemistry (Referativnyi Zhurnal "Khimiya"). The goal of the search was to include all published data for systems designated in the title. Russian archival sources including Deposited Documents of VINITI, scientific works (Nauchnye Trudy or Uchenye Zapiski) of Universities, Research Institutes and Educational Institutions, and materials from conferences, meetings, and symposia are also included. Each critical evaluation includes the data at which the literature search closed for the system evaluated (usually 1998). In spite of all efforts, some sources of experimental data, may have been missed. The editors will gratefully receive information about omissions.

Data for ternary systems containing nitromethane have been measured, published, and presented primarily in two forms: either as data at constant temperature, or as data collected at polythermal conditions. In the first case (isothermal), the investigator is looking for the composition of a saturated solution at a chosen temperature. Such data have the advantage that results from different studies can often be directly compared. In the second case (polythermal) the investigator prepares a mixture of known composition and then determines the solubility temperature. Such data generally require interpolation between measured data points before comparisons between studies is possible.

In some original sources solubility data are reported as incidental or ancillary information to other studies. If, for this or other reasons, details concerning experimental methods, source and purity of materials, or estimated errors are brief or absent, correspondingly short entries appear in the compilations, sometimes with the note, "No further details were reported." Estimated errors were sometimes provided by the compiler with appropriate notation.

For convenience of comparison of experimental data, compilers and the evaluator of this volume, in so far as is possible, expressed all initial results in mass percent and mole fraction as well as in units reported in the original source. Conversions, where they were made, are clearly attributed to the compiler. Some unit conversions require numerical data for the density of pure components and/or the mixtures. Approximate values of mixture densities obtained using calculations recommended in standard handbooks, for example Reid *et al.*[1] Definitions of mass percent and mole fraction as well as their relation to other units of solubility are given in the Introduction. In some compilations the indices $'$ and $''$ are used to express phase number; $'$ describes the nitromethane-rich or organic-rich phase, while $''$ describes the water-rich or nitromethane-poor phase.

In a few systems where one component is a gas, solubility data have been reported originally as the Ostwald coefficient (L). This dimensionless value is the volume of saturating gas absorbed by a volume of pure solvent at the temperature and pressure of the measurement. Thus, the Ostwald coefficient is equal to the ratio of the amount concentrations in the gas and in the liquid.

The general properties of ternary systems exhibiting liquid–liquid equilibrium and basic types of the solubility curves have been treated in detail.[2] Ternary systems with limited mutual solubility of components representing interest for liquid extraction, have been classified by Treybal[2] as follows:

Type I. Systems with one pair partially miscible liquids.
Type II. Systems with two pairs of partially miscible liquids.
Type III. Systems with three pairs of partially miscible liquids.
Type IV. Systems forming solid phases.

In this volume 33 systems, 31% are Type I.

In the series of ternary systems nitromethane+1-normal alcohols+water C1–C3 alcohols are Type I. Depending on temperature systems with C4–C16 alcohols can correspond to Type I to Type IV. For example, the system nitromethane +1-butanol+water at temperatures below 290.5 K has three pairs of partially soluble liquids and falls into Type III. In the temperature interval 290.5–377.7 K, where the two binary pairs nitromethane+water and 1-butanol+water are partially soluble, the ternary system is Type II. Above 377.7 K this ternary system is Type I. Three fluid phases are present in the temperature interval 273–281 K.

1.2. Experimental Methods

Most solubility measurements of ternary and quaternary systems containing nitromethane have been made between room temperature and the UCST (upper critical solution temperature) of the binary system under study. At atmospheric pressure temperatures studied range from 258 K (nitromethane+1,2-ethanediol+1-nonanol) to 449 K (nitromethane+naphthalene+water). Three basic approaches to solubility measurement for ternary and quaternary systems are known: synthetic, titration, and analytical. Of these the synthetic (visual-polythermal, or cloud-point)

method is most commonly used. Almost 53% (74) of the compilations in this volume are for data obtained using the synthetic method. In this method the temperature is determined at which turbidity associated with a second phase appears and/or disappears for a mixture of known composition, often in a sealed ampoule. In some systems the ternary mixtures form three fluid phases. In these cases continued heating determines first the temperature of dissolution of the third fluid phase (solubility temperature of the three liquid phases), and then at higher temperature dissolution of the second fluid phase (solubility temperature of the two liquid phases).

This method was introduced by Alekseev[3] (also transliterated in some older German language publications as "Alexeev" or "Alexejew") in 1876. The method has been refined and improved by Rothmund[4] and Timmermans[5] and is capable of measuring solution temperature with an error (±0.01 K). System pressure at the solution temperature is seldom reported since it is assumed that the effect of pressure is minor.

Two other methods are used for isothermal measurements of solubility. In the titration method one component is added in small portions with vigorous mixing to a solution of the remaining components until persistent turbidity is observed. In the analytical method samples of liquid phases at equilibrium are analyzed by various methods: chemical or physical. Sources of error in these three methods include gravitational effects and impurities in materials whose solubilities are being determined. This has been discussed in detail, Shaw *et al.*[6] For ternary mixtures of nitromethane and organic substances, water is a common impurity since it is difficult to remove completely from most organic liquids and is reabsorbed on exposure to air. The presence of small quantities of water can either lower the temperature of solubility (e.g., in systems of nitromethane and alcohols) or raise these temperatures (e.g., in mixtures of nitromethane and hydrocarbons) (Sazonov[7]).

1.3. Procedure Used in Critical Evaluations

A Critical Evaluation was prepared for each system for which two or more independent reports of solubility are available. In evaluating the available data the evaluators have considered both the data quality of individual original sources to the extent that can be established from the content (and omissions) of those reports and by comparing the results obtained independently in more than one laboratory. Several aspects of the solubility data have been considered: purity of substances and date of experiment; accuracy of the method and reproducibility of the experiment; experience of the researcher(s) and previous publications.

In Critical Evaluations data may be classified as *Recommended, Tentative*, or *Rejected*. Data are recommended if the results of two or more independent groups are in good agreement and the evaluator has no doubt of the adequacy of the experimental and computational procedures used. Data are classified as tentative if only one set of measurements is available or if the evaluator considers some aspect of the experimental or computational procedures as mildly questionable. Data determined by an inadequate or ill-defined method are rejected. Where it is possible, Recommended or Tentative values of mutual solubility and liquid–liquid equilibrium, are specified at 0.1 MPa. Solubility data at several temperatures are described by an algebraic equation. The equations were utilized more often:

$$y = a + b \cdot x + c \cdot x^2 + d \cdot \sqrt{x} + e \cdot x^{3/2} \quad (1)$$

$$y = a + b \cdot x + c \cdot \ln(x) + d \cdot (\ln(x))^2 + e \cdot \sqrt{x}. \quad (2)$$

These smoothing equations give smaller standard deviations than any other tested equations. The equation parameters were calculated by the least squares method and presented in tables. The solubilities calculated by the proposed equations are presented in the figures and tables. Experimental solubility data from references are presented in figures for comparison.

Graphical representations of all reported data are often useful for comparing data and identifying outliers and are included in some Evaluations. These diagrams, representing the solubility data and the compositions of coexisting liquid phases at several temperatures (expressed in mole fraction) and the distribution curves of i component between coexistence liquid phases, can reveal whether or not a trend exists among the data in addition to highlighting any discrepancies of experimental solubility measurements.

The editors wish to acknowledge with thanks the help of Professor G. T. Hefter (Australia) and Dr. S. I. Sinegubova (Russia) who provided copies of several of the articles reviewed in this volume.

1.4 References for the Preface

[1] R. C. Reid, J. M. Prauznitz, and B. E. Poling, *The Properties of Gases and Liquids*, 4th ed. (McGraw-Hill, New York, 1987).
[2] R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).
[3] V. F. Alekseev, Zh. Fiz.-Khim. Ova **8**, 249 (1876).
[4] V. Rothmund, Z. Phys. Chem. **26**, 433 (1898).
[5] J. Timmermans, Z. Phys. Chem. **58**, 129 (1907).
[6] D. Shaw, A. Skrzecz, J. W. Lorimer, and A. Maczynski, *Alcohols with Hydrocarbons*, Vol. 56 of the Solubility Data Series (Oxford University Press, Oxford, 1994).
[7] V. P. Sazonov, Zh. Obshch. Khim. **42**, 1884 (1972).

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2. Introduction to the Solubility Data Series Solubility of Liquids in Liquids

2.1. The Nature of the Project

The Solubility Data project (SDP) has as its aim a comprehensive review of published data for solubilities of gases, liquids, and solids in liquids or solids. Data of suitable precision are compiled for each publication on data sheets in a uniform format. The data for each system are evaluated and,

where data from independent sources agree sufficiently, recommended values are proposed. The evaluation sheets, recommended values, and compiled data sheets are published on consecutive pages.

This series is concerned primarily with liquid–liquid systems, but a limited number or related solid–liquid, fluid–fluid, and multicomponent (organic-water-salt) systems are included where it is considered logical and appropriate. Solubilities at elevated and low temperatures and at elevated pressures have also been included, as it is considered inappropriate to establish artificial limits on the data presented if they are considered relevant or useful.

For some systems, the two components may be miscible in all proportions at certain temperatures and pressures. Data on reported miscibility gaps and upper and lower critical solution temperatures are included where appropriate and when available.

2.2. Compilations and Evaluations

The formats for the compilations and critical evaluations have been standardized for all volumes. A description of these formats follows.

2.2.1. Compilations

The format used for the compilations is, for the most part, self-explanatory. A compilation sheet is divided into boxes, with detailed contents described below.

Components

Each component is listed according to IUPAC name, formula, and Chemical Abstracts (CA) Registry Number. The Chemical Abstracts name is also included if this differs from the IUPAC name, as are trivial names if appropriate IUPAC and common names are cross-referenced to Chemical Abstracts names in the System Index.

The formula is given either in terms of the IUPAC or Hill[1] system and the choice of formula is governed by what is usual for most current users: i.e., IUPAC for inorganic compounds, and Hill system for organic compounds. Components are ordered on a given compilation sheet according to:

(a) saturating components;

(b) nonsaturating components in alphanumerical order;

(c) solvents in alphanumerical order.

The saturating components are arranged in order according to the IUPAC 18-column periodic table with two additional rows:

Columns 1 and 2: H, alkali elements, ammonium, alkaline earth elements

Columns 3 to 12: transition elements

Columns 13 to 17: boron, carbon, nitrogen groups; chalcogenides, halogens

Column 18: noble gases

Row 1: Ce to Lu

Row 2: Th to the end of the known elements, in order of atomic number.

Organic compounds within each Hill formula are ordered in the following succession:

(a) by degree of unsaturation

(b) by order of increasing chain length in the parent hydrocarbon

(c) by order of increasing chain length of hydrocarbon branches

(d) numerically by position of unsaturation

(e) numerically by position by substitution

(f) alphabetically by IUPAC name.

Example:

C_5H_8	cyclopentane
	2-methyl-1,3-butadiene
	1,4-pentadiene
	1-pentyne
C_5H_{10}	cyclopentane
	3-methyl-l-butene
	2-methyl-2-butene
	1-pentene
	2-pentene
C_5H_{12}	2,2-dimethylpropane
	2-methylbutane
	pentane
$C_5H_{12}O$	2,2-dimethyl-l-propanol
	2-methyl-l-butanol
	2-methyl-2-butanol
	3-methyl-l-butanol
	3-methyl-2-butanol
	1-pentanol
	2-pentanol
	3-pentanol
$C_6H_{12}O$	cyclohexanol
	4-methyl-l-penten-3-ol
	1-hexen-3-ol
	4-hexen-3-ol

Deuterated (^2H) compounds follow immediately the corresponding H compounds.

Original Measurements

References are abbreviated in the forms given by Chemical Abstracts Service Source Index (CASSI). Names originally in other than Roman alphabets are given as transliterated by Chemical Abstracts. In the case of multiple entries (for example, translations) an asterisk indicated the publication used for compilation of the data.

Variables

Ranges of temperature, pressure, etc., are indicated here.

Prepared by

The names of all compilers are given here.

Experimental Data

Components are described as (1), (2), etc., as defined in the "Components" box. Data are reported in the units used in the original publication, with the exception that modern names for units and quantities are used; e.g., mass percent for weight percent; mol dm^{-3} for molar; etc. In most cases, both mass and molar values are given. Usually, only one type of value (e.g., mass percent) is found in the original paper, and the compiler has added the other type of value (e.g., mole percent) from computer calculations based on 1989 atomic weights.[2] Temperatures are expressed as t/°C, t/°F or T/K as in the original; if necessary, conversions to T/K are made, sometimes in the compilations, and always in the critical evaluation. However, the author's units are expressed according to IUPAC recommendations[3] as far as possible.

Errors in calculations, fitting equations, etc., are noted, and where possible corrected. Material inserted by the compiler is identified by the word "compiler" or by the compiler's name in parentheses or in a footnote. In addition, compiler-calculated values of mole or mass fractions are included if the original data do not use these units. If densities are reported in the original paper, conversions from concentrations to mole fractions are included, but otherwise this is done in the evaluation, with the values and sources of the densities being quoted and referenced.

Details of smoothing equations (with limits) are included if they are present in the original publication and if the temperature or pressure ranges are wide enough to justify this procedure and if the compiler finds that the equations are consistent with the data.

The precision of the original data is preserved when derived quantities are calculated, if necessary by the inclusion of one additional significant figure. In some cases graphs have been included, either to illustrate presented data more clearly, or if this is the only information in the original. Full grids are not usually inserted as it is not intended that users should read data from the graphs.

Method

The apparatus and procedure are mentioned briefly. Abbreviations used in Chemical Abstracts are often used here to save space, reference being made to sources of further detail if these are cited in the original paper.

Source and Purity of Materials

For each component, referred to as (1), (2), etc., the following information (in this order and an abbreviated form) is provided if available in the original paper: source and specified method of preparation; properties; degree of purity.

Estimated Error

If estimated errors were omitted by the original authors, and if relevant information is available, the compilers have attempted to estimate errors (identified by "compiler" or the compiler's name in parentheses or in a footnote) from the internal consistency of data and type of apparatus used. Methods used by the compilers for estimating and reporting errors are based on Ku and Eisenhart.[4]

Comments and/or Additional Data

Many compilations include this section which provides short comments relevant to the general nature of the work or additional experimental and thermodynamic data which are judged by the compiler to be of value to the reader.

References

The format for these follows the format for the Original Measurements box, except that final page numbers are omitted. References (usually cited in the original paper) are given where relevant to interpretation of the compiled data, or where cross-reference can be made to other compilations.

2.2.2. Evaluations

The evaluator's task is to assess the reliability and quality of the data, to estimate errors where necessary, and to recommend "best" values. The evaluation takes the form of a summary in which all the data supplied by the compiler have been critically reviewed. There are only three boxes on a typical evaluation sheet, and these are described below.

Components

The format is the same as on the Compilation sheets.

Evaluator

The name and affiliation of the evaluator(s) and date up to which the literature was checked.

Critical Evaluation

(a) Critical text. The evaluator checks that the compiled data are correct, assesses their reliability and quality, estimates errors where necessary, and recommends numerical values based on all the published data (including theses, reports and patents) for each given system. Thus, the evaluator reviews the merits or shortcomings of the various data. Only published data are considered. Documented rejection of some published data may occur at this stage, and the corresponding compilations may be removed.

The solubility of comparatively few systems is known with sufficient accuracy to enable a set of recommended values to be presented. Although many systems have been studied by at least two workers, the range of temperatures is often sufficiently different to make meaningful comparison impossible.

Occasionally, it is not clear why two groups of workers obtained very different but internally consistent sets of results at the same temperature, although both sets of results were obtained by reliable methods. In such cases, as a de-

finitive assessment may not be possible. In some cases, two or more sets of data have been classified as tentative even though the sets are mutually inconsistent.

(b) Fitting equations. If the use of a smoothing equation is justifiable the evaluator may provide an equation representing the solubility as a function of the variables reported on all the compilation sheets, stating the limits within which it should be used.

(c) Graphical summary. In addition to (b) above, graphical summaries are often given.

(d) Recommended values. Data are recommended if the results of at least two independent groups are available and they are in good agreement, and if the evaluator has no doubt as to the adequacy and reliability of the applied experimental and computational procedures. Data are reported as tentative if only one set of measurements is available, or if the evaluator considers some aspect of the computational or experimental method as mildly undesirable but estimated that it should cause only minor errors. Data are considered as doubtful if the evaluator considers some aspect of the computational or experimental method as undesirable but still considers the data to have some value where the order of magnitude of the solubility is needed. Data determined by an inadequate method or under ill-defined conditions are rejected. However, references to these data are included in the evaluation together with a comment by the evaluator as to the reason for their rejection.

(e) References. All pertinent references are given here, including all those publications appearing in the accompanying compilation sheets and those which, by virtue of their poor precision, have been rejected and not compiled.

(f) Units. While the original data may be reported in the units used by the investigators, the final recommended values are reported in SI units[3] when the data can be converted accurately.

2.3. Quantities and Units Used in Compilation and Evaluation of Solubility Data

2.3.1. Mixtures, Solutions and Solubilities

A *mixture*[5,6] describes a gaseous, liquid or solid phase containing more than one substance, where the substances are all treated in the same way.

A *solution*[5,6] describes a liquid or solid phase containing more than one substance, when for convenience one of the substances, which is called the *solvent*, and may itself be a mixture, is treated differently than the other substances, which are called *solutes*. If the sum of the mole fraction of the solutes is small compared to unity, the solution is called a *dilute solution*.

The *solubility* of a solute 1 (solid, liquid or gas) is the analytical composition of a saturated solution, expressed in terms of the proportion of the designated solute in a designated solvent.[7]

"Saturated" implies equilibrium with respect to the processes of dissolution and demixing; the equilibrium may be stable or metastable. The solubility of a substance in metastable equilibrium is usually greater than that of the same substance in stable equilibrium. (Strictly speaking, it is the activity of the substance in metastable equilibrium that is greater.) Care must be taken to distinguish true metastability form supersaturation, where equilibrium does not exist.

Either point of view, mixture or solution, may be taken in describing solubility. The two points of view find their expression in the reference states used for definition of activities, activity coefficients and osmotic coefficients. Note that the composition of a saturated mixture (or solution) can be described in terms of any suitable set of thermodynamic components.

2.3.2. Physicochemical Quantities and Units

Solubilities of solids have been the subject of research for a long time, and have been expressed in a great many ways, as described below. In each case, specification of the temperature and either partial or total pressure of the saturating gaseous component is necessary. The nomenclature and units follow, where possible, IUPAC Green Book.[3] A few quantities follow the ISO standards[8] or the German standard;[9] see a review by Cvitas[10] for details.

A note on nomenclature

The nomenclature of the IUPAC *Green Book*[3] calls the solute component B and the solvent component A. In compilations and evaluations, the first-named component (component 1) is the solute, and the second (component 2 for a two-component system) is the solvent. The reader should bear these distinctions in nomenclature in mind when comparing equations given here with those in the *Green Book*.

1. *Mole fraction* of substance 1, x_1 or x (1) (condensed phases), y_1 (gases):

$$x_1 = n_1 \Big/ \sum_{s=1}^{c} n_s \tag{1}$$

where n_s is the amount of substance of s, and c is the number of distinct substances present (often the number of thermodynamic components in the system). *Mole percent* of substance 1 is $100\,x_1$.

2. *Ionic mole fractions* of salt i, x_{i+}, x_{i-}: For a mixture of s binary salts i, each of which ionizes completely into υ_{s+} cations and υ_{s-} anions, with $\upsilon_s = \upsilon_{s+} + \upsilon_{s-}$ and a mixture of p nonelectrolytes j, of which some may be solvent components, a generalization of the definition in Ref. 11 gives

$$x_{i+} = \frac{\upsilon_i + x_i}{1 + \sum_{i=1}^{s} (\upsilon_i - 1) x_s}, \quad x_{i-} = \frac{\upsilon_{i-} x_{i+}}{\upsilon_{i+}} \quad i = 1 \ldots s \tag{2}$$

$$x'_j = \frac{x_j}{1 + \sum_{i=1}^{s} (\upsilon_i - 1) x_i}, \quad j = (s+1), \ldots, p. \tag{3}$$

The sum of these mole fractions is unity, so that, with $c=s+p$,

$$\sum_{i=1}^{s}(x_{i+}+x_{i-})+\sum_{i=s+1}^{c}x_i'=1. \quad (4)$$

General conversions to other units in multicomponent systems are complicated. For a three-component system containing nonelectrolyte 1, electrolyte 2 and solvent 3,

$$x_1=\frac{v_{2+}x_1'}{v_{2+}-(v_2-1)x_{2+}},\quad x_2=\frac{x_{2+}}{v_{2+}-(v_2-1)x_{2+}}. \quad (5)$$

These relations are used in solubility equations for salts, and for tabulation of salt effects on solubilities of gases (see below).

3. *Mass fraction* of substance 1, w_1 or $w(1)$:

$$w_1=g_1\Big/\sum_{s=1}^{c}g_s \quad (6)$$

where g_s is the mass of substance s. *Mass percent* of substance 1 is 100 w_1. The equivalent terms *weight fraction, weight percent* and *g(1)/100 g solution* are no longer used.

4. *Molality* of solute 1 in a solvent 2, m_1:

$$m_1=n_1/n_2M_2 \quad (7)$$

SI base units: mol kg^{-1}. Here, M_2 is the molar mass of the solvent.

5. *Aquamolality, Solvomolality* of substance 1 in a mixed solvent with components, 2, 3,[12] $m_1^{(3)}$:

$$m_1^{(3)}=m_1\bar{M}/M_3 \quad (8)$$

SI base units: mol kg^{-1}. Here, the average molar mass of the solvent is

$$\bar{M}=x_2'M_2+(1-x_2')M_3 \quad (9)$$

and x_2' is the solvent mole fraction of component 2. This term is used most frequently in discussing comparative solubilities in water (component 2) and heavy water (component 3) and in their mixtures.

6. *Amount concentration* if solute 1 in a solution of volume V, c_1:

$$c_1=[\text{formula of solute}]=n_1/V \quad (10)$$

SI base units: mol m^{-3}. The symbol c_1 is preferred to [formula of solute], but both are used. The old terms *molarity, molar* and *moles per unit volume* are no longer used.

7. *Mass concentration* of solute 1 in a solution of volume V, SI ρ_1: base units: kg m^{-3}.

$$\rho_1=g_1/V. \quad (11)$$

8. *Mole ratio*, $r_{A,B}$ (dimensionless)[10]

$$r_{A,B}=n_1/n_2. \quad (12)$$

Mass ratio, symbol $\zeta_{A,B}$, may be defined analogously.[10]

Mole and mass fractions are appropriate to either the mixture or the solution point of view. The other quantities are appropriate to the solution point of view only. Conversions between pairs of these quantities can be carried out using the equations given in Table 1 at the end of this Introduction. Other useful quantities will be defined in the prefaces to individual volumes or on specific data sheets.

9. *Density*, ρ:

$$\rho=g/V \quad (13)$$

SI base units: kg m^{-3}. Here g is the total mass of the system.

10. *Relative density*, $d=\rho/\rho^\circ$: the ratio of the density of a mixture at temperature t, pressure p to the density of a reference substance at temperature t', pressure p'. For liquid solutions, the reference substance is often water at 4 °C, 1 bar. (In some cases 1 atm is used instead of 1 bar.) The term *specific gravity* is no longer used.

Thermodynamics of Solubility

Thermodynamic analysis of solubility phenomena provides a rational basis for the construction of functions to represent solubility data, and thus aids in evaluation, and sometimes enables thermodynamic quantities to be extracted. Both these aims are often difficult to achieve because of a lack of experimental or theoretical activity coefficients. Where thermodynamic quantities can be found, they are not evaluated critically, since this task would involve examination of a large body of data that is not directly relevant to solubility. Where possible, procedures for evaluation are based on established thermodynamic methods. Specific procedures used in a particular volume will be described in the Preface to this volume.

2.4. References for the Introduction

[1] E. A. Hill, J. Am. Chem. Soc. **22**, 478 (1990).

[2] IUPAC Commission on Atomic Weights and Isotopic Abundances, Pure Appl. Chem. **63**, 975 (1980).

[3] I. Mills *et al.*, eds., *Quantities, Units and Symbols in Physical Chemistry* (The Green Book). (Blackwell Scientific Publications, Oxford, UK, 1993).

[4] H. H. Ku, p. 73; C. Eisenhart, p. 69; in H. H. Ku, ed., Precision Measurement and Calibration, *NBS Special Publication 300*, Vol. 1 (Washington, 1969).

[5] J. Regaudy and S. P. Klesney, *Nomenclature of Organic Chemistry* (IUPAC) (The Blue Book) (Pergamon, Oxford, 1979).

[6] V. Gold *et al.*, eds., *Compendium of Chemical Technology* (The Gold Book) (Blackwell Scientific Publications, Oxford, UK, 1987).

[7] H. Freiser and G. H. Nancollas, eds., *Compendium of Analytical Nomenclature* (The Orange Book) (The Blackwell Scientific Publications, Oxford, UK, 1987), Sect. 9.1.8.

[8] ISO Standards Handbook, *Quantities and Units* (International Standards Organization, Geneva, 1993).

[9] German Standard, DIN 1310, *Zusammungsetzung von Mischphasen* (Beuth Verlag, Berlin, 1984).

[10] T. Cvitaŝ, Chem. Int. **17**, 123 (1995).

[11] R. A. Robinson and R. H. Stokes, *Electroyte Solutions* (Butterworths, London, 1959), 2nd ed.

[12] J. W. Lorimer, R. Cohen-Adad, and J. W. Lorimer, *Alkali Metal and Ammonium Chlorides in Water and Heavy Water (Binary Systems)*, IUPAC Solubility Data Series, Vol. 47 (Pergamon, Oxford, UK, 1991), p. 495.

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December, 1995

TABLE 1. Interconversions between quantities used as measures of solubilities c-component systems containing c-1 solutes i and single solvent c (ρ—density of solution; M_i—molar masses of i. For relations for two-component systems, set summations to 0.)

	x_i	w_i	m_i	c_i
$x_i=$	x_i	$\dfrac{1}{1+\dfrac{M_i}{M_c}\left\{\dfrac{1}{w_i}-1+\sum\limits_{j\neq 1}^{c-1}\left(\dfrac{M_c}{M_j}-1\right)\dfrac{w_j}{w_i}\right\}}$	$\dfrac{1}{1+\dfrac{1}{m_iM_c}+\sum\limits_{j\neq i}^{c-1}\dfrac{m_j}{m_i}}$	$\dfrac{1}{1+\dfrac{1}{M_c}\left(\dfrac{\rho}{c_i}-M_i\right)+\sum\limits_{j\neq i}^{c-1}\dfrac{c_j}{c_i}\left(1-\dfrac{M_j}{M_c}\right)}$
$w_i=$	$\dfrac{1}{1+\dfrac{M_c}{M_i}\left\{\dfrac{1}{x_i}-1+\sum\limits_{j\neq i}^{c-1}\left(\dfrac{M_j}{M_c}-1\right)\dfrac{x_j}{x_i}\right\}}$	w_i	$\dfrac{1}{1+\dfrac{1}{m_iM_i}\left(1+\sum\limits_{j\neq i}^{c-1}m_jM_j\right)}$	$\dfrac{c_iM_i}{\rho}$
$m_i=$	$\dfrac{1}{M_c\left(\dfrac{1}{x_i}-1-\sum\limits_{j\neq i}^{c-1}\dfrac{x_j}{x_i}\right)}$	$\dfrac{1}{M_i\left(\dfrac{1}{w_i}-1-\sum\limits_{j\neq i}^{c-1}\dfrac{w_j}{w_i}\right)}$	m_i	$\dfrac{1}{\dfrac{1}{c_i}\left(\rho-\sum\limits_{j\neq i}^{c-1}c_jM_j\right)-M_i}$
$c_i=$	$\dfrac{\rho}{M_i+M_c\left\{\dfrac{1}{x_i}-1+\sum\limits_{j\neq i}^{c-1}\left(\dfrac{M_j}{M_c}-1\right)\dfrac{x_j}{x_i}\right\}}$	$\dfrac{\rho w_i}{M_i}$	$\dfrac{\rho}{\dfrac{1}{m_i}\left(1+\sum\limits_{j\neq i}^{c-1}m_jM_j\right)+M_j}$	c_i

3. Ternary Systems Nitromethane+Water+Inorganic Compound

3.1. + Argon

Components:
(1) Nitromethane; CH_3NO_2 ; [75-52-5]
(2) Argon; Ar; [7440-37-1]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
H. L. Friedman, J. Am. Chem. Soc. **76**, 3294–7 (1954).

Variables:
T/K=298

Prepared By:
V. P. Sazonov

Experimental Data

Solubility of argon in mixtures of nitromethane and water

Solvent	t/°C	T/K (compiler)	Ostwald solubility coefficients (L) Experiment	Avg.
H_2O	24.85	298.00	0.0342, 0.0338	0.0340
H_2O saturated with CH_3NO_2[a]	24.85	298.00	0.0317, 0.0317	0.0317
CH_3NO_2 saturated with H_2O[a]	24.85	298.00	0.139, 0.141	0.140
CH_3NO_2	24.85	298.00	0.138, 0.146, 0.146	0.143[b]

[a] Composition of water saturated nitromethane and nitromethane-saturated water solutions not specified.
[b]Recorded as 0.145 on original. Value corrected by compiler.

Auxiliary Information

Method/Apparatus/Procedure:
The method was essentially that employed by Eucken and Herzberg.[1] The solvent was degassed by alternately opening to the vacuum pump for 5–15 s and then stirring very rapidly to produce cavitation. This was repeated 5–10 times. In the solubility measurement itself, gas which had been previously saturated with solvent vapor, was admitted to the saturation, vessel, holding about 80 mL of solution and with 5–10 mL remaining space, and volume–time measurements were taken and extrapolated back to the time the gas was admitted. Then the stirrer was turned on and driven very fast, producing a slightly (~1%) supersaturated solution. The approach to equilibrium was then followed from each direction while stirring as rapidly as possible without producing cavitation and bubbles.

Source and Purity of Materials:
(1) Source not specified; purity not specified; redistilled and dried by filtering at −20 °C.
(2) Linde Air Products; spectro grade.
(3) Conductivity water.

Estimated Error:
Solubility: relative error of 2–3 determinations less than 3%.

References:
[1]A. Eucken and C. Herzberg, Z. Phys. Chem. (Leipzig) **195**, 1 (1950).

3.2. + Cadmium Iodide

Components:
(1) Nitromethane; CH_3NO_2 ; [75-52-5]
(2) Cadmium iodide; CdI_2 ; [7790-80-9]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
J. Timmermans, Z. Phys. Chem. **58**, 129–213 (1907).

Variables:
T/K=325–345

Prepared By:
V. P. Sazonov

Experimental Data

Solubility temperatures of liquid phases

t/°C	T/K (compiler)	w_1	w_2	x_1 (compiler)	x_2 (compiler)
51.7	324.9	0.354	0.458	0.332	0.072
61.4	334.6	0.404	0.383	0.339	0.054
66.2	339.4	0.429	0.345	0.342	0.046
70.4	343.6	0.459	0.298	0.345	0.037
72.2	345.4	0.467	0.286	0.346	0.035
64.0	337.2	0.246	0.440	0.178	0.053

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method was used. Initial mixtures were prepared by weighing. Tests were carried out in tubes with glass stoppers. These tubes were fixed with a rubber ring into a water bath.

Source and Purity of Materials:
(1) Source not specified; fractionally distilled.
(2) Not specified.
(3) Distilled.

Estimated Error:
Composition: about 1%, Temperature: ±0.1 K.

3.3. + Helium

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Helium; He; [7440-59-7]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
H. L. Friedman, J. Am. Chem. Soc. **76**, 3294–7 (1954).

Variables:
T/K=298

Prepared By:
V. P. Sazonov

Experimental Data

Solubility of helium in mixtures of nitromethane and water

Solvent	t/°C	T/K (compiler)	Ostwald solubility coefficients (L) Experiment	Avg.
H_2O	24.85	298.00	0.0091, 0.0093, 0.0096	0.0093
H_2O saturated with CH_3NO_2[a]	24.85	298.00	0.0089, 0.0084, 0.0092	0.0088
CH_3NO_2 saturated with H_2O[a]	24.85	298.00	0.0170, 0.0163	0.0167
CH_3NO_2	24.85	298.00	0.0169, 0.0176, 0.0177	0.0174

[a] Composition of water saturated nitromethane and nitromethane saturated water solutions not specified.

Auxiliary Information

Method/Apparatus/Procedure:
The method was essentially that employed by Eucken and Herzberg.[1] The solvent was degassed by alternately opening to the vacuum pump for 5–15 s and then stirring very rapidly to produce cavitation. This was repeated 5–10 times. In the solubility measurement itself, gas which had been previously saturated with solvent vapor, was admitted to the saturation vessel, holding about 80 mL of solution, and with 5–10 mL remaining space, and volume–time measurements were taken and extrapolated back to the time the gas was admitted. Then the stirrer was turned on and driven very fast, producing a slightly (~1%) supersaturated solution. The approach to equilibrium was then followed from each direction while stirring as rapidly as possible without producing cavitation and bubbles.

Source and Purity of Materials:
(1) Source not specified; purity not specified; redistilled and dried by filtering at −20 °C.
(2) Air Reduction Co.; purity 99.8%.
(3) Conductivity water.

Estimated Error:
Solubility: relative error of 2–3 determinations less than 3%.

References:
[1]A. Eucken and C. Herzberg, Z. Phys. Chem. (Leipzig) **195**, 1 (1950).

3.4. + Hydrogen Peroxide

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Hydrogen peroxide; H_2O_2; [7722-84-1]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
V. G. Tsvetkov, B. V. Klimin, and I. B. Rabinovich, Tr. Khim. Khim. Tekhnol. (Gor'kii) **41**, 16–7 (1975).

Variables:
T/K=233–375

Prepared By:
V. P. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant content of nitromethane, respectively 0.5 mole fractions. The data are also presented in graphical form.

Solubility temperatures of the liquid phases*

t/°C	T/K (compiler)	x_1	x_2	w_1 (compiler)	w_2 (compiler)
−40.0	233.2	0.500	0.500	0.642	0.358
10.4	283.6	0.500	0.373	0.671	0.278
36.0	309.2	0.500	0.300	0.689	0.230
64.7	337.9	0.500	0.200	0.714	0.159
90.8	364.0	0.500	0.100	0.742	0.083
102.2	375.4	0.500	0.000	0.772	0.000

* These data were extracted graphically by the compiler.

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method was used. No experimental details given.

Source and Purity of Materials:
(1) Source not specified; dried and distilled.
(2) Source not specified; concentrated and analyzed according to Schumb *et al.*[1]
(3) Distilled.

Estimated Error:
Temperature: ± 0.1 K.

References:
[1]W. C. Schumb, C. N. Satterfield, and R. L. Wentworth, *Hydrogen Peroxide* (Reinhold, New York, 1955).

3.5. + Nitric Acid

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Nitric acid; HNO_3; [7697-37-2]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
R. K. Warner, Aust. J. Appl. Sci. **4**, 427–43 (1953).

Variables:
T/K=293

Prepared By:
V. P. Sazonov

Experimental Data

Nitric acid distribution between nitromethane-rich and water-rich phases

t/°C	T/K	w_2 Water-rich phase	w_2 Nitromethane-rich phase
20.0	293.2	0.140	0.005
		0.197	0.016
		0.258	0.050
		0.277	0.075
		0.286	0.103
		0.292	0.136
		0.286	0.160
		0.260	0.177
		0.195	0.195[a]

[a] System completely miscible.

Auxiliary Information

Method/Apparatus/Procedure:
The analytical method was used. The distribution of (2) between (1) and (3) was studied by preparing a mixture of aqueous nitric acid and nitromethane, such that after mixing the two phases were almost identical in composition. An extremely slow rate of phase separation of approximately equal volumes of each phase indicated this. Nitric acid (15 N) was added dropwise to the system and agitated until the system just became homogeneous. This condition was taken as the plait point and the termination of the distribution curve. The single-phase system was analyzed for nitric acid and the remaining points on the curve were obtained by adding successively increasing amounts of water to the system remaining after equilibration and analysis of the two phases from the previous determination. Nitric acid was determined in both phases by dilution of weighed aliquots with 100–150 mL of water and titration with 0.1 N potassium hydroxide to the methyl orange end point.

Source and Purity of Materials:
(1) Source not specified; purity not specified; distilled.
(2) Not specified.
(3) Redistilled.

Estimated Error:
Temperature: control to ± 0.1 K.

3.6. + Sulfur Hexafluoride

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Sulfur hexafluoride; SF_6; [2551-62-4]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
H. L. Friedman, J. Am. Chem. Soc. **76**, 3294–7 (1954).

Variables:
T/K=298

Prepared By:
V. P. Sazonov

Experimental Data

Solubility of sulfur fluoride in mixtures of nitromethane and water

Solvent	t/°C	T/K (compiler)	Ostwald solubility coefficients (L) Experiment	Avg.
H_2O	24.85	298.00	0.0054, 0.0053, 0.0055, 0.0058	0.0055
H_2O saturated with CH_3NO_2[a]	24.85	298.00	0.0058, 0.0053	0.0055
CH_3NO_2	24.85	298.00	0.374, 0.380	0.377

[a] Composition of water saturated nitromethane solution not specified.

Auxiliary Information

Method/Apparatus/Procedure:
The method was essentially that employed by Eucken and Herzberg.[1] The solvent was degassed by alternately opening to the vacuum pump for 5–15 s and then stirring very rapidly to produce cavitation. This was repeated 5–10 times. In the solubility measurement itself, gas which had been previously saturated with solvent vapor, was admitted to the saturation vessel, holding about 80 mL of soln., and with 5–10 mL remaining space, and volume–time measurements were taken and extrapolated back to the time the gas was admitted. Then the stirrer was turned on and driven very fast, producing a slightly (~1%) supersaturated solution. The approach to equilibrium was then followed from each direction while stirring as rapidly as possible without producing cavitation and bubbles.

Source and Purity of Materials:
(1) Source not specified; purity not specified; redistilled and dried by filtering at −20 °C.
(2) Matheson; purified from a more volatile impurity by fractional condensation at −190 °C.
(3) Conductivity water.

Estimated Error:
Solubility: relative error of 2–3 determinations less than 3%.

References:
[1] A. Eucken and C. Herzberg, Z. Phys. Chem. (Leipzig) **195**, 1 (1950).

3.7. + Thorium Nitrate Tetrahydrate

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Thorium nitrate tetrahydrate; $Th(NO_3)_4 \cdot 4H_2O$; [13470-07-0]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
R. K. Warner, Aust. J. Appl. Sci. **4**, 427–43 (1953).

Variables:
T/K = 293

Prepared By:
V. P. Sazonov

Experimental Data

Thorium nitrate distribution between nitromethane-rich and water-rich phases

t/°C	T/K	w_2 Water-rich phase	w_2 Nitromethane-rich phase
20.0	293.2	0.218	0.0002
		0.345	0.0004
		0.501	0.0012
		0.552	0.0047
		0.566	0.0049
		0.596	0.0072
		0.629	0.0109
		0.645	0.0133[a]

[a] System saturated with $Th(NO_3)_4 \cdot 4H_2O$.

Auxiliary Information

Method/Apparatus/Procedure:
The analytical method was used. The equilibrium procedure for determining the distribution curve has been reported in Warner.[1] To obtain the final point on each curve, the system was saturated with (2) by agitation in the presence of excess solid for periods up to 8–10 h before sampling. After sampling each phase, the system stood overnight at 20 °C. The following day the system was intermittently agitated for a further 2 h and the phases analyzed for (2) content to ensure saturation had been reached. The thorium concentration was determined by evaporation of weighed aliquots, followed by ignition to thorium dioxide.

Source and Purity of Materials:
(1) Source not specified; purity not specified; distilled.
(2) New Metals and Chemicals; pure grade; free of sulfate; ignition to thorium dioxide gave 47.67%.
(3) Redistilled.

Estimated Error:
Temperature: control to ± 0.1 K.

References:
[1] R. K. Warner, Aust. J. Appl. Sci. **3**, 156 (1952).

3.8. + Uranyl Nitrate Hexahydrate

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Uranyl nitrate hexahydrate; $UO_2(NO_3)_2 \cdot 6H_2O$; [13520-83-7]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
R. K. Warner, Aust. J. Appl. Sci. **4**, 427–43 (1953).

Variables:
T/K = 293

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Uranyl nitrate distribution between nitromethane-rich and water-rich phases

t/°C	T/K	w_2 Water-rich phase	w_2 Nitromethane-rich phase
20.0	293.2	0.333	0.003
		0.414	0.012
		0.453	0.026
		0.513	0.083
		0.538	0.132[a]

TABLE 2. Effect of ammonium nitrate on distribution of uranyl nitrate between nitromethane-rich and water-rich phases

t/°C	T/K	w_2 Water-rich phase[a]	w_2 Nitromethane-rich phase[a]
20.0	293.2	0.060	0.012
		0.137	0.025
		0.278	0.064
		0.381	0.122
		0.468	0.215
		0.470	0.221[b]

[a] Saturated with ammonium nitrate.
[b] All systems saturated with $UO_2(NO_3)_2 \cdot 6H_2O$.

TABLE 3. Effect of nitric acid concentration on distribution of uranyl nitrate between nitromethane-rich and water-rich phases at 20 °C

Initial mixture	w_2 Water-rich phase	w_2 Nitromethane-rich phase	Remarks
10 mL water + 10 mL CH_3NO_2	0.538	0.132[a]	two liquid phases
10 mL 1.0 N HNO_3 + 10 mL CH_3NO_2	0.513	0.150[a]	two liquid phases
10 mL 2.5 N HNO_3 + 10 mL CH_3NO_2	0.485	0.181[a]	two liquid phases
10 mL 5.0 N HNO_3 + 10 mL CH_3NO_2	0.425	0.255[a]	two liquid phases
10 mL 10 N HNO_3 + 10 mL CH_3NO_2	—	0.354[a]	one liquid phase
10 mL 15 N HNO_3 + 10 mL CH_3NO_2	—	0.407[a]	one liquid phase

[a] All systems saturated with $UO_2(NO_3)_2 \cdot 6H_2O$.

Auxiliary Information

Method/Apparatus/Procedure:

The analytical method was used. The equilibrium procedure for determining the equilibrium distribution curve has been reported in Warner.[1] To obtain the final point on each curve, the system was saturated with by (2) agitation, in the presence of excess solid for periods of 8–10 h before sampling. After sampling each phase, the system was allowed to stand overnight at 20 °C. The following day the system was intermittently agitated for a further 2 h and the phases analyzed for (2) content to ensure saturation had been reached. The effect of nitric acid concentration on the distribution of uranyl nitrate between nitromethane and aqueous nitric acid was studied by adding equal volumes of pure solvent and aqueous nitric acid solution to excess uranyl nitrate hexahydrate crystals. The uranium concentrations were determined by evaporation of weighed aliquots, followed by ignition to uranouranic oxide.

Source and Purity of Materials:

(1) Source not specified; purity not specified; distilled.
(2) Source not specified; purity not specified; purified as described in Warner.[1]
(3) Redistilled.

Estimated Error:

Temperature: control to ± 0.1 K.

References:

[1]R. K. Warner, Aust. J. Appl. Sci. **3**, 156 (1952).

4. Ternary Systems Nitromethane+Two Inorganic Compounds

4.1. + Hydrocyanic Acid + Tetrachloromethane

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Hydrocyanic acid; CHN; [74-90-8]
(3) Tetrachloromethane; CCl_4; [56-23-5]

Original Measurements:

A. W. Francis, J. Phys. Chem. **63**, 753–5 (1959).

Variables:

T/K = 298

Prepared By:

V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, hydrocyanic acid and tetrachloromethane*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
25	298	0.0	0.231	0.0	0.050
		0.181	0.212	0.100	0.052
		0.324	0.197	0.200	0.054
		0.440	0.185	0.300	0.056
		0.536	0.176	0.400	0.058
		0.616	0.170	0.500	0.061
		0.628	0.250	0.600	0.106
		0.482	0.474	0.600	0.261
		0.353	0.614	0.500	0.385
		0.253	0.724	0.400	0.508
		0.170	0.817	0.300	0.640
		0.104	0.886	0.200	0.753
		0.048	0.945	0.100	0.864
		0.0	0.996	0.0	0.975

* This table was prepared, by the compiler, from the published solubility curve of ternary system.

Auxiliary Information

Method/Apparatus/Procedure:

Probably the titration method was used. Samples of hydrogen cyanide were taken by a 1 mL graduated pipette connected to a propipette, and mixed with other liquids in a small graduated glass stoppered tubes which could be shaken for equilibrium studies. A tube was sealed, weighed, shaken, then cooled, reopened, more reagent added and resealed, etc.

Source and Purity of Materials:

(1) Not specified.
(2) Distilled from a cylinder and condensed in a large tube in an ice-bath, kept at 0 °C in a glass stoppered vessel; boiling point = 26 °C.
(3) Not specified.

Estimated Error:

Not specified.

5. Ternary Systems Nitromethane+Water+Organic Compound

5.1. +Formic Acid

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Formic acid; CH_2O_2; [64-18-6]
(3) Water; H_2O; [7732-18-5]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+formic acid+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+formic acid+water

Author(s)	T/K	Type of data[a]
Zhuravlev and Maslovskaya[1]	293	Solubility curve (22)
Maslovskaya[2]	293	Equilibrium (8)
	313	Solubility curve (17), equilibrium (7)

[a] Number of experimental points in parentheses.

Solubility curve

The system nitromethane+formic acid+water forms a miscibility gap of Type I, Treybal.[3] Only one binary pair of components, nitromethane+water, is partially miscible. The data for this system were previously compiled and critically evaluated.[4] The recommended value for the solubility of nitromethane in water at 293.2 K is $x_1''=0.0345$; and at 313.2 K, $x_1''=0.0426$. The solubility of nitromethane in water at 293.2 K reported in Zhuravlev and Maslovskay[1] (0.0900 mass fraction; 0.0284 mole fraction) and at 313.2 K in Maslovskaya[2] (0.1000 mass fraction; 0.0318 mole fraction) are rejected because they are inconsistent with recommended value from Savonov *et al.*[4]

Solubility data obtained by the titration method for the ternary system nitromethane+formic acid+water were reported in two references. Data of Maslovskaya,[2] which were reported at 313.2 K, indicate a smaller miscibility gap than the data at 293.2 K reported in Zhuravlev and Maslovskay.[1] Thus, with increasing temperature the mutual solubility of the components increases, Fig. 1. The data for the nitromethane+formic acid+water system are consistent with the data for the nitromethane+acetic acid+water system measured and reported by Maslovskaya in the same paper.[2] Experimental errors were not reported, but are estimated by the evaluator to be ± 0.005 mass fractions. Solubility data at 293.2 and 313.2 K (water-rich and nitromethane-rich branches together) are described by an algebraic equation in the form:

$$x_2=a+b\cdot x_3+c\cdot(x_3)^2+d\cdot(x_3)^{1/2}+e\cdot(x_3)^{3/2}.$$

This smoothing equation gives a smaller standard deviation than any other tested equation. The equation parameters (*a,b,c,d,e*) were calculated by the least squares method and presented in Table 2. Binodal curves in this system were calculated and compared separately for solubility data reported in Zhuravlev and Maslovskay[1] and Maslovskaya.[2]

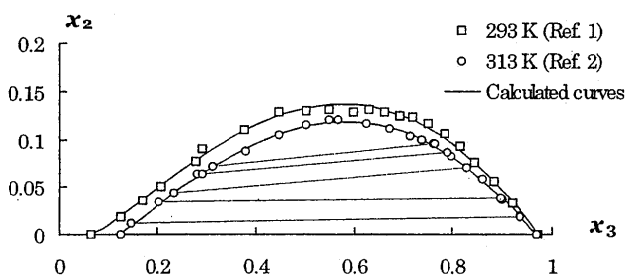

FIG. 1. Solubility curves and tie lines of the system nitromethane+formic acid+water (mole fraction).

TABLE 2. The equation parameters

T/K	a	b	c	d	e	St. dev.
293, Ref. 1	−0.024 41	−0.4811	−1.8327	0.1002	2.2184	0.0042
313, Ref. 2	−0.009 66	0.3699	−1.3482	−0.1860	1.1522	0.0020

The solubilities calculated by the proposed equation are presented in the Fig. 1 and in Table 3. Experimental solubility data, Zhuravlev and Maslovskay[1] and Maslovskaya,[2] are presented in Fig. 1 for comparison.

TABLE 3. Calculated mutual solubilities nitromethane, formic acid, and water

T/K	x_1	x_2	x_3	w_1	w_2	w_3
293.2	0.034	0.000	0.966	0.108	0.000	0.892
	0.034	0.016	0.950	0.104	0.037	0.859
	0.053	0.047	0.900	0.150	0.100	0.750
	0.105	0.095	0.800	0.254	0.174	0.572
	0.176	0.124	0.700	0.370	0.196	0.434
	0.264	0.136	0.600	0.486	0.189	0.325
	0.368	0.132	0.500	0.598	0.162	0.240
	0.585	0.115	0.400	0.769	0.114	0.117
	0.614	0.086	0.300	0.800	0.085	0.115
	0.751	0.049	0.200	0.887	0.044	0.069
	0.889	0.011	0.100	0.959	0.009	0.032
	0.938	0.000	0.062	0.981	0.000	0.019
313.2	0.043	0.000	0.957	0.131	0.000	0.869
	0.039	0.011	0.950	0.119	0.025	0.856
	0.062	0.038	0.900	0.174	0.080	0.746
	0.119	0.081	0.800	0.286	0.147	0.567
	0.192	0.108	0.700	0.400	0.170	0.430
	0.282	0.118	0.600	0.514	0.162	0.324
	0.386	0.114	0.500	0.623	0.139	0.238
	0.504	0.096	0.400	0.726	0.104	0.170
	0.633	0.067	0.300	0.820	0.065	0.115
	0.770	0.030	0.200	0.904	0.027	0.069
	0.840	0.010	0.150	0.942	0.008	0.050

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+formic acid+water were reported in Maslovskaya.[2] Composition of each phase was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of the saturation curve measurements. The tie lines at 313.2 K cover the whole range of the miscibility gap and are nearly parallel with one another and to the tie line between nitromethane and water. Data reported at 293.2 and at 313.2 K[2] are in agreement. Experimental errors were not reported in the papers, but are estimated by the evaluator to be ± 0.005 mass fractions.

Recommended or tentative data

Solubility and liquid–liquid equilibrium data measured by different methods are in agreement with one another. Experimental data on solubilities at T/K=293.2 and 313.2, Zhuravlev and Maslovskay[1] and Maslovskaya,[2] are presented in Fig. 1. The ternary solubility data,[1,2] were used to obtain equation parameters of the binodal curve.

In view of the inaccurate results obtained in Zhuravlev and Maslovskay[1] and Maslovskaya[2] for the binary nitromethane+water system, the evaluator considers the ternary system data to be tentative and concludes that new studies on the ternary system would be of value.

References:

[1]E. F. Zhuravlev and N. V. Maslovskaya, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **18**, 334 (1975); Deposited Doc., VINITI 1466 (1974).

[2]N. V. Maslovskaya, dissertation, Kalinin University, 1974.

[3]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

[4]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series. Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Formic acid; CH_2O_2; [64-18-6]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
E. F. Zhuravlev and N. V. Maslovskaya, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **18**, 334 (1975);
*Deposited Doc., VINITI 1466 (1974).

Variables:
T/K = 293

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, formic acid, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.0	293.2	0.0284	0.0000	0.0900	0.0000
		0.0469	0.0335	0.1365	0.0735
		0.0620	0.0556	0.1700	0.1150
		0.0813	0.0749	0.2100	0.1460
		0.0925	0.0927	0.2295	0.1735
		0.1081	0.1058	0.2575	0.1900
		0.1331	0.1161	0.3010	0.1980
		0.1560	0.1227	0.3380	0.2005
		0.1819	0.1244	0.3785	0.1952
		0.2090	0.1280	0.4170	0.1925
		0.2410	0.1306	0.4590	0.1876
		0.2729	0.1283	0.4995	0.1770
		0.3203	0.1314	0.5510	0.1705
		0.3688	0.1298	0.6000	0.1592
		0.4267	0.1288	0.6514	0.1483
		0.5139	0.1103	0.7258	0.1175
		0.6209	0.0901	0.8020	0.0878
		0.6462	0.0763	0.8225	0.0732
		0.7420	0.0500	0.8822	0.0448
		0.7961	0.0352	0.9125	0.0304
		0.8588	0.0181	0.9450	0.0150
		0.9353	0.0000	0.9800	0.0000

Auxiliary Information

Method/Apparatus/Procedure:
The solubility curve was determined by the titration method. No further details were reported.

Source and Purity of Materials:
(1) Source not specified, pure grade; distilled.
(2) Source not specified, pure grade; distilled.
(3) Doubly distilled.

Estimated Error:
Not reported.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Formic acid; CH_2O_2; [64-18-6]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
N. V. Maslovskaya, dissertation, Kalinin University, 1974.

Variables:
T/K = 293 and 313

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, formic acid, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.0	313.2	0.0318	0.0000	0.1000	0.0000
		0.0450	0.0196	0.1340	0.0440
		0.0642	0.0374	0.1796	0.0788
		0.0807	0.0587	0.2130	0.1168
		0.1208	0.0822	0.2890	0.1483
		0.1423	0.0950	0.3240	0.1632
		0.1632	0.0988	0.3582	0.1635
		0.1818	0.1036	0.3860	0.1660
		0.2158	0.1114	0.4330	0.1685
		0.2593	0.1162	0.4880	0.1650
		0.3113	0.1210	0.5460	0.1600
		0.3300	0.1205	0.5660	0.1558
		0.3832	0.1150	0.6200	0.1403
		0.4486	0.1052	0.6800	0.1203
		0.5347	0.0871	0.7510	0.0922
		0.6559	0.0631	0.8340	0.0605
		0.8763	0.0000	0.9600	0.0000

TABLE 2. Compositions of coexisting liquid phases

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Water-rich phase (compiler)		Nitromethane-rich phase		Water-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.0	293.2	0.893	0.012	0.035	0.013	0.960	0.010	0.108	0.030
		0.822	0.033	0.046	0.032	0.924	0.028	0.135	0.070
		0.788	0.044	0.057	0.048	0.905	0.038	0.159	0.101
		0.761	0.051	0.063	0.057	0.890	0.045	0.172	0.117
		0.744	0.056	0.074	0.072	0.880	0.050	0.196	0.143
		0.701	0.066	0.077	0.075	0.855	0.061	0.200	0.148
		0.648	0.084	0.098	0.096	0.820	0.080	0.240	0.178
		0.594	0.093	0.121	0.112	0.785	0.093	0.280	0.195
40.0	313.3	0.843	0.012	0.046	0.018	0.942	0.010	0.137	0.041
		0.765	0.034	0.065	0.039	0.900	0.030	0.180	0.053
		0.733	0.042	0.099	0.068	0.882	0.038	0.250	0.130
		0.724	0.044	0.100	0.070	0.877	0.040	0.251	0.132
		0.646	0.064	0.125	0.086	0.828	0.062	0.296	0.154
		0.622	0.069	0.128	0.087	0.813	0.068	0.300	0.155
		0.616	0.072	0.142	0.095	0.808	0.071	0.324	0.163

5.2. +Methanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Methanol; CH_4O; [67-56-1]
(3) Water; H_2O; [7732-18-5]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+methanol+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+methanol+water

Author(s)	T/K	Type of data
Zhuravlev and Maslovskaya[1]	293	Solubility curve (19)
Maslovskaya[2]	293	Equilibrium (9)
	313	Solubility curve (19), equilibrium (7)
Tolstova and Vasil'eva[3]	293	Solubility curve (15), equilibrium (7)

[a] Number of experimental points in parentheses.

Solubility curve

The system nitromethane+methanol+water forms a miscibility gap of Type I, Treybal.[4] Only one binary pair of components, nitromethane+water, is partially miscible. The data for this system were previously compiled and critically evaluated.[5] The recommended value for the solubility of nitromethane in water at 293.2 K is $x_1''=0.0345$; and at 313.2 K, $x_1''=0.0426$. The solubility of nitromethane in water reported in Zhuravlev and Maslovskaya[1] (0.090 mass fraction; 0.028 mole fraction) and at 313.2 K in Maslovskaya[2] (0.100 mass fraction; 0.032 mole fraction) are rejected because they are inconsistent with recommended value from Sazonov *et al.*[5]

Solubility data obtained by the titration method for the ternary system nitromethane+methanol+water were reported in three references. Data reported at 293.2 K by Zhuravlev and Maslovskaya,[1] and by Tolstova and Yasil'eva,[3] are in agreement. Data of Maslovskaya,[2] which were reported at 313.2 K, are less than those in Zhuravlev and Maslovskaya[1] and Tolstova and Yasil'eva.[3] Thus, with increasing temperature the mutual solubility of the components increases, Fig. 2. The data for the nitromethane+methanol+water system are consistent with the data for the nitromethane+ethanol+water system measured and reported by Maslovskaya.[2] Experimental errors were not reported, but are estimated by the evaluator to be ±0.002 mass fractions. Solubility data[1,3] at 293.2 K (water-rich and nitromethane-rich branches together) are described by an algebraic equation in the form

$$x_2=a+b\cdot x_3+c\cdot\ln(x_3)+d\cdot(\ln(x_3))^2+e\cdot(x_3)^{1/2}.$$

The proposed equation gives a smaller standard deviation than any other tested equations. The equation parameters (a,b,c,d,e) were calculated by the least squares method and presented in Table 2. Binodal curves in this system were calculated and compared separately for solubility data reported in Zhuravlev and Maslovskaya[1] and Tolstova and Yasil'eva[3] as well as for the combined data.

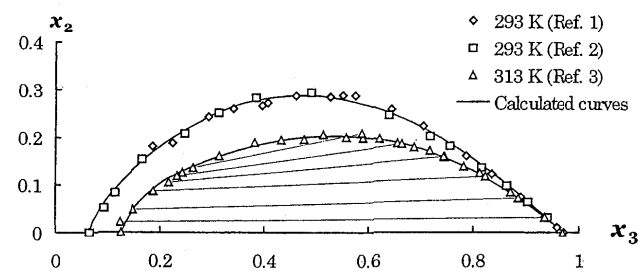

FIG. 2. Solubility curves and tie lines of the system nitromethane+methanol+water (mole fraction).

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility curve was determined by the titration method. The analytical method was used, samples being withdrawn from coexisting liquid phases at equilibrium for analysis by refractometry.

Source and Purity of Materials:
(1) Source not specified, pure grade reagent; distilled; boiling point=101.0 °C; n(20 °C,D)=1.3818, d(20 °C, 4 °C) =1.1385.
(2) Source not specified, pure grade reagent; distilled; boiling point=105 °C; n(20 °C,D)=1.3701, d(20 °C, 4 °C) =1.2030.
(3) Doubly distilled.

Estimated Error:
Not reported.

TABLE 2. The equation parameters

T/K	a	b	c	d	e	St. dev.
293, Refs 1, 3	−17.3154	−7.8732	−5.8377	−0.6081	25.1518	0.0068
313, Ref. 2	−49.7290	−14.9105	−18.4061	−2.2021	64.6105	0.0034

The solubilities calculated by the proposed equation are presented in Fig. 2 and Table 3. Experimental solubility data, Refs. 1–3, are presented in Fig. 2 for comparison.

TABLE 3. Calculated mutual solubilities nitromethane, methanol, and water

T/K	x_1	x_2	x_3	w_1	w_2	w_3
293.2	0.034	0.000	0.966	0.108	0.000	0.892
	0.032	0.018	0.950	0.099	0.029	0.872
	0.032	0.068	0.900	0.096	0.107	0.797
	0.045	0.155	0.800	0.124	0.224	0.652
	0.078	0.222	0.700	0.194	0.290	0.516
	0.133	0.267	0.600	0.295	0.311	0.394
	0.212	0.288	0.500	0.415	0.296	0.289
	0.318	0.282	0.400	0.544	0.253	0.203
	0.453	0.247	0.300	0.675	0.193	0.132
	0.619	0.181	0.200	0.801	0.123	0.076
	0.826	0.074	0.100	0.924	0.043	0.033
	0.974	0.019	0.070	0.988	0.010	0.002
	0.938	0.000	0.062	0.981	0.000	0.019
313.2	0.043	0.000	0.957	0.131	0.000	0.869
	0.031	0.019	0.950	0.096	0.031	0.873
	0.039	0.061	0.900	0.116	0.095	0.789
	0.070	0.130	0.800	0.187	0.182	0.631
	0.124	0.176	0.700	0.293	0.218	0.489
	0.201	0.199	0.600	0.417	0.216	0.367
	0.298	0.202	0.500	0.540	0.202	0.258
	0.413	0.187	0.400	0.656	0.156	0.188
	0.545	0.155	0.300	0.762	0.114	0.124
	0.697	0.103	0.200	0.860	0.067	0.073
	0.799	0.051	0.150	0.918	0.031	0.051
	0.890	0.000	0.110	0.965	0.000	0.035

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+methanol+water were reported in Maslovskaya,[2] and Tolstova and Yasil'eva.[3] Composition of each phase, Maslovskaya,[2] was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of the saturation curve measurements. Compositions of phases in equilibrium reported in Tolstova and Yasil'eva[3] were measured by gas chromatography but detailed information about experimental procedures is not reported. The tie lines cover the whole range of the miscibility gap. Data reported at 293.2 K by Maslovskaya[2] and Tolstova and Yasil'eva[3] are in agreement. The direction of the tie lines changes with concentration, but is similar in all reported papers. Plait points were reported in both cases: at 293.2 K the values are $x_1=0.297$, $x_2=0.286$, Zhuravlev and Maslovskaya,[1] and $x_1=0.361$, $x_2=0.272$, Tolstova and Yasil'eva.[3]

Experimental errors were not reported, but are estimated by the evaluator to be ±0.005 mass fractions. The experimental liquid–liquid equilibrium data at 293.2 K, Maslovskaya,[2] and Tolstova and Yasil'eva,[3] are used for construction of the smoothed curve for distribution of methanol between water-rich and nitromethane-rich phases, Fig. 3. These data are described by an algebraic equation

$$x_2''=-4.2771(x_2')^2+2.2409x_2'-0.0042.$$

Calculated and experimental distribution data, Maslovskaya[2] and Tolstova and Vasil'eva,[3] are presented in Fig. 2 for comparison.

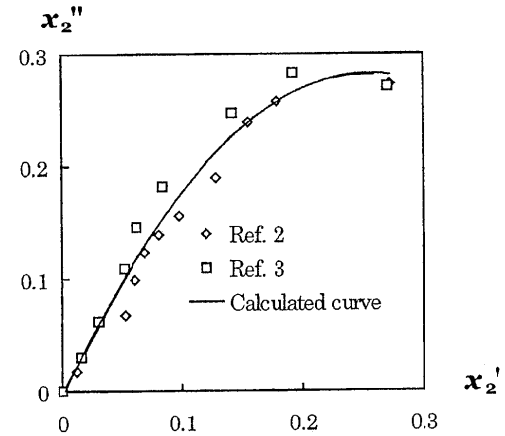

FIG. 3. The distribution of methanol between coexisting liquid phases of the ternary system nitromethane+methanol+water at 293.2 K (mole fraction).

Recommended or tentative data

Solubility and liquid–liquid equilibrium data measured by different methods are in agreement with one another. Experimental data on solubility[1–3] at 293 and 313 K are presented in Fig. 2. The ternary solubility data[1–3] were used to obtain equation parameters of the binodal curve.

In view of the inaccurate results, obtained in Zhuravlev *et al.*,[1] Maslovskaya,[2] and Tolstova and Vasil'eva,[3] for the binary nitromethane+water system, the evaluator considers the ternary system data to be tentative and concludes that new studies on the ternary system would be of value.

References:

[1]E. F. Zhuravlev and N. V. Maslovskaya, Zh. Obshch. Khim. **44**, 1849 (1974).
[2]N. V. Maslovskaya, dissertation, Kalinin University, 1974.
[3]T. S. Tolstova and M. A. Vasil'eva, Sb. Nauch. Tr. Gos. Inst. Prikl. Khim. 3 (1977).
[4]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).
[5]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Methanol; CH_4O; [67-56-1]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
E. F. Zhuravlev, and N. V. Maslovskaya, Zh. Obshch. Khim. **44**, 1849–52 (1974).

Variables:
T/K = 293

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, methanol, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.0	293.2	0.0284	0.0000	0.0900	0.0000
		0.0320	0.0112	0.1000	0.0184
		0.0329	0.0324	0.1010	0.0522
		0.0361	0.0740	0.1070	0.1150
		0.0416	0.1227	0.1180	0.1826
		0.0518	0.1616	0.1405	0.2300
		0.0715	0.2239	0.1800	0.2960
		0.0984	0.2589	0.2320	0.3205
		0.1384	0.2883	0.3015	0.3297
		0.1621	0.2885	0.3407	0.3183
		0.1892	0.2856	0.3828	0.3034
		0.2522	0.2877	0.4678	0.2802
		0.3214	0.2728	0.5500	0.2450
		0.3382	0.2670	0.5685	0.2356
		0.3997	0.2606	0.6277	0.2148
		0.4639	0.2432	0.6842	0.1883
		0.5885	0.1880	0.7814	0.1310
		0.6336	0.1807	0.8089	0.1211
		0.9353	0.0000	0.9800	0.0000

Estimated plait point: $w_1 = 0.521$, $w_2 = 0.263$ ($x_1 = 0.297$, $x_2 = 0.286$, compiler).

Auxiliary Information

Method/Apparatus/Procedure:
The solubility curve was determined by the titration method. No further details were reported.

Source and Purity of Materials:
(1) Source not specified, pure grade; distilled.
(2) Source not specified, pure grade; distilled.
(3) Doubly distilled.

Estimated Error:
Not reported.

Components:
(1) Nitromethane; CH_3NO_2; [75-52- 5]
(2) Methanol; CH_4O; [67-56-1]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
N. V. Maslovskaya, dissertation, Kalinin University, 1974.

Variables:
T/K = 293 and 313

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, methanol, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.0	313.2	0.0318	0.0000	0.1000	0.0000
		0.0450	0.0845	0.1300	0.1281
		0.0626	0.1252	0.1700	0.1786
		0.0793	0.1390	0.2070	0.1905
		0.0958	0.1590	0.2400	0.2090
		0.1115	0.1722	0.2698	0.2187
		0.1336	0.1796	0.3102	0.2189
		0.1581	0.1876	0.3215	0.2190
		0.1829	0.1972	0.3897	0.2205
		0.2124	0.1990	0.4329	0.2129
		0.2437	0.2003	0.4750	0.2050
		0.2812	0.2060	0.5200	0.2000
		0.3280	0.1959	0.5740	0.1800
		0.3281	0.1958	0.5741	0.1799
		0.3723	0.1951	0.6180	0.1700
		0.4300	0.1895	0.6700	0.1550
		0.5253	0.1609	0.7479	0.1202
		0.6324	0.1259	0.8215	0.0858
		0.8763	0.0000	0.9600	0.0000

TABLE 2. Compositions of coexisting liquid phases

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Water-rich phase (compiler)		Nitromethane-rich phase		Water-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.0	293.2	0.929	0.012	0.029	0.018	0.975	0.007	0.092	0.029
		0.872	0.053	0.035	0.067	0.946	0.030	0.105	0.105
		0.861	0.061	0.039	0.099	0.940	0.035	0.114	0.150
		0.850	0.069	0.043	0.123	0.934	0.040	0.121	0.183
		0.837	0.081	0.046	0.139	0.926	0.047	0.128	0.203
		0.806	0.098	0.051	0.156	0.910	0.058	0.138	0.223
		0.739	0.129	0.059	0.190	0.874	0.080	0.155	0.262
		0.685	0.155	0.082	0.239	0.842	0.100	0.200	0.308
		0.635	0.179	0.096	0.257	0.810	0.120	0.228	0.320
40.0	313.2	0.855	0.022	0.035	0.031	0.947	0.013	0.108	0.050
		0.804	0.048	0.043	0.072	0.921	0.029	0.126	0.110
		0.726	0.087	0.059	0.118	0.878	0.055	0.162	0.170
		0.715	0.091	0.062	0.123	0.872	0.058	0.168	0.176
		0.678	0.106	0.097	0.160	0.850	0.070	0.242	0.210
		0.649	0.119	0.151	0.186	0.832	0.080	0.340	0.220
		0.602	0.136	0.205	0.209	0.802	0.095	0.420	0.225

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Methanol; CH_4O; [67-56-1]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
T. S. Tolstova and M. A. Vasil'eva, Sb. Nauch. Tr. Gos. Inst. Prikl. Khim. 3–4 (1977).

Variables:
T/K = 293

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, methanol, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_1 (compiler)	w_1	w_2
20.0	293.2	0.030	0.031	0.093	0.050
		0.033	0.064	0.100	0.100
		0.038	0.099	0.110	0.150
		0.047	0.137	0.130	0.200
		0.063	0.182	0.165	0.250
		0.075	0.203	0.190	0.270
		0.115	0.247	0.265	0.300
		0.216	0.295	0.420	0.300
		0.333	0.284	0.560	0.250
		0.436	0.252	0.660	0.200
		0.546	0.208	0.750	0.150
		0.681	0.154	0.840	0.100
		0.803	0.084	0.912	0.050
		0.856	0.052	0.940	0.030
		0.935	0.000	0.980	0.000

TABLE 2. Compositions of coexisting liquid phases

		Nitromethane-rich phase (compiler)		Water-rich phase (compiler)		Nitromethane-rich phase		Water-rich phase	
t/°C	T/K (compilers)	x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.0	293.2	0.905	0.016	0.031	0.030	0.966	0.009	0.095	0.048
		0.885	0.030	0.033	0.062	0.956	0.017	0.099	0.097
		0.856	0.052	0.039	0.109	0.940	0.030	0.113	0.164
		0.846	0.062	0.051	0.146	0.934	0.036	0.140	0.210
		0.803	0.084	0.063	0.182	0.912	0.050	0.165	0.250
		0.707	0.142	0.113	0.247	0.856	0.090	0.262	0.300
		0.590	0.193	0.180	0.283	0.781	0.134	0.370	0.305

Estimated plait point: $w_1 = 0.590$, $w_2 = 0.235$ ($x_1 = 0.361$, $x_2 = 0.272$; compiler).

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility curve was determined by the titration method. The mixtures of (1) and (3) or of (1) and (2) were titrated by the third component with thorough mixing until the appearance of weak turbidity. The compositions of equilibrium liquid phases were determined by the analytical method with the apparatus described in Komarova and Kogan.[1]

Source and Purity of Materials:
(1) Source not specified, pure grade; distilled.
(2) Source not specified, pure grade; distilled.
(3) distilled.

Estimated Error: Not reported.

References:
[1]E. G. Komarova and V. B. Kogan, Zh. Prikl. Khim. (Leningrad) 37, 1771 (1964).

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility curve was determined by the titration method. The analytical method was used, samples being withdrawn from coexisting liquid phases at equilibrium for analysis by refractometry.

Source and Purity of Materials:
(1) Source not specified, pure grade reagent; distilled; boiling point = 101.0 °C; n(20 °C,D) = 1.3818, d(20 °C) = 1138.5 g·L^{-1}.
(2) Source not specified, pure grade reagent; distilled; boiling point = 65.3 °C; n(20 °C,D) = 1.3291, d(20 °C) = 797.8 g·L^{-1}.
(3) Doubly distilled.

Estimated Error:
Not reported.

5.3. +Tetrachloroethane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Tetrachloroethene; C_2Cl_4; [127-18-4]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
H. Schuberth and P. Kranke, Z. Phys. Chem. (Leipzig) **245**, 49–67 (1970).

Variables:
T/K=288–323

Prepared By:
V. P. Sazonov

Experimental Data

Compositions of three coexisting liquid phases for the system nitromethane+tetrachloroethene+water

t/°C	T/K (compiler)	Nitromethane-rich phase x_1'	x_2'	Tetrachloroethene-rich phase x_1''	x_2''	Water-rich phase x_1'''	x_2'''
15.0	288.2	0.847	0.124	0.098	0.898	0.029	—*
20.0	293.2	0.842	0.129	0.113	0.882	0.030	—
30.0	303.2	0.821	0.149	0.154	0.839	0.032	—
40.0	313.2	0.775	0.190	0.224	0.767	0.035	—
50.0	323.2	0.708	0.250	0.331	0.659	0.039	—

The same data are presented below in mass fraction

t°C	T/K (compiler)	Nitromethane-rich phase (compiler) w_1'	w_2'	Tetrachloroethene-rich phase (compiler) w_1''	w_2''	Water-rich phase (compiler) w_1'''	w_2'''
15.0	288.2	0.710	0.283	0.038	0.961	0.092	—*
20.0	293.2	0.701	0.292	0.045	0.954	0.095	—
30.0	303.2	0.665	0.328	0.063	0.936	0.101	—
40.0	313.2	0.595	0.397	0.097	0.902	0.109	—
50.0	323.2	0.506	0.485	0.156	0.843	0.121	—

* The water-rich phase contained traces of tetrachloroethene.

Auxiliary Information

Method/Apparatus/Procedure:
The analytical method was used. Mixtures of (1), (2), and (3) were stirred at a given temperature for a time interval sufficient to achieve equilibrium between liquid phases. After this, the samples of the separate phases were selected for chromatographic analysis. Injections were made with a syringe kept at the corresponding temperature.

Source and Purity of Materials:
(1) Source not specified, distilled; boiling point=100.9 °C, $n(20\,°C,D)=1.3819$, $\rho(20\,°C)=1138.0\ g\cdot L^{-1}$.
(2) Source not specified, distilled; boiling point=120.6 °C, $n(20\,°C,D)=1.5055$, $\rho(20\,°C)=1622.9\ g\cdot L^{-1}$.
(3) Distilled.

Estimated Error:
Not reported.

5.4. +Acetic Acid

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Acetic acid; $C_2H_4O_2$; [64-19-7]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+acetic acid+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+acetic acid+water

Author(s)	T/K	Type of data[a]
Skrzec and Murphy[1]	300	Solubility curve (16), equilibrium (5)
Zhuravlev and Maslovskaya[2]	293	Solubility curve (22)
Maslovskaya[3]	293	Equilibrium (8)
	313	Solubility curve (17), equilibrium (7)

[a] Number of experimental points in parentheses.

Solubility curve

The system nitromethane+acetic acid+water forms a miscibility gap of Type I, Treybal.[4] Only one binary pair of components, nitromethane+water, is partially miscible. The data for this system were previously compiled and critically evaluated.[5] The recommended values for the solubility of nitromethane in water at 293.2 K is $x_1''=0.0345$; and at 313.2 K, $x_1''=0.0426$. The solubility of nitromethane in water at 293.2 K reported in Maslovskaya and Zhuravlev[2] (0.0900 mass fraction; 0.0284 mole fraction) and at 313.2 K in Maslovskaya[3] (0.1000 mass fraction; 0.0318 mole fraction) are rejected because they are inconsistent with recommended values.[5]

Solubility data obtained by the titration method for the ternary system nitromethane+acetic acid+water were reported in three references. The data of Maslovskaya,[3] which were reported at 313.2 K, indicate a smaller miscibility gap than the data at 293.2 K reported by Maslovskaya and Zhuravlev.[2] Thus, with increasing temperature the mutual solubility of the components increases, Fig. 4. On the other hand, data on solubility, Maslovskaya and Zhuravlev,[2] at 293 K differ only slightly from the data Skrzec and Murphy,[1] reported at 300 K, Fig. 4. Therefore, the solubility data of Skrzec and Murphy[1] were poor and not were considered, but are given in Fig. 4 for comparison. Experimental errors were not reported in the papers, but are estimated by the evaluator to be ±0.002 mass fractions. Solubility data at 293.2 and 313.2 K (water-rich and nitromethane-rich branches together) are described by an algebraic equation in the form:

$$x_2=a+b\cdot x_3+c\cdot\ln(x_3)+d\cdot(\ln(x_3))^2+e\cdot(x_3)^{1/2}.$$

This smoothing equation gives a smaller standard deviation than any other tested equation. The equation parameters (a,b,c,d,e) were calculated by the least squares method and presented in Table 2. Binodal curves in this system were calculated and compared separately for solubility data reported in Maslovskaya and Zhuravlev[2] and Maslovskaya.[3]

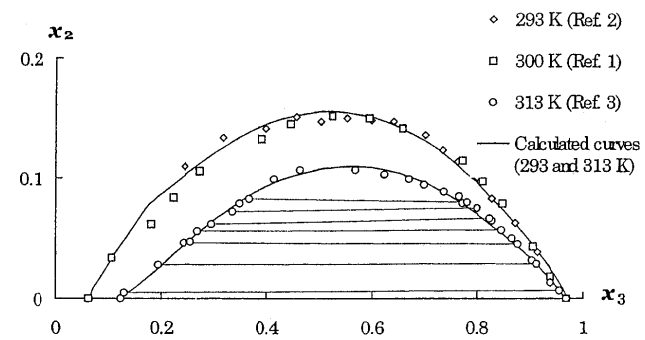

FIG. 4. Data of solubility curves and tie lines of the system nitromethane+acetic acid+water (mole fractions).

TABLE 2. The equation parameters

T/K	a	b	c	d	e	St. dev.
293, Ref. 2	−17.1481	−6.5393	−5.9762	−0.6421	23.6731	0.0053
313, Ref. 3	−11.3766	−4.8395	−3.7941	−0.3783	16.2013	0.0028

The solubilities calculated by the proposed equation are presented in Fig. 4 and in Table 3. Experimental solubility data[1–3] are presented in Fig. 4 for comparison.

TABLE 3. Calculated mutual solubilities nitromethane, acetic acid, and water

T/K	x_1	x_2	x_3	w_1	w_2	w_3
293.2	0.034	0.000	0.966	0.108	0.000	0.892
	0.032	0.018	0.950	0.097	0.054	0.849
	0.053	0.047	0.900	0.145	0.127	0.728
	0.104	0.096	0.800	0.239	0.217	0.544
	0.169	0.131	0.700	0.335	0.255	0.410
	0.249	0.151	0.600	0.433	0.259	0.308
	0.344	0.156	0.500	0.533	0.238	0.229
	0.455	0.145	0.400	0.636	0.199	0.165
	0.579	0.121	0.300	0.736	0.151	0.113
	0.714	0.086	0.200	0.833	0.099	0.068
	0.921	0.009	0.070	0.969	0.009	0.022
	0.938	0.000	0.062	0.981	0.000	0.019
313.2	0.043	0.000	0.957	0.131	0.000	0.869
	0.039	0.011	0.950	0.118	0.033	0.849
	0.067	0.033	0.900	0.183	0.089	0.728
	0.130	0.070	0.800	0.299	0.158	0.543
	0.204	0.096	0.700	0.404	0.187	0.409
	0.291	0.109	0.600	0.506	0.186	0.308
	0.392	0.108	0.500	0.607	0.165	0.228
	0.507	0.093	0.400	0.708	0.128	0.164
	0.635	0.065	0.300	0.806	0.081	0.113
	0.773	0.027	0.200	0.900	0.031	0.069
	0.841	0.009	0.150	0.941	0.010	0.049
	0.890	0.000	0.110	0.965	0.000	0.035

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+acetic acid+water were reported in Skrzec and Murphy[1] and Maslovskaya.[3] Composition of each phase in Maslovskaya[3] was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of saturation curve measurements. The tie lines at 313.2 K cover the whole range of the miscibility gap and are nearly parallel to one another and to the tie line between nitromethane and water, Fig. 4. The tie line data in Skrzec and Murphy[1] were obtained by the analytical method. Data reported at 293.2 and at 313.2 K, Maslovskaya,[3] and also at 299.9 K in Skrzec and Murphy,[1] are in agreement. Plait points were reported in all references and presented in Table 4. Experimental errors were not reported in the papers, but are estimated by the evaluator to be ±0.005 mass fractions.

TABLE 4. Estimated plait points

t/°C	T/K	x_1	x_2	w_1	w_2
20.0	293.2	0.381	0.151	0.570	0.223
26.7	299.9	0.350	0.149	0.543	0.227
40.0	313.2	0.292	0.105	0.509	0.180

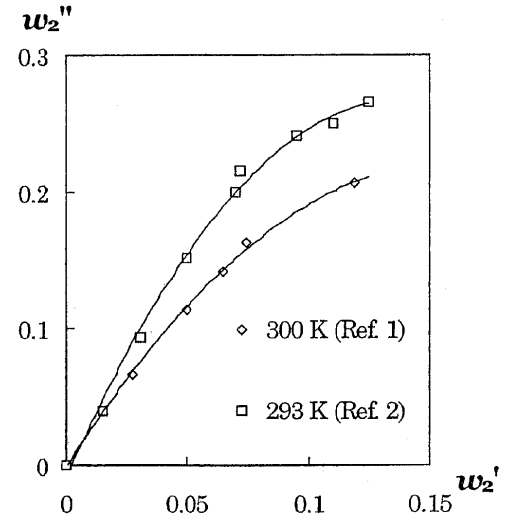

FIG. 5. The distribution of acid between coexisting liquid phases of the ternary system nitromethane+acetic acid+water (mass fractions).

Recommended or tentative data

Solubility and liquid–liquid equilibrium data measured by different methods are in agreement with one another. Experimental data on solubilities at T/K=293.2 and 313.2, Zhuravlev and Maslovskaya[2] and Maslovskaya,[3] are presented in Fig. 4. The ternary solubility data, Zhuravlev and Maslovskaya[2] and Maslovskaya,[3] were used to obtain equation parameters of the binodal curve. The experimental liquid–liquid equilibrium data at 293.2 and 299.9 K, Skrzec and Murphy[1] and Maslovskaya,[3] are used for construction of the smoothed curve for distribution of acid between nitromethane-rich and water-rich phases, Fig. 5. These data also should be considered as tentative.

In view of the inaccurate results obtained in Zhuravlev and Maslovskaya[2] and Maslovskaya[3] for the binary nitromethane+water system, the evaluator considers the ternary system data to be tentative and concludes that new studies on the ternary system would be of value.

References:

[1]A. E. Skrzec and N. F. Murphy, Ind. Eng. Chem. **46**, 2245 (1954).

[2]E. F. Zhuravlev and N. V. Maslovskaya, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **18**, 334 (1975); Deposited Doc., VINITI 1466 (1974).

[3]N. V. Maslovskaya, dissertation, Kalinin University, 1974.

[4]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

[5]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series. Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Acetic acid; $C_2H_4O_2$; [64-19-7]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
A. E. Skrzec and N. F. Murphy, Ind. Eng. Chem. **46**, 2245–7 (1954).

Variables:
T/K = 300

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, acetic acid and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
26.7	299.9	0.030	0.000	0.0960	0.0000
		0.043	0.018	0.1260	0.540
		0.052	0.043	0.1430	0.117
		0.073	0.079	0.1820	0.194
		0.093	0.097	0.217	0.223
		0.115	0.114	0.254	0.246
		0.202	0.141	0.378	0.259
		0.256	0.150	0.442	0.255
		0.324	0.152	0.516	0.238
		0.411	0.145	0.600	0.208
		0.477	0.133	0.660	0.1805
		0.621	0.106	0.771	0.1288
		0.693	0.084	0.832	0.0990
		0.758	0.062	0.869	0.0700
		0.861	0.034	0.930	0.0366
		0.939	0.000	0.9811	0.0000

TABLE 2. Distribution of acetic acid between coexisting liquid phases

t/°C	T/K (compiler)	w_2 Nitromethane-rich phase	w_2 Water-rich phase
26.7	299.9	0.0275	0.0674
		0.0501	0.1140
		0.0650	0.1415
		0.0743	0.1630
		0.1190	0.2060

Estimated plait point: $w_1 = 0.543$, $w_2 = 0.227$ ($x_1 = 0.350$, $x_2 = 0.149$; compiler).

Auxiliary Information

Method/Apparatus/Procedure:
The analytical and titration methods were used. Measured volumes of (2) were added dropwise to a solution of (1) and (3) until the mixture became turbid for 3 secs. The stoppered flask was kept at constant temperature overnight, drops of (3) were again added, until the mixture became turbid and remained so for 20 min. Tie line data were obtained by preparing various three-component mixtures within the area of the binodal curve, and analyzing solvent and water layers for (2). Each layer was then diluted with (3) and titrated with NaOH using phenolphthalein indicator.

Source and Purity of Materials:
(1) Commercial Solvents Corp., technical grade; purity 99.5 mass %.
(2) Fisher Scientific Co., glacial; CP reagent; purity 99.5 mass %.
(3) Not specified.

Estimated Error:
Temperature: ±0.5 K.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Acetic acid; $C_2H_4O_2$; [64-19-7]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
E. F. Zhuravlev and N. V. Maslovskaya, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **18**, 334 (1975).
*Deposited Doc., VINITI 1466 (1974).

Variables:
T/K = 293

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, acetic acid, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.0	293.2	0.0280	0.0000	0.0900	0.0000
		0.0473	0.0381	0.1334	0.1056
		0.0644	0.0624	0.1680	0.1600
		0.0881	0.0824	0.2127	0.1958
		0.1003	0.1004	0.2305	0.2270
		0.1234	0.1138	0.2680	0.2430
		0.1439	0.1227	0.2990	0.2510
		0.1632	0.1357	0.3240	0.2650
		0.2133	0.1474	0.3900	0.2650
		0.2536	0.1477	0.4405	0.2525
		0.2991	0.1499	0.4910	0.2420
		0.3516	0.1474	0.5455	0.2250
		0.3932	0.1509	0.5815	0.2195
		0.4606	0.1411	0.6424	0.1936
		0.5489	0.1338	0.7090	0.1700
		0.6459	0.1096	0.7821	0.1305
		0.9350	0.0000	0.9800	0.0000

Estimated plait point: $w_1 = 0.570$, $w_2 = 0.223$ ($x_1 = 0.381$, $x_2 = 0.151$, compiler).

Auxiliary Information

Method/Apparatus/Procedure:
The solubility curve was determined by the titration method. No further details were reported.

Source and Purity of Materials:
(1) Source not specified, pure grade; distilled.
(2) Source not specified, pure grade; distilled.
(3) Doubly distilled.

Estimated Error:
Not reported.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Acetic acid; $C_2H_4O_2$; [64-19-7]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
N. V. Maslovskaya, dissertation, Kalinin University, 1974.

Variables:
T/K = 293 and 313

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, acetic acid, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.0	313.2	0.0320	0.0000	0.1000	0.0000
		0.0476	0.0136	0.1408	0.0395
		0.0654	0.0320	0.1800	0.0866
		0.0845	0.0503	0.2170	0.1271
		0.1074	0.0649	0.2585	0.1535
		0.1488	0.0789	0.3275	0.1708
		0.1517	0.0844	0.3295	0.1805
		0.1758	0.0887	0.3660	0.1818
		0.2065	0.0940	0.4085	0.1830
		0.2302	0.0988	0.4380	0.1850
		0.2752	0.1027	0.4915	0.1805
		0.3254	0.1069	0.5440	0.1758
		0.4323	0.1066	0.6420	0.1558
		0.4870	0.0993	0.6890	0.1382
		0.5725	0.0792	0.7600	0.1035
		0.6989	0.0472	0.8520	0.0566
		0.8760	0.0000	0.9600	0.0000

Estimated plait point: $w_1 = 0.509$, $w_2 = 0.180$ ($x_1 = 0.292$, $x_2 = 0.105$, compiler)

TABLE 2. Compositions of coexisting phases

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Water-rich phase (compiler)		Nitromethane-rich phase		Water-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.0	293.2	0.906	0.014	0.033	0.010	0.960	0.015	0.100	0.030
		0.867	0.029	0.046	0.034	0.936	0.031	0.131	0.094
		0.822	0.046	0.062	0.059	0.907	0.050	0.161	0.152
		0.780	0.063	0.084	0.084	0.878	0.070	0.204	0.200
		0.773	0.065	0.094	0.093	0.874	0.072	0.220	0.215
		0.719	0.083	0.114	0.111	0.837	0.095	0.252	0.241
		0.690	0.095	0.124	0.118	0.815	0.110	0.268	0.250
		0.656	0.105	0.163	0.136	0.790	0.125	0.324	0.265
40.0	313.2	0.866	0.005	0.038	0.007	0.953	0.005	0.115	0.021
		0.779	0.028	0.060	0.029	0.902	0.032	0.168	0.080
		0.713	0.046	0.078	0.045	0.860	0.054	0.205	0.115
		0.675	0.056	0.097	0.057	0.834	0.068	0.240	0.140
		0.643	0.062	0.109	0.066	0.813	0.077	0.262	0.155
		0.594	0.072	0.126	0.075	0.778	0.093	0.289	0.169
		0.553	0.083	0.139	0.080	0.745	0.110	0.310	0.176

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility curve was determined by the titration method. The analytical method was used, samples being withdrawn from coexisting liquid phases at equilibrium for analysis by refractometry.

Source and Purity of Materials:
(1) Source not specified, pure grade reagent; distilled; boiling point = 101.0 °C, n(20 °C,D) = 1.3818, d(20 °C,4 °C) = 1.1385.
(2) Source not specified, dried and distilled; boiling point = 117.1 °C, n(20 °C,D) = 1.3723, d(20 °C,4 °C) = 1.0530.
(3) Doubly distilled.

Estimated Error:
Not reported.

5.5. +Ethanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Ethanol; C_2H_6O; [64-17-5]
(3) Water; H_2O; [7732-18-5]

Evaluator:

V. P. Sazonov, Technical University, Samara, Russia, May, 2000.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+ethanol+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+ethanol+water

Author(s)	T/K	Type of data[a]
Zhuravlev and Maslovskaya[1]	293	Solubilitiy curve (21)
Maslovskaya[2]	293	Equilibrium (8)
	313	Solubility curve (14), equilibrium (7)
Rezanova *et al.*[3]	303	Solubility curve (10), equilibrium (7)
	313	Solubility curve (13), equilibrium (6)
	323	Solubility curve (12), equilibrium (5)
	333	Solubility curve (8), equilibrium (4)

[a] Number of experimental points in parentheses.

Solubility curve

The system nitromethane+ethanol+water forms a miscibility gap of Type I, Treybal.[4] Only one binary pair of components, nitromethane+water, is partially miscible. The data for this binary system were previously complied and critically evaluated[5] and are summarized in Table 2.

TABLE 2. Recommended and original data for the mutual solubility the system nitromethane+water

T/K	293		303		313		323		333	
Mole fraction	x_1''	x_3'	x_1''	x_3'	x_1''	x_3'	x_1''	x_3'	x_1''	x_3'
Recommended	0.034	0.062	0.038	0.083	0.043	0.124	0.049	0.135	0.056	0.167
Refs. 1 and 2	0.028	0.065	—	—	0.032	0.124	—	—	—	—
Ref. 3	—	—	0.038	0.091	0.042	0.105	0.047	0.130	0.051	0.151

The solubility of nitromethane in water at 293.2 K reported in Zhuravlev and N. V. Maslovskaya[1] and at 313.2 K in Maslovskaya[2] are rejected because are inconsistent with recommended values from Savanov *et al.*[5] Data of the solubility nitromethane and water reported in Ref. 3 are consistent with recommended values.

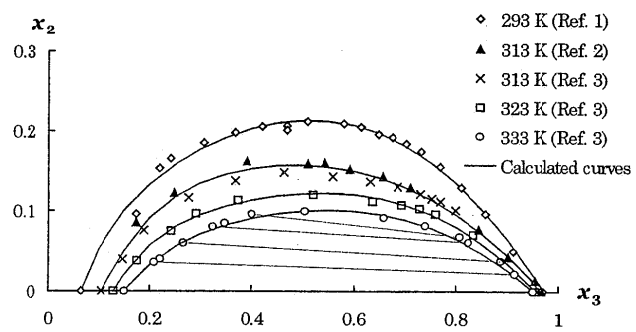

FIG. 6. Solubility curves and tie lines of the system nitromethane+ethanol+water (mole fraction).

Solubility data obtained by the titration method for the ternary system nitromethane+ethanol+water were reported in three references. The data reported at 313.2 K by Zhuravlev and Maslovskaya[1] and by Rezanova *et al.*[3] are in satisfactory agreement, but do not agree with the data at 303 K, from Rezanova *et al.*[3] Therefore, these data were not considered and are not shown in Fig. 6. The data for the nitromethane+ethanol+water system are consistent with the data for the nitromethane+1-propanol+water system measured and reported by Maslovskaya in the same paper.[2] Experimental errors were reported in Rezanova *et al.*[3] as ±0.0005 mole fractions. Solubility data[1-3] together and separately are described by an algebraic equation in the form

$$x_2=a+b\cdot x_3+c\cdot(x_3)^2+d\cdot(x_3)^{1/2}+e\cdot(x_3)^{3/2}.$$

The proposed equation gives a smaller standard deviation than any other tested equations. The equation parameters (a,b,c,d,e) were calculated by the least squares method and presented in Table 3. Binodal curves in this system were calculated and compared separately for solubility data reported in Zhuravlev and Maslovskaya,[2] and Rezanova *et al.*,[3] as well as for the combined data.

TABLE 3. The equation parameters

T/K	a	b	c	d	e	ST. dev.
293, Ref. 1	−0.4819	−6.9096	−4.1129	3.1739	8.2995	0.0078
313, Refs. 2 and 3	−0.9877	−11.5058	−4.5975	5.6954	11.3710	0.0096
323, Ref. 3	−1.0921	−13.9941	−5.7980	6.4712	14.3810	0.0039
333, Ref. 3	−0.8743	−10.2619	−4.3010	4.9013	10.5063	0.0036

The solubility data, as calculated by the proposed equation, are considered tentative and are presented in Fig. 6 and in Table 4. Experimental solubility data[1-3] are presented in Fig. 6 for comparison.

TABLE 4. Calculated mutual solubilities of nitromethane, ethanol, and water

T/K	x_1	x_2	x_3	w_1	w_2	w_3
293.2	0.034	0.000	0.966	0.108	0.000	0.892
	0.029	0.021	0.950	0.089	0.049	0.862
	0.034	0.066	0.900	0.097	0.143	0.760
	0.064	0.136	0.800	0.159	0.255	0.586
	0.118	0.182	0.700	0.255	0.297	0.448
	0.193	0.207	0.600	0.367	0.297	0.336
	0.286	0.214	0.500	0.481	0.271	0.248
	0.397	0.203	0.400	0.594	0.229	0.177
	0.523	0.177	0.300	0.702	0.179	0.119
	0.667	0.133	0.200	0.807	0.121	0.072
	0.848	0.052	0.100	0.925	0.043	0.032
	0.922	0.008	0.070	0.972	0.006	0.022
	0.938	0.000	0.062	0.981	0.000	0.019
313.2	0.043	0.000	0.957	0.131	0.000	0.869
	0.037	0.013	0.950	0.113	0.030	0.857
	0.055	0.045	0.900	0.155	0.096	0.749
	0.104	0.096	0.800	0.252	0.176	0.572
	0.170	0.130	0.700	0.358	0.207	0.435
	0.250	0.150	0.600	0.463	0.210	0.327
	0.343	0.157	0.500	0.563	0.195	0.242
	0.447	0.153	0.400	0.657	0.170	0.173
	0.565	0.135	0.300	0.748	0.135	0.117
	0.709	0.091	0.200	0.847	0.082	0.071
	0.869	0.011	0.120	0.952	0.009	0.039
	0.890	0.000	0.110	0.965	0.000	0.035
323.2	0.049	0.000	0.951	0.148	0.000	0.852
	0.046	0.004	0.950	0.140	0.009	0.851
	0.065	0.035	0.900	0.182	0.074	0.744
	0.120	0.080	0.800	0.288	0.145	0.567
	0.192	0.108	0.700	0.400	0.170	0.430
	0.280	0.120	0.600	0.511	0.165	0.324
	0.378	0.122	0.500	0.612	0.149	0.239
	0.487	0.113	0.400	0.705	0.124	0.171
	0.605	0.095	0.300	0.791	0.094	0.115
	0.743	0.057	0.200	0.879	0.051	0.070
	0.830	0.020	0.150	0.933	0.017	0.050
	0.870	0.000	0.130	0.956	0.000	0.044
333.2	0.056	0.000	0.944	0.167	0.000	0.833
	0.054	0.006	0.940	0.161	0.013	0.826
	0.074	0.026	0.900	0.206	0.055	0.739
	0.135	0.065	0.800	0.321	0.117	0.562
	0.211	0.089	0.700	0.435	0.139	0.426
	0.300	0.100	0.600	0.543	0.137	0.320
	0.400	0.100	0.500	0.642	0.121	0.237
	0.509	0.091	0.400	0.732	0.099	0.169
	0.629	0.071	0.300	0.816	0.069	0.115
	0.767	0.033	0.200	0.901	0.029	0.070
	0.833	0.007	0.160	0.941	0.006	0.053
	0.830	0.000	0.170	0.944	0.000	0.056

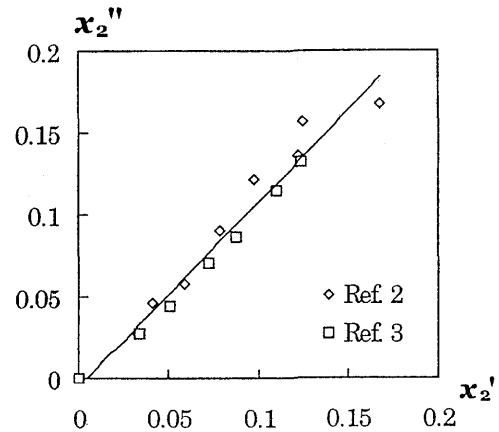

FIG. 7. The distribution of ethanol between coexisting liquid phases of the ternary system nitromethane+ethanol+water at 313.2 K (mole fraction).

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+ethanol+water were reported in Maslovskaya[2] and Rezanova *et al.*[3] Composition of each phase, Maslovskaya,[2] was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of the saturation curve measurements. Compositions of phases in equilibrium reported in Rezanova *et al.*[3] were measured by gas chromatography but detailed experimental procedures are not reported. The tie lines cover the whole range of the miscibility gap. The data reported at 313.2 K by Maslovskaya,[2] and Rezanova *et al.*[3] are in agreement. The direction of the tie lines changes with concentration, but is similar in all reported papers. Plait points were reported in Zhuravlev and Maslovskaya[1] at 293.2 K ($x_1=0.330, x_2=0.201$) and in Maslovskaya[2] at 313.2 K ($x_1=0.451, x_2=0.168$).

Experimental errors were reported only in Rezanova *et al.*[3] to be ±0.002 mole fractions.

Recommended or tentative data

Solubility and liquid–liquid equilibrium data measured by different methods are in agreement with one another. Experimental data on solubility at all temperatures[1–3] are presented in Fig. 6 in mole fractions

The experimental liquid–liquid equilibrium data at 313.2 K, Maslovskaya[2] and Rezanova *et al.*,[3] are used for construction of the smoothed curve for distribution of ethanol between water-rich and nitromethane-rich phases, Fig. 7. These data also should be considered tentative.

References:

[1]E. F. Zhuravlev and N. V. Maslovskaya, Zh. Obshch. Khim. **44**, 1849 (1974).

[2]N. V. Maslovskaya, dissertation, Kalinin University, 1974.

[3]E. N. Rezanova, A. M. Toikka, and N. P. Markuzin, Zh. Prikl. Khim. (S-Peterburg) **66**, 359 (1993).

[4]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

[5]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Ethanol; C_2H_6O; [64-17-5]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
E. F. Zhuravlev and N. V. Maslovskaya, Zh. Obshch. Khim. **44**, 1849–52 (1974).

Variables:
T/K = 293

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, ethanol, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.0	293.2	0.0280	0.0000	0.0900	0.0000
		0.0380	0.0503	0.1100	0.1100
		0.0448	0.0967	0.1206	0.1966
		0.0598	0.1299	0.1506	0.2470
		0.0757	0.1557	0.1801	0.2798
		0.0927	0.1748	0.2102	0.2993
		0.1121	0.1845	0.2442	0.3034
		0.1328	0.1925	0.2782	0.3045
		0.1564	0.1963	0.3155	0.2989
		0.1811	0.2055	0.3500	0.2999
		0.2096	0.2094	0.3888	0.2931
		0.2792	0.2121	0.4736	0.2716
		0.3237	0.2069	0.5234	0.2525
		0.3295	0.2012	0.5315	0.2450
		0.3730	0.2058	0.5715	0.2380
		0.4343	0.1982	0.6272	0.2161
		0.5094	0.1855	0.6889	0.1893
		0.5936	0.1659	0.7516	0.1585
		0.6274	0.1536	0.7765	0.1435
		0.7302	0.0962	0.8550	0.0850
		0.9350	0.0000	0.9800	0.0000

Estimated plait point: $w_1 = 0.532$, $w_2 = 0.245$ ($x_1 = 0.330$, $x_2 = 0.201$, compiler).

Auxiliary Information

Method/Apparatus/Procedure:
The solubility curve was determined by the titration method. No further details were reported.

Source and Purity of Materials:
(1) Source not specified, pure grade; distilled.
(2) Source not specified, pure grade; distilled.
(3) Doubly distilled.

Estimated Error:
Not reported.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Ethanol; C_2H_6O; [64-17-5]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
N. V. Maslovskaya, dissertation, Kalinin University, 1974.

Variables:
T/K = 293 and 313

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, ethanol, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.0	313.2	0.0320	0.0000	0.1000	0.0000
		0.0328	0.0138	0.1010	0.0320
		0.0556	0.0427	0.1569	0.0911
		0.0774	0.0771	0.2010	0.1510
		0.1587	0.1299	0.3400	0.2100
		0.2005	0.1434	0.3990	0.2155
		0.2549	0.1525	0.4678	0.2112
		0.2956	0.1607	0.5120	0.2100
		0.3310	0.1594	0.5500	0.2000
		0.4469	0.1625	0.6525	0.1791
		0.6297	0.1229	0.7924	0.1167
		0.7411	0.0854	0.8650	0.0752
		0.8760	0.0000	0.9600	0.0000

Estimated plait point: $w_1 = 0.653$, $w_2 = 0.184$ ($x_1 = 0.451$, $x_2 = 0.168$, compiler).

TABLE 2. Compositions of coexisting liquid phases

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Water-rich phase (compiler)		Nitromethane-rich phase		Water-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.0	293.2	0.901	0.022	0.031	0.017	0.958	0.018	0.094	0.040
		0.848	0.050	0.035	0.040	0.926	0.041	0.102	0.090
		0.810	0.068	0.039	0.064	0.903	0.058	0.110	0.137
		0.770	0.087	0.045	0.093	0.877	0.075	0.122	0.190
		0.737	0.103	0.054	0.118	0.855	0.090	0.140	0.230
		0.714	0.113	0.057	0.131	0.840	0.100	0.145	0.250
		0.672	0.132	0.081	0.165	0.810	0.120	0.190	0.290
		0.649	0.141	0.093	0.175	0.794	0.130	0.210	0.300
40.0	313.2	0.828	0.033	0.039	0.027	0.926	0.028	0.117	0.060
		0.809	0.041	0.050	0.046	0.915	0.035	0.141	0.098
		0.779	0.059	0.058	0.058	0.894	0.051	0.160	0.120
		0.734	0.079	0.088	0.090	0.865	0.070	0.220	0.170
		0.687	0.098	0.140	0.122	0.833	0.090	0.311	0.205
		0.635	0.122	0.181	0.136	0.795	0.115	0.373	0.212
		0.618	0.125	0.242	0.157	0.784	0.120	0.450	0.220

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility curve was determined by the titration method. The analytical method was used, samples being withdrawn from coexisting liquid phases at equilibrium for analysis by refractometry.

Source and Purity of Materials:
(1) Source not specified, pure grade reagent; distilled; boiling point = 101.0 °C; n(20 °C,D) = 1.3818, d(20 °C,4 °C) = 1.1385.
(2) Purity not specified; dried and distilled; boiling point = 78.0 °C; n(20 °C,D) = 1.3620, d(20 °C,4 °C) = 0.7970.
(3) Doubly distilled.

Estimated Error:
Not reported.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Ethanol; C_2H_6O; [64-17-5]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
E. N. Rezanova, A. M. Toikka, and N. P. Markuzin, Zh. Prikl. Khim. (S.-Peterburg) **66**, 359–63 (1993).

Variables:
T/K = 293–333

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, ethanol, and water

t/°C (compiler)	T/K	x_1	x_2	w_1 (compiler)	w_2 (compiler)
30.00	303.15	0.0380	0.0000	0.1180	0.0000
		0.0931	0.1243	0.2228	0.2245
		0.1371	0.1497	0.2976	0.2453
		0.1633	0.1555	0.3390	0.2436
		0.2325	0.1676	0.4350	0.2356
		0.2649	0.1685	0.4736	0.2274
		0.3589	0.1703	0.5729	0.2052
		0.4208	0.1619	0.6317	0.1834
		0.6782	0.1028	0.8266	0.0946
		0.9090	0.0000	0.9713	0.0000
40.00	313.15	0.0420	0.0000	0.1293	0.0000
		0.1000	0.1010	0.2427	0.1850
		0.1181	0.1121	0.2747	0.1968
		0.1312	0.1156	0.2976	0.1979
		0.1477	0.1217	0.3244	0.2018
		0.1838	0.1307	0.3791	0.2035
		0.2314	0.1368	0.4440	0.1981
		0.2972	0.1432	0.5210	0.1895
		0.3876	0.1483	0.6089	0.1758
		0.4950	0.1378	0.6997	0.1470
		0.6066	0.1164	0.7815	0.1132
		0.7359	0.0755	0.8672	0.0672
		0.8125	0.0395	0.9170	0.0336
		0.8950	0.0000	0.9665	0.0000
50.0	323.2	0.0470	0.0000	0.1431	0.0000
		0.0955	0.0701	0.2419	0.1340
		0.1446	0.0959	0.3277	0.1641
		0.1686	0.1028	0.3655	0.1682
		0.1987	0.1075	0.4100	0.1674
		0.2524	0.1122	0.4811	0.1614
		0.3602	0.1202	0.5960	0.1501
		0.5139	0.1132	0.7244	0.1204
		0.6122	0.0965	0.7940	0.0945
		0.6841	0.0745	0.8429	0.0693
		0.7869	0.0379	0.9074	0.0330
60.00	333.15	0.8700	0.0000	0.9578	0.0000
		0.0510	0.0000	0.1540	0.0000
		0.1156	0.0607	0.2857	0.1132
		0.1789	0.0814	0.3900	0.1339
		0.2513	0.0916	0.4885	0.1344
		0.3974	0.0996	0.6399	0.1210
		0.5688	0.0845	0.7740	0.0868
		0.7404	0.0402	0.8862	0.0363
		0.8490	0.0000	0.9501	0.0000

TABLE 2. Compositions of coexisting liquids phases

t/°C (compiler)	T/K	Nitromethane-rich phase		Water-rich phase		Nitromethane-rich phase (compiler)		Water-rich phase (compiler)	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
30.00	303.15	0.8544	0.0269	0.0413	0.0306	0.9392	0.0223	0.1221	0.0683
		0.8216	0.0464	0.0442	0.0488	0.9174	0.0391	0.1267	0.1056
		0.7804	0.0650	0.0550	0.0770	0.8918	0.0561	0.1489	0.1573
		0.7519	0.0753	0.0645	0.0925	0.8746	0.0661	0.1683	0.1822
		0.6723	0.1063	0.0855	0.1186	0.8220	0.0981	0.2085	0.2183
		0.6162	0.1221	0.1208	0.1417	0.7844	0.1173	0.2712	0.2401
		0.5540	0.1381	0.1781	0.1604	0.7395	0.1329	0.3602	0.2448
40.00	313.15	0.8248	0.0337	0.0471	0.0269	0.9247	0.0285	0.1382	0.0596
		0.7884	0.0510	0.0529	0.0443	0.9017	0.0440	0.1499	0.0948
		0.7384	0.0728	0.0642	0.0710	0.8696	0.0647	0.1721	0.1436
		0.7003	0.0878	0.0783	0.0858	0.8446	0.0799	0.2009	0.1661
		0.6265	0.1104	0.1257	0.1148	0.7956	0.1058	0.2879	0.1985
		0.5691	0.1235	0.1845	0.1315	0.7557	0.1238	0.3799	0.2044
50.00	323.15	0.7927	0.0346	0.0550	0.0238	0.9114	0.0300	0.1595	0.0521
		0.7388	0.0569	0.0659	0.0369	0.8774	0.0510	0.1838	0.0777
		0.6736	0.0796	0.0742	0.0650	0.8352	0.0745	0.1966	0.1300
		0.6169	0.0946	0.1004	0.0741	0.7976	0.0923	0.2510	0.1398
		0.5006	0.1141	0.1704	0.1030	0.7147	0.1229	0.3683	0.1680
60.0	333.15	0.7566	0.0359	0.0635	0.0221	0.8954	0.0321	0.1814	0.0476
		0.6739	0.0603	0.0749	0.0381	0.8446	0.0570	0.2049	0.0787
		0.5957	0.0803	0.1152	0.0607	0.7922	0.0806	0.2849	0.1133
		0.5036	0.0964	0.1265	0.0675	0.7252	0.1048	0.3045	0.1226

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility curves were determined by the titration method. The analytical method was used, samples being withdrawn from coexisting liquid phases at equilibrium for analysis by gas chromatography. No details were reported.

Source and Purity of Materials:
(1) Source not specified, pure grade; dried over $CaCl_2$ and repeatedly distilled in a laboratory packed column of 20 theoretical plates.
(2) Source not specified, pure grade; distilled.
(3) Doubly distilled.

Estimated Error:
Solubility: ±0.0005 mole fraction;
Composition: ±0.002 mole fraction;
Temperature: control to ±0.01 K.

5.6. +1,2-Ethanediol

Components:
(1) Nitromethane: CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) Water; H_2O [7732-18-5]

Original Measurements:
V. Kubicek, J. P. Novak, and J. Matous, Collect. Czech. Chem. Commun. **58**, 983–95 (1993).

Variables:
T/K = 293

Prepared By:
N. V. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, 1,2-ethanediol, and water

t/°C	T/K (compiler)	x_1	x_2	w_1 (compiler)	w_2 (compiler)
20	293	0.040	0.121	0.097	0.300
		0.048	0.217	0.099	0.454
		0.074	0.367	0.121	0.609
		0.169	0.614	0.197	0.728
		0.947	0.035	0.959	0.036

TABLE 2. Compositions of equilibrium liquid phases ternary system

		Nitromethane-rich phase		Glycol (water)-rich phase		Nitromethane-rich phase (compiler)		Glycol (water)-rich phase (compiler)	
t/°C	T/K (compiler)	x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20	293	0.946	0.025	0.115	0.503	0.965	0.026	0.155	0.692
		0.941	0.013	0.057	0.301	0.972	0.014	0.103	0.554
		0.936	0.006	0.041	0.162	0.976	0.006	0.093	0.374
		0.932	0.002	0.035	0.069	0.977	0.002	0.095	0.190

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility curve was determined by the titration method. The compositions of equilibrium liquid phases were determined by the analytical method with the apparatus described in Kubicek *et al.*[1]

Source and Purity of Materials:
(1) Xenon (Polan); dried with sodium and distilled on a packed column with 40 theoretical plates; n(20 °C,D) = 1.380, ρ(20 °C) = 1138.2 g·L^{-1}.
(2) Lachema (Czech); not purified; stored over Dusimo S4 molecular sieve and its water content monitored by the Karl Fischer method during the measurement; n(20 °C,D) = 1.4297, ρ(20 °C) = 1109.5 g·L^{-1}.
(3) Twice distilled.

Estimated Error:
Composition: ±0.001 mole fraction.

References:
[1]V. Kubicek, J. Matous, and J. P. Novak, Collect. Czech. Chem. Commun. **57**, 2021 (1992).

5.7. +2-Propenamide

Components:
(1) Nitromethane: CH_3NO_2; [75-52-5]
(2) 1,2-propenamide; C_3H_5NO; [79-06-1]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
K. Duraiswamy and G. W. Minard, J. Chem. Eng. Data **18**, 203–5 (1973).

Variables:
T/K = 291–303

Prepared By:
N. V. Sazonov

Experimental Data

The distribution of 2-propenamide between coexistence liquid phases

t/°C	T/K (compiler)	w_2' Nitromethane-rich phase	w_2'' Water-rich phase	K_2, distribution coefficient[a]	B, selectivity[b]
18.5	291.7	0.0030	0.0114	0.26	13.28
		0.0087	0.0430	0.20	8.14
		0.0145	0.0834	0.17	5.95
		0.0266	0.1011	0.26	6.70
		0.0349	0.2173	0.16	2.56
		0.0542	0.2356	0.23	2.63
		0.0772	0.2992	0.26	2.12
25.0	298.2	0.0028	0.0106	0.26	9.08
		0.0114	0.0427	0.27	8.48
		0.0173	0.0823	0.21	5.61
		0.0325	0.1179	0.28	6.32
		0.0521	0.1624	0.32	5.55
30.0	303.2	0.0046	0.0101	0.45	25.50
		0.0107	0.0416	0.26	7.36
		0.0190	0.0802	0.25	6.25
		0.0272	0.1150	0.24	5.14
		0.0365	0.1.36	0.24	3.94
		0.0651	0.2255	0.29	3.00
		0.0980	0.2675	0.37	2.22
		0.1373	0.2958	0.47	1.52

[a] $K_2 = w_2'/w_2''$, distribution coefficient is the ratio of concentration of a component (2) in coexistence liquid phases.
[b] $B = K_3/K_2$, selectivity is the ratio of distribution coefficients of two components.

Auxiliary Information

Method/Apparatus/Procedure:
The cloud-point[1] and analytical methods were used. The liquid/liquid equilibrium curve was determined by the former, and compositions of equilibrium liquid phases by the latter. The three components, in such amounts as to form two liquid phases, were added to a separatory funnel, shaken while immersed at constant temperature for 4–5 h, and allowed to settle into two layers. The two layers were separated and kept at constant temperature and the density of each was measured. Samples of each layer were analyzed for (2) content. Since these compositions must lie on the binodal curve, complete equilibrium compositions of the conjugate phases were known.

Source and Purity of Materials:
(1) Source not specified, commercial reagent grade; not purified.
(2) Eastman Kodak White grade; not purified.
(3)Not specified.

Estimated Error:
Temperature: control to ±0.5 K;
Weighing: to 0.1 mg;
Titer: ±0.05 mL.

References:
[1]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

5.8. +Propanoic Acid

Components:
(1) Nitromethane: CH_3NO_2; [75-52-5]
(2) Propanoic acid; $C_3H_6O_2$; [79-09-4]
(3)Water; H_2O; [7732-18-5]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A summary of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+propanoic acid+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+propanoic acid+water

Author(s)	T/K	Type of data[a]
Zhuravlev and Maslovskaya[1]	293	Solubility curve (20)
Maslovskaya[2]	293	Equilibrium (9)
	313	Solubility curve (23), equilibrium (7)

[a]Number of experimental points in parentheses.

Solubility curve

The system nitromethane+propanoic acid+water forms a miscibility gap of Type I, Treybal.[3] Only one binary pair of components, nitromethane+water, is partially miscible. The data for this system were previously compiled and critically evaluated.[4] The recommended values for the solubility of nitromethane in water at 293.2 K is $x_1''=0.0345$; and at 313.2 K, $x_1''=0.0426$. The solubility of nitromethane in water at 293.2 K reported in Zhuravlev and Maslovskaya[1] (0.090 mass fraction; 0.028 mole fraction) and at 313.2 K in Maslovskaya[2] (0.100 mass fraction; 0.032 mode fraction) are rejected because they are inconsistent with recommended values from Sazonov *et al.*[4]

Solubility data obtained by the titration method for the ternary system nitromethane+propanoic acid+water were reported in two references. Data of Zhuravlev and Maslovskaya[1] which were reported at 293.2 K are in poor agreement with the data of Maslovskaya,[2] which were reported at 313.2 K and are inconsistent with the data at same temperature in a series of systems nitromethane+acid (formic,acetic,butanoic)+water. Therefore data at 293.2 K, Zhuravlev and Maslovskaya,[1] were not considered, but in Fig. 8 are given for comparison. Experimental errors were not reported, but are estimated by the evaluator to be ±0.002 mass fraction. Solubility data at 313.2 (water-rich and nitromethane-rich branches together) are described by an algebraic equation in the form:

$$x_2=a+b\cdot x_3+c\cdot(x_3)^2+d\cdot(x_3)^{1/2}+e\cdot(x_3)^{3/2}.$$

This smoothing equation gives a smaller standard deviation than any other tested equation. The equation parameters (a,b,c,d,e) were calculated by the least squares method and presented in Table 2. Binodal curves in this system were calculated and compared separately for solubility data reported in Zhuravlev and Maslovskaya[1] and Maslovskaya.[2]

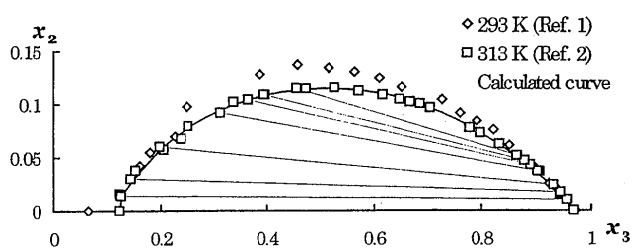

FIG. 8. Solubility curves and tie lines of the system nitromethane+propanoic acid+water (mole fraction).

5.9. +1-Propanol

TABLE 2. The equation parameters

T/K	a	b	c	d	e	St. dev.
313, Ref. 2	−0.4994	−5.2346	−2.3690	−2.7262	−5.3623	−0.0037

The solubilities calculated by the proposed equation are presented in Fig. 8. Experimental solubility data (Zhuravlev and Maslovskaya[1] and Maslovskaya[2]) are presented in Fig. 8 for comparison.

TABLE 3. Calculated mutual solubilities of nitromethane, propanoic acid, and water

T/K	x_1	x_2	x_3	w_1	w_2	w_3
313.2	0.043	0.000	0.957	0.131	0.000	0.869
	0.038	0.012	0.950	0.114	0.044	0.842
	0.065	0.035	0.900	0.174	0.114	0.712
	0.128	0.072	0.800	0.283	0.194	0.523
	0.203	0.097	0.700	0.385	0.223	0.392
	0.289	0.111	0.600	0.481	0.224	0.295
	0.385	0.115	0.500	0.573	0.208	0.219
	0.492	0.108	0.400	0.662	0.178	0.160
	0.609	0.091	0.300	0.754	0.137	0.109
	0.742	0.058	0.200	0.851	0.081	0.068
	0.856	0.014	0.130	0.939	0.019	0.042
	0.890	0.000	0.110	0.965	0.000	0.035

Liquid–liquid equilibrium (LLE) data

LEE data for the ternary system nitromethane+propanoic acid+water were reported in Maslovskaya.[2] Composition of each phase was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of the saturation curve measurements. The tie lines at 313.2 K cover the whole range of the miscibility gap, Fig. 8. The distribution of acid mainly in the nitromethane-rich phase is observed. Data reported at 293.2 and 313.2 K, Maslovskaya,[2] are in agreement. Plait points were reported in both cases: at 293.2 K it is $x_1=0.197$, $x_2=0.110$, and 313.2 K it is $x_1=0.198$, $x_2=0.095$. Experimental errors were not reported in the papers, but are estimated by the evaluator to be ±0.005 mass fractions.

Recommended or tentative data

Solubility and liquid–liquid equilibrium data measured by different methods are in agreement with one another. Experimental data on solubilities at T/K=293.2 and 313.2, Zhuravlev and Maslovskaya[1] and Maslovskaya,[2] are presented in Fig. 8. The ternary solubility data, Maslovskaya,[2] were used to obtain equation parameters of the binodal curve.

In view of the inaccurate results obtained in Zhuravlev and Maslovskaya[1] and Maslovskaya[2] for the binary nitromethane+water system, the evaluator considers the ternary system data to be tentative and concludes that new studies on the ternary system would be of value.

References:

[1]E. F. Zhuravlev and N. V. Maslovskaya, Izv. Vyssh. Uchebn. Zaved., Khim, Khim. Tekhnol. **18**, 334 (1975); Deposited Doc. VINTI 1466 (1974).
[2]N. V. Maslovskaya, dissertation, Kalinin University, 1974.
[3]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).
[4]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series. Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Propanoic acid; $C_3H_6O_2$; [79-09-4]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
E. F. Zhuravlev and N. V. Maslovskaya, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **18**, 334 (1975).
*Deposited Doc., VINITI 1466 (1974).

Variables:
T/K = 293

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, propanoic acid, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.0	293.2	0.0280	0.0000	0.0900	0.0000
		0.0414	0.0195	0.1210	0.0690
		0.0521	0.0253	0.1467	0.0863
		0.0654	0.0423	0.1720	0.1350
		0.0891	0.0613	0.2150	0.1.95
		0.1038	0.0758	0.2370	0.2100
		0.1254	0.0843	0.2720	0.2220
		0.1495	0.0915	0.3085	0.2292
		0.1701	0.1041	0.3330	0.2475
		0.2337	0.1159	0.4127	0.2483
		0.2674	0.1243	0.4473	0.2523
		0.3076	0.1303	0.4870	0.2503
		0.3520	0.1343	0.5280	0.2445
		0.4072	0.1371	0.5750	0.2350
		0.4871	0.1276	0.6445	0.2050
		0.6534	0.0975	0.7730	0.1400
		0.7033	0.0696	0.8310	0.0998
		0.7653	0.0548	0.8648	0.0752
		0.7971	0.0421	0.8900	0.0570
		0.9350	0.0000	0.9800	0.0000

Estimated plait point: $w_1 = 0.368$; $w_2 = 0.250$ ($x_1 = 0.197$; $x_2 = 0.110$, compiler).

Auxiliary Information

Method/Apparatus/Procedure:
The solubility curve was determined by the titration method. No further details were reported.

Source and Purity of Materials:
(1) Source not specified, pure grade; distilled.
(2) Source not specified, pure grade; distilled.
(3) Doubly distilled.

Estimated Error:
Not reported.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Propanoic acid; $C_3H_6O_2$; [79-09-4]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
N. V. Maslovskaya, dissertation, Kalinin University (1974).

Variables:
T/K = 293 and 313

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, propanoic acid, and water

t/°C	T/K	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.0	313.2	0.0320	0.0000	0.1000	0.0000
		0.0405	0.0153	0.1200	0.0550
		0.0593	0.0367	0.1600	0.1200
		0.0847	0.0515	0.2106	0.1554
		0.1058	0.0628	0.2475	0.1783
		0.1307	0.0732	0.2876	0.1954
		0.1455	0.0780	0.3100	0.2017
		0.1999	0.0964	0.3810	0.2230
		0.2157	0.1002	0.4000	0.2255
		0.2320	0.1020	0.4200	0.2240
		0.2499	0.1045	0.4405	0.2235
		0.2775	0.1085	0.4700	0.2230
		0.3182	0.1123	0.5110	0.2190
		0.3599	0.1156	0.5495	0.2141
		0.4140	0.1147	0.5980	0.2010
		0.4961	0.1090	0.6660	0.1775
		0.5621	0.1020	0.7160	0.1577
		0.6694	0.0794	0.7970	0.1147
		0.6943	0.0677	0.8200	0.0970
		0.7372	0.0572	0.8500	0.0800
		0.8096	0.0379	0.8990	0.0510
		0.8601	0.0158	0.9390	0.0210
		0.8760	0.0000	0.9600	0.0000

Estimated plait point: $w_1 = 0.380$, $w_2 = 0.220$ ($x_1 = 0.198$, $x_2 = 0.095$, compiler).

TABLE 2. Compositions of coexisting liquid phases

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Water-rich phase (compiler)		Nitromethane-rich phase		Water-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.0	293.2	0.918	0.010	0.033	0.007	0.965	0.013	0.101	0.026
		0.886	0.022	0.037	0.012	0.943	0.028	0.112	0.045
		0.808	0.046	0.041	0.017	0.891	0.061	0.122	0.061
		0.673	0.089	0.054	0.030	0.790	0.128	0.149	0.102
		0.577	0.114	0.065	0.042	0.715	0.172	0.172	0.135
		0.484	0.130	0.080	0.056	0.650	0.212	0.198	0.168
		0.441	0.135	0.085	0.060	0.604	0.224	0.207	0.177
		0.404	0.137	0.093	0.066	0.572	0.236	0.220	0.190
		0.400	0.138	0.094	0.067	0.569	0.237	0.222	0.191
40.0	313.2	0.860	0.014	0.034	0.010	0.941	0.018	0.104	0.035
		0.826	0.030	0.039	0.017	0.913	0.040	0.116	0.060
		0.742	0.060	0.045	0.024	0.850	0.083	0.130	0.083
		0.596	0.092	0.059	0.037	0.745	0.140	0.160	0.120
		0.533	0.104	0.069	0.043	0.695	0.165	0.180	0.137
		0.498	0.109	0.076	0.047	0.667	0.177	0.193	0.147
		0.431	0.115	0.085	0.052	0.612	0.198	0.210	0.150

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility curve was determined by the titration method. The analytical method was used, samples being withdrawn from coexisting liquid phases at equilibrium for analysis by refractometry.

Source and Purity of Materials:

(1) Source not specified, pure grade reagent; distilled; boiling point= 101.0 °C; n(20 °C,D)=1.3818, d(20 °C,4 °C) =1.1385.
(2) Source not specified, dried and distilled; boiling point =140.6 °C; n(20 °C,D)=1.3876, d(20 °C,4 °C)=0.9920.
(3) Doubly distilled.

Estimated Error:

Not reported.

5,9. +1-Propanol

Components:	Evaluator:
(1) Nitromethane; CH_3NO_2; [75-52-5] (2) 1-Propanol; C_3H_8O; [71-23-8] (3) Water; H_2O; [7732-18-5]	V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+1-propanol+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+1-propanol+water

Author(s)	T/K	Type of data[a]
Fowler and Hunt[1]	298	Solubility curve (13)
Zhuravlev and Maslovskaya[2]	293	Solubility curve (23)
Maslovskaya[3]	293	Equilibrium (9)
	313	Solubility curve (20), equilibrium (7)

[a] Number of experimental points in parentheses.

Solubility curve

The system nitromethane+1-propanol+water forms a miscibility gap of Type I, Treybal.[4] Only one binary pair of components, nitromethane+water, is partially miscible. The data for this system were previously compiled and critically evaluated by Sazonov *et al.*[5] The recommended values for the solubility of nitromethane in water at 293.2 K is $x_1''=0.0345$; and at 313.2 K, $x_1''=0.0426$. The solubility of nitromethane in water at 293.2 K, reported in Zhuravlev and Maslovskaya[2] (0.090 mass fraction; 0.028 mole fraction) and at 313.2 K in Maslovskaya[3] (0.100 mass fraction; 0.032 mole fraction), are rejected because they are inconsistent with recommended values from Sazonov *et al.*[5] Data of Fowler and Hunt[1] at 298 K are in excellent accord with recommended values.

Solubility data obtained by the titration method for the ternary system nitromethane+1-propanol+water were reported in three references. Data of Maslovskaya,[3] reported at 313.2 K, indicate a smaller miscibility gap than the data at 293.2 K reported in Zhuravlev and Maslovskaya[2] and are in agreement. Thus, with an increase in temperature the mutual solubility of the components increases, Fig. 9. The data for the nitromethane+1-propanol+water system are consistent with the data for the nitromethane+ethanol+water system measured and reported by Maslovskaya in the same paper.[3] Data of Fowler and Hunt,[1] which were reported at 298 K, are in poor agreement with data of Zhuravlev and Maslovskaya[2] at 293.2 K. Therefore, solubility data at 293.2 K, Zhuravlev and Maslovskaya,[2] were not considered, but in Fig. 9 are given for comparison. Experimental errors were not reported in the papers, but are estimated by the evaluator to be ±0.002 mass fractions. Solubility data at 298 and 313 K (water-rich and nitromethane-rich branches together) are described by an algebraic equation in the form:

$$x_2=a+b\cdot x_3+c\cdot(x_3)^2+d\cdot(x_3)^{1/2}+e\cdot(x_3)^{3/2}.$$

This smoothing equation gives a smaller standard deviation than any other tested equation. The equation parameters (a, b, c, d, and e) were calculated by the least squares method and presented in Table 2. Binodal curves in this system were calculated and compared separately for solubility data reported in Fowler and Hunt,[1] Zhuravlev and Maslovskaya,[2] and Maslovskaya.[3]

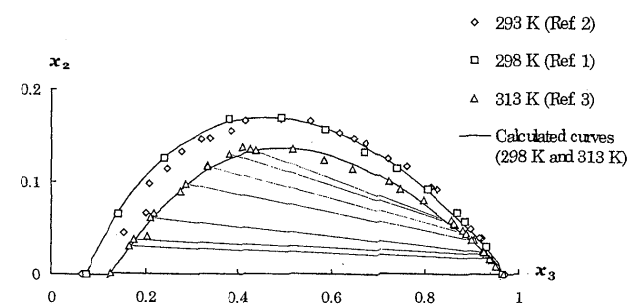

FIG. 9. Solubility curves and tie lines of the system nitromethane+1-propanol+water (mole fraction).

TABLE 2. The equation parameters

T/K	a	b	c	d	e	ST. dev.
298, Ref. 1	−0.1874	0.3822	−0.0995	−0.6433	−0.7514	0.0052
313, Ref. 3	0.0699	5.6921	1.9162	−1.5288	−6.1597	0.0056

TABLE 3. Calculated solubilities of nitromethane, 1-propanol, and water

T/K	x_1	x_2	x_3	w_1	w_2	w_3
298.2	0.035	0.000	0.965	0.110	0.000	0.890
	0.033	0.017	0.950	0.100	0.051	0.849
	0.055	0.045	0.900	0.151	0.121	0.728
	0.108	0.092	0.800	0.248	0.208	0.544
	0.170	0.130	0.700	0.336	0.253	0.411
	0.245	0.155	0.600	0.426	0.265	0.309
	0.332	0.168	0.500	0.514	0.256	0.230
	0.434	0.166	0.400	0.606	0.228	0.166
	0.553	0.147	0.300	0.703	0.184	0.113
	0.694	0.106	0.200	0.809	0.122	0.069
	0.871	0.029	0.100	0.937	0.031	0.032
	0.913	0.007	0.080	0.967	0.007	0.026
	0.926	0.000	0.074	0.977	0.000	0.023
313.2	0.043	0.000	0.957	0.131	0.000	0.869
	0.037	0.013	0.950	0.112	0.038	0.850
	0.065	0.035	0.900	0.178	0.094	0.728
	0.125	0.075	0.800	0.287	0.169	0.544
	0.193	0.107	0.700	0.382	0.208	0.410
	0.272	0.128	0.600	0.473	0.219	0.308
	0.364	0.136	0.500	0.564	0.207	0.229
	0.472	0.128	0.400	0.659	0.175	0.166
	0.600	0.100	0.300	0.762	0.125	0.113
	0.750	0.050	0.200	0.874	0.057	0.069
	0.868	0.002	0.130	0.955	0.021	0.024
	0.890	0.000	0.110	0.965	0.000	0.035

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+1-propanol+water were reported in Maslovskaya.[3] Composition of each phase was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of the saturation curve measurements. The tie lines at 313.2 K cover the whole range of the miscibility gap. The distribution of alcohol mainly in the nitromethane-rich phase is observed. Data reported at 293.2 and 313.2 K, Maslovskaya,[3] are in agreement. Plait points were reported in both cases: at 293.2 K it is $x_1=0.163$, $x_2=0.134$ and at 313.2 K it is $x_1=0.182$, $x_2=0.100$. Experimental errors were not reported in the paper, but are estimated by the evaluator to be ±0.005 mass fractions.

Recommended or tentative data

Solubility and liquid–liquid equilibrium data measured by different methods are in agreement with one another. Experimental data on solubilities[1–3] at T/K=293, 298, and 313 are presented in Fig. 9. The ternary solubility data[1,3] were used to obtain equation parameters of the binodal curves.

In view of the inaccurate results obtained in Zhuravlev and Maslovskaya[2] and Maslovskaya[3] for the binary nitromethane+water system, the evaluator considers the ternary system data to be tentative and concludes that new studies on the ternary system would be of value.

References:

[1]A. R. Fowler and H. Hunt, Ind. Eng. Chem. **33**, 90 (1941).

[2]E. F. Zhuravlev and N. V. Maslovskaya, Zh. Obshch. Khim. **44**, 1849 (1974).

[3]N. V. Maslovskaya, dissertation, Kalinin University, 1974.

[4]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

[5]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series. Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Propanol; C_3H_8O; [71-23-8]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

A. R. Fowler and H. Hunt, Ind. Eng. Chem. **33**, 90–5 (1941).

Variables:

T/K=298

Prepared By:

V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, 1-propanol, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
25	298	0.035	0.000	0.1103	0.000
		0.040	0.030	0.115	0.085
		0.056	0.057	0.150	0.150
		0.064	0.066	0.166	0.169
		0.102	0.091	0.2375	0.208
		0.146	0.114	0.306	0.2355
		0.198	0.132	0.376	0.247
		0.259	0.156	0.443	0.262
		0.339	0.168	0.5215	0.255
		0.450	0.168	0.618	0.227
		0.636	0.125	0.766	0.149
		0.794	0.064	0.883	0.0705
		0.927	0.000	0.9772	0.000

Auxiliary Information

Method/Apparatus/Procedure:

The titration method was used. Nitromethane and water were shaken together in various proportions, heated to about 50 °C, and allowed to stand at 25 °C with occasional shaking, for 1 week. The two-phase mixtures were then titrated with 1-propanol to a clear one-phase solution, the chemical being measured by means of calibrated burettes.

Source and Purity of Materials:

(1) Commercial Solvents Corp., technical grade; fractionated; boiling point range (100.9–101.5 °C) at 99.725 kPa; ρ(25 °C) = 1129.9 g·L^{-1}.
(2) Eastman Kodak Co., C. P. grade; dried over Drierite; ρ(25 °C) = 800.0 g·L^{-1}.
(3) Redistilled.

Estimated Error:

Temperature: control to ±0.5 K.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Propanol; C_3H_8O; [71-23-8]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
E. F. Zhuravlev and N. V. Maslovskaya, Zh. Obshch. Khim. **44**, 1849 (1974).

Variables:
T/K=293

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, 1-propanol, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.0	293.2	0.0280	0.0000	0.0900	0.0000
		0.0372	0.0395	0.1100	0.0717
		0.0427	0.0395	0.1210	0.1104
		0.0523	0.0483	0.1432	0.1301
		0.0805	0.0912	0.1940	0.2165
		0.0934	0.0933	0.2195	0.2160
		0.1212	0.1160	0.2632	0.2479
		0.1542	0.1243	0.3150	0.2500
		0.1837	0.1422	0.3514	0.2679
		0.2067	0.1469	0.3812	0.2668
		0.2314	0.1525	0.4107	0.2665
		0.2790	0.1657	0.4603	0.2692
		0.3391	0.1681	0.5217	0.2545
		0.4183	0.1660	0.5938	0.2320
		0.4579	0.1551	0.6317	0.2107
		0.5148	0.1458	0.6781	0.1903
		0.5345	0.1450	0.6925	0.1849
		0.5907	0.1322	0.7359	0.1622
		0.6378	0.1142	0.7745	0.1366
		0.6953	0.0969	0.8161	0.1119
		0.7346	0.0654	0.8561	0.0751
		0.8049	0.0433	0.9020	0.0478
		0.9350	0.0000	0.9800	0.0000

Estimated plait point: $w_1=0.325$, $w_2=0.262$ ($x_1=0.163$, $x_2=0.134$, compiler).

Auxiliary Information

Method/Apparatus/Procedure:
The solubility curve was determined by the titration method. No further details were reported.

Source and Purity of Materials:
(1) Source not specified, pure grade; distilled.
(2) Source not specified, pure grade; distilled.
(3) Doubly distilled.

Estimated Error:
Not reported.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Propanol; C_3H_8O; [71-23-8]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
N. V. Maslovskaya, dissertation, Kalinin University, 1974.

Variables:
T/K=293 and 313

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, 1-propanol, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.0	313.2	0.0320	0.0000	0.1000	0.0000
		0.0395	0.0088	0.1200	0.0263
		0.0405	0.0152	0.1212	0.0448
		0.0514	0.0246	0.1475	0.0696
		0.0579	0.0371	0.1601	0.1009
		0.0700	0.0469	0.1858	0.1224
		0.0845	0.0574	0.2143	0.1432
		0.1222	0.0798	0.2800	0.1800
		0.1604	0.0912	0.3405	0.1905
		0.1753	0.0994	0.3598	0.2008
		0.2426	0.1134	0.4457	0.2050
		0.2933	0.1231	0.4999	0.2065
		0.3489	0.1353	0.5500	0.2100
		0.4283	0.1339	0.6213	0.1912
		0.4543	0.1370	0.6400	0.1900
		0.5498	0.1167	0.7205	0.1505
		0.6361	0.0884	0.7907	0.1082
		0.7187	0.0656	0.8486	0.0762
		0.7565	0.0405	0.8835	0.0465
		0.8760	0.0000	0.9600	0.0000

Estimated plait point: $w_1=0.370$, $w_2=0.200$ ($x_1=0.182$, $x_2=0.100$, compiler).

TABLE 2. Compositions of coexisting liquid phases

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Water-rich phase (compiler)		Nitromethane-rich phase		Water-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.0	293.2	0.886	0.019	0.032	0.010	0.950	0.020	0.098	0.030
		0.870	0.029	0.034	0.017	0.937	0.031	0.104	0.050
		0.795	0.056	0.041	0.028	0.889	0.062	0.118	0.080
		0.703	0.092	0.046	0.038	0.823	0.106	0.130	0.106
		0.592	0.130	0.051	0.048	0.738	0.160	0.140	0.130
		0.514	0.146	0.057	0.058	0.678	0.190	0.151	0.153
		0.485	0.153	0.059	0.061	0.653	0.203	0.155	0.158
		0.426	0.166	0.072	0.077	0.600	0.230	0.180	0.191
		0.315	0.170	0.083	0.088	0.497	0.264	0.200	0.210
40.0	313.2	0.807	0.029	0.044	0.017	0.913	0.032	0.130	0.050
		0.788	0.037	0.047	0.021	0.899	0.042	0.138	0.060
		0.730	0.060	0.050	0.024	0.858	0.069	0.144	0.069
		0.617	0.097	0.062	0.037	0.774	0.120	0.170	0.100
		0.550	0.116	0.067	0.044	0.721	0.150	0.180	0.115
		0.488	0.130	0.080	0.053	0.670	0.175	0.205	0.135
		0.440	0.135	0.081	0.055	0.630	0.190	0.208	0.139

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility curve was determined by the titration method. The analytical method was used, samples being withdrawn from coexisting liquid phases at equilibrium for analysis by refractometry.

Source and Purity of Materials:

(1) Source not specified, pure grade reagent; distilled; boiling point = 101.0 °C; n(20 °C,D) = 1.3818, d(20 °C,4 °C) = 1.1385.
(2) Purity not specified; dried and distilled; boiling point = 97.1 °C; n(20 °C,D) = 1.3856, d(20 °C,4 °C) = 0.7969.
(3) Doubly distilled.

Estimated Error:

Not reported.

5.10. +2-Propanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Propanol; C_3H_8O; [67-63-0]
(3) Water; H_2O; [7732-18-5]

Evaluator:

V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+2-propanol+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+2-propanol+water

Author(s)	T/K	Type of data[a]
Schumacher and Hunt[1]	298	Solubility curve (14)
Sazonov[2]	298	Equilibrium (8)

[a] Number of experimental points in parentheses.

Solubility curve

The system nitromethane+2-propanol+water forms a miscibility gap of Type I, Treybal.[3] Only one binary pair of components, nitromethane+water, is partially miscible. The data for this system were previously compiled and critically evaluated (Savanov *et al.*[4]). The recommended value for the solubility of nitromethane in water at 298.2 K is $x_1 = 0.035$ and water in nitromethane at 298.2 K, $x_2 = 0.074$. Data of Schumacher and Hunt[1] at 298 K are in excellent agreement with these recommended values.

Solubility data obtained by the titration method for the ternary system nitromethane+2-propanol+water were reported in Schumacher and Hunt.[1] The data of Schumacher and Hunt[1] (reported for 298 K), and data of Sazonov[2] (reported for 298 K) are in agreement. Experimental errors were not reported in either papers, but are estimated by the evaluator to be ±0.002 mass fractions. Solubility data at 298 K (Schumacher and Hunt[1] and Sazonov[2]) both separately and in common (water-rich and nitromethane-rich branches together) are described by an algebraic equation in the form:

$$x_2 = [a + b \cdot x_3 + c \cdot (x_3)^2]/[1 + d \cdot (x_3) + e \cdot (x_3)^2 + f \cdot (x_3)^3].$$

This smoothing equation gives a smaller standard deviation than any other tested equation. The equation parameters (a, b, c, d, e and f) were calculated by the least squares method and presented in Table 2.

TABLE 2. The equation parameters

T/K	a	b	c	d	e	f	St. dev.
298, Refs. 1 and 2	−0.0586	0.9331	−0.9068	−0.7095	4.3031	−4.1297	0.0030

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+2-propanol+water were reported in Sazonov.[2] The compositions of the coexisting liquid phases (Sazonov[2]) were determined by gas chromatography. The tie lines at 298.2 K cover the whole range of the miscibility gap. The distribution of alcohol mainly in nitromethane-rich phase is observed, Fig. 10. Experimental errors were not reported in the paper, but are estimated by the evaluator to be ±0.0002 mole fractions.

The solubilities calculated by the proposed equation are presented in the Table 3 and Fig. 10. Experimental solubility data, Refs. 1 and 2, are presented in Fig. 10 for comparison.

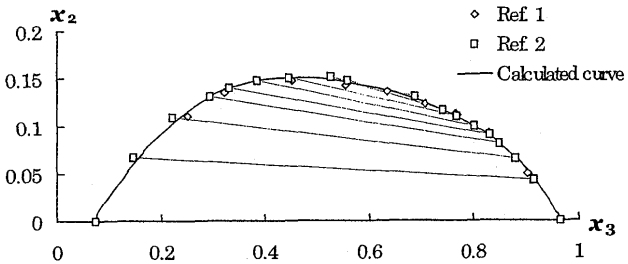

FIG. 10. Solubility curve and tie lines of the system nitromethane+2-propanol+water at 298 K (mole fraction).

TABLE 3. Calculated solubility data for the system nitromethane+2-propanol+water at 298 K

x_1	x_2	x_3	w_1	w_2	w_3
0.035	0.000	0.965	0.110	0.000	0.890
0.036	0.014	0.950	0.109	0.042	0.849
0.045	0.055	0.900	0.123	0.148	0.729
0.100	0.100	0.800	0.230	0.227	0.543
0.175	0.125	0.700	0.347	0.244	0.409
0.258	0.142	0.600	0.449	0.243	0.308
0.350	0.150	0.500	0.542	0.229	0.229
0.451	0.149	0.400	0.630	0.205	0.165
0.569	0.131	0.300	0.723	0.164	0.113
0.708	0.092	0.200	0.826	0.106	0.068
0.874	0.026	0.100	0.941	0.028	0.031
0.909	0.011	0.080	0.963	0.011	0.026
0.926	0.000	0.074	0.977	0.000	0.023

Solubility and liquid–liquid equilibrium data measured by different methods are in agreement with one another. The ternary solubility data[1,2] were used to obtain equation parameters of the bimodal curve. Experimental data on solubilities at $T/K=298$ (Schumacher and Hunt[1] and Sazonov[2]) are recommended.

References:

[1]J. E. Schumacher and H. Hunt, Ind. Eng. Chem. **34**, 701 (1942).
[2]V. P. Sazonov, Zh. Prikl. Khim. (Leningrad) **59**, 1451 (1986).
[3]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).
[4]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Propanol; C_3H_8O; [67-63-0]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
J. E. Schumacher and H. Hunt, Ind. Eng. Chem. **34**, 701–4 (1942).

Variables:
$T/K=298$

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, 2-propanol, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
25	298	0.0353	0.000	0.1103	0.000
		0.047	0.050	0.129	0.136
		0.081	0.091	0.195	0.216
		0.122	0.111	0.266	0.239
		0.123	0.112	0.268	0.241
		0.172	0.123	0.343	0.242
		0.171	0.123	0.342	0.242
		0.229	0.136	0.416	0.243
		0.230	0.136	0.417	0.243
		0.305	0.143	0.501	0.231
		0.401	0.148	0.590	0.214
		0.542	0.135	0.704	0.172
		0.639	0.110	0.778	0.132
		0.9268	0.000	0.9772	0.000

Auxiliary Information

Method/Apparatus/Procedure:
The method described by Fowler and Hunt[1] was used. No experimental details given.

Source and Purity of Materials:
(1) Commercial Solvents Corp., technical grade; fractionated; boiling point range (101.0–101.7 °C), ρ(25 °C) $=1129.0\ g\cdot L^{-1}$.
(2) Carbide and Carbon Co., technical grade; dried and fractionated; boiling point range (82.0–82.3 °C), ρ(25 °C) $=780.3\ g\cdot L^{-1}$.
(3) Distilled.

Estimated Error:
Temperature: control to ±0.5 K.

References:

[1]A. R. Fowler and H. Hunt, Ind. Eng. Chem. **33**, 90 (1941).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Propanol; C_3H_8O; [67-63-0]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
V. P. Sazonov, Zh. Prikl. Khim. (Leningrad) **59**, 1451–6 (1986).

Variables:
T/K = 298

Prepared By:
V. P. Sazonov

Experimental Data

Compositions of coexisting liquid phases

t/°C	T/K (compiler)	Nitromethane-rich phase x_1'	x_2'	Water-rich phase x_1''	x_2''	Nitromethane-rich phase (compiler) w_1'	w_2'	Water-rich phase (compiler) w_1''	w_2''
25.0	298.2	0.7872	0.0663	0.0422	0.0431	0.8788	0.0729	0.1190	0.1196
		0.6705	0.1081	0.0536	0.0657	0.7961	0.1263	0.1417	0.1710
		0.5756	0.1308	0.0694	0.0813	0.7276	0.1628	0.1734	0.2000
		0.5278	0.1399	0.0808	0.0900	0.6912	0.1803	0.1951	0.2139
		0.4677	0.1476	0.0978	0.1000	0.6437	0.2000	0.2258	0.2273
		0.4008	0.1508	0.1218	0.1103	0.5880	0.2178	0.2665	0.2375
		0.3227	0.1517	0.1426	0.1169	0.5145	0.2381	0.2994	0.2417
		0.2946	0.1481	0.1817	0.1309	0.4870	0.2410	0.3538	0.2510

Estimated plait point: $x_1 = 0.222$, $x_2 = 0.141$ ($w_1 = 0.404$, $w_2 = 0.253$; compiler).

Auxiliary Information

Method/Apparatus/Procedure:
The analytical method with the apparatus described in Sazonov[1] was used. The compositions of the coexisting liquid phases were determined by gas chromatography.

Source and Purity of Materials:
(1) Source not specified, pure grade reagent; dried and twice distilled in a packed column; 99.9 mol. % purity.
(2) Source not specified, C.P. reagent; dried and twice distilled in a packed column; 99.9 mol. % purity.
(3) Twice distilled.

Estimated Error:
Not reported.

References:
[1] V. P. Sazonov, Zh. Prikl. Khim. (Leningrad) **55**, 513 (1982).

5.11. +Butanoic Acid

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Butanoic acid; $C_4H_8O_2$; [107-92-6]
(3) Water; H_2O; [7732-18-5]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+butanoic acid+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+butanoic acid+water

Author(s)	T/K	Type of data[a]
Zhuravlev and Maslovskaya[1]	293	Solubility curve (21)
Maslovskaya[2]	293	Equilibrium (6)
	313	Solubility curve (22), equilibrium (5)

[a]Number of experimental points in parentheses.

Solubility curve

The system nitromethane+butanoic acid+water forms a miscibility gap of Type I, Treybal.[3] Only one binary pair of components, nitromethane+water, is partially miscible. The data for this system were previously compiled and critically evaluated.[4] The recommended value for the solubility of nitromethane in water at 293.2 K is $x_1'' = 0.0345$; and at 313.2 K, $x_1'' = 0.0426$. The solubility of nitromethane in water at 293.2 K reported in Zhuravlev and Maslovskaya[1] (0.090 mass fraction; 0.028 mole fraction) and at 313.2 K in Maslovskaya[2] (0.100 mass fraction; 0.032 mole fraction) are rejected because they are inconsistent with recommended values from Sazonov *et al.*[4]

Solubility data obtained by the titration method for the ternary system nitromethane+butanoic acid+water were reported in two references. The data of Maslovskaya,[2] reported at 313.2 K, indicate a smaller miscibility gap than the data at 293.2 K reported in Zhuravlev and Maslovskaya.[1] Thus, with an increase in temperature the mutual solubility of the components increases, Fig. 11. Experimental errors were not reported, but are estimated by the evaluator to be ±0.005 mass fractions. Solubility data at 293.2 and 313.2 K (water-rich and nitromethane-rich branches together) are described by an algebraic equation in the form:

$$x_2 = a + b \cdot x_3 + c \cdot (x_3)^2 + d \cdot (x_3)^{1/2} + e \cdot (x_3)^{3/2}.$$

This smoothing equation gives a smaller standard deviation than any other tested equation. The equation parameters (a,b,c,d,e) were calculated by the least squares method and presented in Table 2. Binodal curves in this system were calculated and compared separately for solubility data reported in Zhuravlev and Maslovskaya[1] and Maslovskaya.[2]

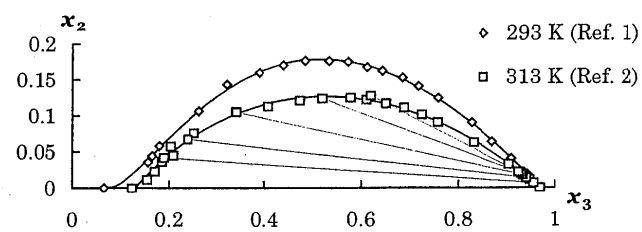

FIG. 11. Solubility curves and tie lines of the system nitromethane+butanoic acid+water (mole fraction).

TABLE 2. The equation parameters

T/K	a	b	c	d	e	St. dev.
293, Ref. 1	0.3333	8.6637	2.2265	−3.0211	−8.2229	0.0025
313, Ref. 2	−0.2094	−0.0099	−0.6081	0.5842	0.2249	0.0041

The solubilities calculated by the proposed equation are presented in the Fig. 11 and in Table 3. Experimental solubility data[1,2] are presented in Fig. 11 for comparison.

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+butanoic acid+water were reported in Ref. 2. Composition of each phase was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of the saturation curve measurements. The tie lines at 293.2 K cover the whole range of the miscibility gap. The distribution of acid mainly in the nitromethane-rich phase is observed. Data reported at 293.2 and 313.2 K, Ref. 2, are in agreement. Plait points were reported in both cases: at 293.2 K the values is $x_1=0.089$, $x_2=0.096$ and at 313.2 K it is $x_1=0.097$, $x_2=0.060$. Experimental errors were not reported in either papers, but are estimated by the evaluator to be ±0.005 mass fractions.

TABLE 3. Calculated solubilities of nitromethane, butanoic acid, and water

T/K	x_1	x_2	x_3	w_1	w_2	w_3
293.2	0.034	0.000	0.966	0.108	0.000	0.892
	0.035	0.015	0.950	0.104	0.064	0.832
	0.053	0.047	0.900	0.137	0.175	0.688
	0.097	0.103	0.800	0.201	0.309	0.490
	0.155	0.145	0.700	0.271	0.367	0.362
	0.229	0.171	0.600	0.351	0.378	0.271
	0.322	0.178	0.500	0.443	0.354	0.203
	0.436	0.164	0.400	0.551	0.299	0.150
	0.573	0.127	0.300	0.678	0.217	0.105
	0.731	0.069	0.200	0.822	0.112	0.066
	0.893	0.007	0.100	0.958	0.011	0.031
	0.938	0.000	0.062	0.981	0.000	0.019
313.2	0.043	0.000	0.957	0.131	0.000	0.869
	0.040	0.010	0.950	0.119	0.043	0.838
	0.065	0.035	0.900	0.171	0.133	0.696
	0.123	0.077	0.800	0.262	0.236	0.502
	0.194	0.106	0.700	0.350	0.276	0.374
	0.277	0.123	0.600	0.439	0.281	0.280
	0.374	0.126	0.500	0.532	0.259	0.209
	0.484	0.116	0.400	0.629	0.218	0.153
	0.610	0.090	0.300	0.736	0.157	0.107
	0.754	0.046	0.200	0.857	0.075	0.068
	0.879	0.001	0.120	0.960	0.002	0.038
	0.890	0.000	0.110	0.965	0.000	0.035

Recommended or tentative data

Solubility and liquid–liquid equilibrium data measured by different methods are in agreement with one another. Experimental data on solubilities at T/K=293.2 and 313.2 Zhuravlev and Maslovskaya[1] and Maslovskaya[2] are presented in Fig. 11. The ternary solubility data, Refs. 1 and 2, were used to obtain equation parameters of the binodal curve.

In view of the inaccurate results obtained in Zhuravlev and Maslovskaya[1] and Maslovskaya[2] for the binary nitromethane+water system, the evaluator considers the ternary system data to be tentative and concludes that new studies on the ternary system would be of value.

References:

[1]E. F. Zhuravlev and N. V. Maslovskaya, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **18**, 334 (1975); Deposited Doc., VINITI 1466 (1974).

[2]N. V. Maslovskaya, dissertation, Kalinin University, 1974.

[3]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

[4]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Butanoic acid; $C_4H_8O_2$; [107-92-6]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

E. F. Zhuravlev and N. V. Maslovskaya, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **18**, 334 (1975); *Deposited Doc., VINITI 1466 (1974).

Variables:

T/K=293

Prepared By:

V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, butanoic acid, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.0	293.2	0.0280	0.0000	0.0900	0.0000
		0.0378	0.0191	0.1100	0.0800
		0.0493	0.0401	0.1310	0.1540
		0.0663	0.0632	0.1600	0.2200
		0.0817	0.0902	0.1790	0.2852
		0.1178	0.1244	0.2260	0.3447
		0.1413	0.1407	0.2540	0.3650
		0.1635	0.1529	0.2790	0.3766
		0.1954	0.1622	0.3155	0.3782
		0.2210	0.1676	0.3435	0.3760
		0.2532	0.1747	0.3755	0.3740
		0.2917	0.1761	0.4150	0.3615
		0.3400	0.1766	0.4610	0.3455
		0.3909	0.1704	0.5100	0.3210
		0.4526	0.1597	0.5675	0.2890
		0.5361	0.1433	0.6400	0.2470
		0.6311	0.1062	0.7322	0.1778
		0.7627	0.0576	0.8485	0.0925
		0.7904	0.0444	0.8750	0.0710
		0.8078	0.0358	0.8920	0.0570
		0.9350	0.0000	0.9800	0.0000

Estimated plait point: $w_1=0.190$, $w_2=0.296$ ($x_1=0.098$, $x_2=0.096$, compiler).

Auxiliary Information

Method/Apparatus/Procedure:

The solubility curve was determined by the titration method. No further details were reported.

Source and Purity of Materials:

(1) Source not specified, pure grade; distilled.
(2) Source not specified, pure grade; distilled.
(3) Doubly distilled.

Estimated Error:

Not reported.

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Butanoic acid; $C_4H_8O_2$; [107-92-6]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

N. V. Maslovskaya, Dissertation, Kalinin University, 1974.

Variables:

T/K=293 and 313

Prepared By:

V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, butanoic acid, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.0	313.2	0.0320	0.0000	0.1000	0.0000
		0.0408	0.0117	0.1210	0.0500
		0.0468	0.0171	0.1345	0.0710
		0.0505	0.0217	0.1420	0.0880
		0.0622	0.0325	0.1654	0.1245
		0.1050	0.0627	0.2380	0.2050
		0.1517	0.0906	0.2997	0.2583
		0.1745	0.1012	0.3266	0.2733
		0.2017	0.1112	0.3570	0.2840
		0.2334	0.1168	0.3930	0.2840
		0.2683	0.1218	0.4299	0.2816
		0.2973	0.1251	0.4585	0.2785
		0.4055	0.1212	0.5630	0.2430
		0.4788	0.1131	0.6280	0.2140
		0.5543	0.1054	0.6870	0.1885
		0.6721	0.0757	0.7854	0.1276
		0.7393	0.0575	0.8380	0.0940
		0.7475	0.0446	0.8560	0.0737
		0.7794	0.0360	0.8798	0.0587
		0.8064	0.0232	0.9058	0.0377
		0.8332	0.0177	0.9300	0.0189
		0.8760	0.0000	0.9600	0.0000

TABLE 2. Compositions of coexisting liquid phases

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Water-rich phase (compiler)		Nitromethane-rich phase		Water-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.0	293.2	0.913	0.011	0.029	0.001	0.960	0.017	0.091	0.006
		0.757	0.071	0.033	0.011	0.830	0.112	0.100	0.046
		0.595	0.123	0.035	0.014	0.695	0.208	0.103	0.060
		0.404	0.165	0.039	0.022	0.525	0.310	0.111	0.090
		0.292	0.176	0.042	0.027	0.415	0.362	0.117	0.110
		0.253	0.175	0.044	0.033	0.376	0.374	0.122	0.130
40.0	313.2	0.769	0.042	0.038	0.007	0.869	0.068	0.114	0.032
		0.694	0.067	0.045	0.014	0.806	0.112	0.130	0.060
		0.554	0.105	0.048	0.018	0.687	0.188	0.136	0.075
		0.357	0.124	0.050	0.020	0.518	0.260	0.141	0.082
		0.253	0.128	0.053	0.022	0.392	0.285	0.147	0.090

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility curve was determined by the titration method. The analytical method was used, samples being withdrawn from coexisting liquid phases at equilibrium for analysis by refractometry.

Source and Purity of Materials:

(1) Source not specified, pure grade reagent; distilled; b.p. =101.0 °C; n(20 °C,D)=1.3818, d(20 °C,4 °C)=1.1385.
(2) Source not specified, dried and distilled; b.p.=162.6 °C; n(20 °C,D)=1.3995, d(20 °C,4 °C)=0.9620.
(3) Doubly distilled.

Estimated Error:

Not reported.

5.12. +2-Methyl-1-propanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Methyl-1-propanol; $C_4H_{10}O$; [78-83-1]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
I. K. Zhuravleva and E. F. Zhuravlev, Zh. Fiz. Khim. **49**, 778–81 (1975).

Variables:
T/K=268–354

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2) as 17.0:83.0, 23.0:77.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.3:29.7, 80.0:20.0, and 90.0:10.0, respectively.

Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
−3.5	269.7	0.112	0.447	0.142	0.692
−1.5	271.7	0.109	0.437	0.141	0.686
15.5	288.7	0.103	0.415	0.138	0.672
34.0	307.2	0.099	0.398	0.135	0.662
47.0	320.2	0.093	0.374	0.132	0.645
58.5	331.7	0.088	0.356	0.129	0.631
67.0	340.2	0.085	0.340	0.127	0.619
74.0	347.2	0.083	0.332	0.126	0.612
−3.0	270.2	0.224	0.617	0.220	0.734
0.0	273.2	0.235	0.647	0.223	0.744
0.5	273.7	0.147	0.404	0.191	0.637
1.5	274.7	0.240	0.662	0.224	0.749
5.0	278.2	0.251	0.689	0.227	0.757
8.5	281.7	0.142	0.392	0.188	0.630
15.5	288.7	0.140	0.386	0.187	0.626
23.0	296.2	0.136	0.377	0.185	0.620
28.5	301.7	0.134	0.371	0.184	0.616
35.5	308.7	0.131	0.360	0.182	0.609
45.5	318.7	0.126	0.346	0.179	0.599
50.5	323.7	0.124	0.341	0.178	0.595
63.5	336.7	0.116	0.318	0.173	0.577
71.5	344.7	0.108	0.298	0.167	0.561
76.0	349.2	0.104	0.286	0.165	0.550
−3.5	269.7	0.277	0.531	0.283	0.659
−1.5	271.7	0.195	0.374	0.251	0.585
2.5	275.7	0.295	0.569	0.288	0.673
3.0	276.2	0.191	0.367	0.249	0.581
8.0	281.2	0.320	0.614	0.295	0.687
25.0	298.2	0.172	0.329	0.239	0.556
45.0	318.2	0.153	0.295	0.227	0.531
54.5	327.7	0.011	0.020	0.033	0.077
55.5	328.7	0.143	0.274	0.220	0.514
63.0	336.2	0.133	0.255	0.213	0.497
69.0	342.2	0.124	0.239	0.206	0.482
71.0	344.2	0.011	0.021	0.034	0.081
74.0	347.2	0.116	0.222	0.199	0.465
75.0	348.2	0.012	0.022	0.036	0.084
78.0	351.2	0.109	0.210	0.193	0.451
78.5	351.7	0.013	0.024	0.039	0.091
−1.0	272.2	0.354	0.421	0.372	0.538
1.5	274.7	0.266	0.329	0.339	0.509
3.0	276.2	0.376	0.464	0.381	0.571
12.0	285.2	0.250	0.309	0.331	0.497
22.0	295.2	0.239	0.294	0.325	0.487
29.0	302.2	0.230	0.284	0.320	0.480
44.5	317.7	0.205	0.254	0.305	0.458
62.5	335.7	0.168	0.208	0.278	0.417
69.0	342.2	0.154	0.191	0.266	0.400
73.0	346.2	0.142	0.175	0.255	0.382
77.5	350.7	0.123	0.152	0.236	0.354
80.0	353.2	0.111	0.137	0.222	0.334
−5.0	268.2	0.352	0.289	0.435	0.434
−2.0	271.2	0.372	0.307	0.443	0.444
−0.5	272.7	0.401	0.330	0.455	0.455
0.0	273.2	0.415	0.341	0.460	0.460
1.0	274.2	0.436	0.359	0.467	0.468
4.0	277.2	0.459	0.378	0.475	0.475
8.5	281.7	0.506	0.417	0.489	0.489
17.0	290.2	0.328	0.270	0.423	0.424
19.0	292.2	0.326	0.269	0.422	0.423
28.0	301.2	0.302	0.249	0.410	0.410
30.0	303.2	0.021	0.018	0.065	0.065
40.0	313.2	0.022	0.018	0.067	0.068
41.0	314.2	0.277	0.228	0.395	0.396
51.0	324.2	0.024	0.020	0.073	0.073
53.0	326.2	0.250	0.205	0.378	0.378
58.0	331.2	0.223	0.184	0.359	0.359
59.5	332.7	0.027	0.022	0.080	0.080
62.5	335.7	0.028	0.023	0.082	0.083
65.0	338.2	0.204	0.168	0.344	0.344
68.0	341.2	0.191	0.157	0.333	0.332
70.0	343.2	0.180	0.148	0.323	0.322
71.0	344.2	0.031	0.025	0.090	0.090
73.0	346.2	0.165	0.136	0.308	0.308
75.0	348.2	0.150	0.123	0.292	0.291
76.5	349.7	0.119	0.098	0.254	0.254
80.0	353.2	0.083	0.068	0.199	0.199
80.0	353.2	0.038	0.031	0.107	0.108
81.0	354.2	0.060	0.050	0.158	0.157
−0.5	272.7	0.493	0.271	0.553	0.369
0.0	273.2	0.505	0.277	0.558	0.371
1.5	274.7	0.032	0.018	0.096	0.064
2.0	275.2	0.533	0.292	0.567	0.378
2.5	275.7	0.481	0.264	0.548	0.366
4.0	277.2	0.564	0.310	0.577	0.385
4.5	277.7	0.586	0.322	0.584	0.389
4.5	277.7	0.033	0.018	0.099	0.066
7.5	280.7	0.476	0.261	0.547	0.364
9.5	282.7	0.618	0.339	0.593	0.395
14.0	287.2	0.036	0.019	0.105	0.070
19.0	292.2	0.458	0.252	0.539	0.360
23.0	296.2	0.037	0.021	0.110	0.073
34.5	307.7	0.425	0.233	0.525	0.350
44.0	317.2	0.395	0.217	0.511	0.341
50.5	323.7	0.041	0.023	0.120	0.080
55.0	328.2	0.361	0.198	0.493	0.329
56.0	329.2	0.045	0.025	0.129	0.086
62.5	335.7	0.316	0.173	0.466	0.311
65.5	338.7	0.056	0.030	0.153	0.102
69.5	342.7	0.256	0.140	0.423	0.282
70.0	343.2	0.065	0.036	0.174	0.116
73.0	346.2	0.229	0.125	0.400	0.266
74.0	347.2	0.212	0.117	0.384	0.257
74.5	347.7	0.088	0.048	0.219	0.146
75.5	348.7	0.113	0.062	0.262	0.174
76.0	349.2	0.148	0.081	0.312	0.208
−1.0	272.2	0.600	0.209	0.659	0.279
0.0	273.2	0.618	0.215	0.666	0.281
2.0	275.2	0.633	0.220	0.671	0.283
3.5	276.7	0.573	0.200	0.649	0.275
5.0	278.2	0.655	0.227	0.678	0.286
5.0	278.2	0.031	0.011	0.094	0.040
9.0	282.2	0.709	0.246	0.694	0.293
9.0	282.2	0.564	0.196	0.646	0.273
10.0	283.2	0.033	0.011	0.099	0.042
15.5	288.7	0.550	0.191	0.640	0.271
18.5	291.7	0.036	0.013	0.109	0.046
26.5	299.7	0.526	0.183	0.631	0.266
33.0	306.2	0.041	0.015	0.122	0.052
44.0	317.2	0.047	0.016	0.137	0.058
44.0	317.2	0.484	0.168	0.612	0.258
50.0	323.2	0.050	0.018	0.145	0.062

54.0	327.2	0.445	0.155	0.592	0.251
57.5	330.7	0.057	0.020	0.162	0.068
63.5	336.7	0.402	0.140	0.569	0.240
65.0	338.2	0.065	0.023	0.179	0.076
71.0	344.2	0.358	0.124	0.541	0.228
72.5	345.7	0.081	0.028	0.214	0.091
75.5	348.7	0.309	0.107	0.505	0.213
77.0	350.2	0.101	0.035	0.253	0.107
77.5	350.7	0.270	0.094	0.472	0.200
79.0	352.2	0.234	0.081	0.437	0.185
79.5	352.7	0.138	0.048	0.316	0.134
−2.5	270.7	0.733	0.151	0.771	0.193
1.0	274.2	0.707	0.145	0.763	0.190
1.5	274.7	0.774	0.159	0.784	0.196
2.0	275.2	0.030	0.006	0.092	0.023
5.0	278.2	0.798	0.164	0.791	0.198
10.0	283.2	0.032	0.007	0.100	0.025
20.0	293.7	0.035	0.007	0.108	0.027
24.0	297.2	0.656	0.135	0.744	0.186
35.5	308.7	0.043	0.009	0.128	0.032
39.0	312.2	0.613	0.127	0.727	0.182
44.5	317.7	0.599	0.123	0.721	0.180
47.0	320.2	0.050	0.011	0.148	0.037
54.0	327.2	0.056	0.012	0.162	0.041
57.5	330.7	0.547	0.113	0.697	0.175
58.0	331.2	0.061	0.012	0.174	0.043
64.5	337.7	0.514	0.105	0.681	0.170
65.5	338.7	0.067	0.014	0.189	0.047
70.5	343.7	0.075	0.016	0.208	0.052
71.0	344.2	0.471	0.097	0.657	0.165
75.5	348.7	0.448	0.092	0.644	0.161
78.0	351.2	0.428	0.088	0.631	0.158
−2.0	271.2	0.853	0.078	0.881	0.098
4.0	277.2	0.032	0.003	0.099	0.011
6.0	279.2	0.837	0.076	0.876	0.097
12.5	285.7	0.035	0.003	0.108	0.012
17.0	290.2	0.822	0.076	0.871	0.097
23.0	296.2	0.806	0.074	0.866	0.096
25.0	298.2	0.040	0.004	0.121	0.013
30.0	303.2	0.783	0.072	0.858	0.095
35.0	308.2	0.045	0.004	0.135	0.015
40.0	313.2	0.753	0.069	0.847	0.094
44.5	317.7	0.051	0.005	0.153	0.017
48.5	321.7	0.716	0.066	0.832	0.093
58.0	331.2	0.062	0.006	0.180	0.020
59.0	332.2	0.679	0.062	0.817	0.091
67.0	340.2	0.073	0.007	0.207	0.023
67.5	340.7	0.635	0.058	0.797	0.089
71.5	344.7	0.617	0.057	0.789	0.088
75.5	348.7	0.087	0.008	0.238	0.027

Compositions of two coexistent liquid phases at 0 and 20 °C are also reported in graphical form.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phase were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; freshly distilled; boiling point = 101.3 °C, n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified, freshly distilled; boiling point = 106 °C/98.66 kPa; n(20 °C,D) = 1.3960, d(20 °C,4 °C) = 0.8010.
(3) Twice distilled; n(20 °C,D) = 1.333.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

5.13. +2-Methyl-2-propanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Methyl-2-propanol; $C_4H_{10}O$; [75-65-0]
(3) Water; H_2O; [7732-18-5]

Evaluator:

V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+2-methyl-2-propanol+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+2-methyl-2-propanol+water

Author(s)	T/K	Type of data[a]
Zhuravlev and Maslovskaya[1]	293	Solubility curve (18)
Maslovskaya[2]	293	Equilibrium (9)
	313	Solubility curve (18), equilibrium (7)

[a] Number of experimental points in parentheses.

Solubility curve

The system nitromethane+2-methyl-2-propanol+water forms a miscibility gap of Type I, Treybal.[3] Only one binary pair of components, nitromethane+water, is partially miscible. The data for this system were previously compiled and critically evaluated.[4] The recommended value for the solubility of nitromethane in water at 293.2 K is $x_1''=0.0345$; and at 313.2 K, $x_1''=0.0426$. The solubility of nitromethane in water at 293.2 K, reported in Zhuravlev and Maslovskaya[1] (0.090 mass fraction; 0.028 mole fraction) and at 313.2 K in Maslovskaya[2] (0.100 mass fraction; 0.032 mole fraction), are rejected because they are inconsistent with recommended values from Sazonov *et al.*[4] Solubility data obtained by the titration method for the ternary system nitromethane+2-methyl-2-propanol+water were reported in two references. The data of Maslovskaya,[2] which were reported at 313.2 K, indicate a smaller miscibility gap than the data at 293.2 K reported in Zhuravlev and Maslovskaya.[1] Thus, with an increase in temperature the mutual solubility of the components increases, Fig. 12. Experimental errors were not reported, but are estimated by the evaluator to be ±0.002 mass fractions. Solubility data at 293.2 K and 313.2 K (water-rich and nitromethane-rich branches together) are described by an algebraic equation in the form:

$$x_2=a+b\cdot x_3+c\cdot(x_3)^2+d\cdot(x_3)^{1/2}+e\cdot(x)^{3/2}.$$

This smoothing equation gives a smaller standard deviation than any other tested equation. The equation parameters (a,b,c,d,e) were calculated by the least squares method and presented in Table 2. Binodal curves in this system were calculated and compared separately for solubility data reported in Refs. 1 and 2.

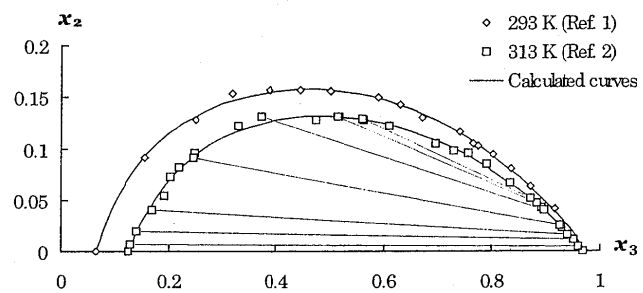

FIG. 12. Solubility curves and tie lines of the system nitromethane+2-methyl-2-propanol+water (mole fraction).

TABLE 2. The equation parameters

T/K	a	b	c	d	e	St. dev.
293, Ref. 1	−0.4355	−5.6084	−2.6643	2.7994	5.8943	0.0032
313, Ref. 2	−0.9115	−9.6697	−3.5790	5.0132	9.1295	0.0037

The solubilities calculated by the proposed equation are presented in the Fig. 12 and in Table 3. Experimental solubility data, Refs. 1 and 2, are presented in Fig. 12 for comparison.

TABLE 3. Calculated solubilities of nitromethane, 2-methyl-2-propanol, and water

T/K	x_1	x_2	x_3	w_1	w_2	w_3
293.2	0.034	0.000	0.966	0.108	0.000	0.892
	0.035	0.015	0.950	0.105	0.055	0.840
	0.053	0.047	0.900	0.141	0.152	0.707
	0.097	0.103	0.800	0.212	0.273	0.515
	0.155	0.145	0.700	0.288	0.327	0.385
	0.229	0.171	0.600	0.373	0.338	0.289
	0.322	0.178	0.500	0.470	0.315	0.215
	0.436	0.164	0.400	0.579	0.264	0.157
	0.573	0.127	0.300	0.702	0.189	0.109
	0.731	0.069	0.200	0.837	0.096	0.067
	0.893	0.007	0.100	0.959	0.009	0.032
	0.938	0.000	0.062	0.981	0.000	0.019
313.2	0.043	0.000	0.957	0.131	0.000	0.869
	0.040	0.010	0.950	0.120	0.037	0.843
	0.065	0.035	0.900	0.174	0.114	0.712
	0.123	0.077	0.800	0.272	0.207	0.521
	0.194	0.106	0.700	0.366	0.243	0.391
	0.277	0.123	0.600	0.459	0.247	0.294
	0.374	0.126	0.500	0.554	0.227	0.219
	0.484	0.116	0.400	0.651	0.190	0.159
	0.610	0.090	0.300	0.755	0.135	0.110
	0.754	0.046	0.200	0.868	0.064	0.068
	0.869	0.001	0.130	0.956	0.001	0.043
	0.890	0.000	0.110	0.965	0.000	0.035

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+2-methyl-2-propanol+water were reported in Maslovskaya.[2] Composition of each phase was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of the saturation curve measurements. The tie lines at 313.2 K cover the whole range of the miscibility gap. The distribution of alcohol mainly in the nitromethane-rich phase is observed. Data reported at 293.2 and 313.2 K, Maslovskaya,[2] are in agreement. Plait points were reported in both cases: at 293.2 K it is $x_1=0.155$, $x_2=0.117$ and at 313.2 K it is $x_1=0.125$, $x_2=0.085$. Experimental errors were not reported in either papers, but are estimated by the evaluator to be ±0.005 mass fractions.

Recommended or tentative data

Solubility and liquid–liquid equilibrium data measured by different methods are in agreement with one another. Experimental data on solubilities at T/K=293.2 and 313.2, Zhuravlev and Maslovskaya[1] and Maslovskaya,[2] are presented in Fig. 12. The ternary solubility data, Zhuravlev and Maslovskaya[1] and Maslovskaya,[2] were used to obtain equation parameters of the binodal curve.

In view of the inaccurate results obtained in Zhuravlev and Maslovskaya[1] and Maslovskaya[2] for the binary nitromethane–water system, the evaluator considers the ternary system data to be tentative and concludes that new studies on the ternary system would be of value.

References:

[1]E. F. Zhuravlev and N. V. Maslovskaya, Zh. Obshch. Khim. **44**, 1849 (1974).

[2]N. V. Maslovskaya, dissertation, Kalinin University, 1974.

[3]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

[4]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Methyl-2-propanol; $C_4H_{10}O$; [75-65-0]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

E. F. Zhuravlev and N. V. Maslovskaya, Zh. Obshch. Khim. **44**, 1849 (1974).

Variables:

T/K=293

Prepared By:

V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, 2-methyl-2-propanol, and water

t/ °C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.0	293.2	0.0280	0.0000	0.0900	0.0000
		0.0434	0.0420	0.1191	0.1400
		0.0641	0.0639	0.1605	0.1945
		0.0823	0.0815	0.1923	0.2311
		0.1016	0.0952	0.2237	0.2544
		0.1231	0.1025	0.2586	0.2613
		0.1311	0.1055	0.2706	0.2644
		0.1429	0.1164	0.2842	0.2810
		0.1982	0.1301	0.3575	0.2849
		0.2273	0.1431	0.3873	0.2960
		0.2610	0.1499	0.4231	0.2950
		0.3443	0.1555	0.5058	0.2773
		0.3981	0.1572	0.5527	0.2650
		0.4565	0.1568	0.5998	0.2502
		0.5299	0.1532	0.6546	0.2298
		0.6234	0.1287	0.7309	0.1833
		0.7537	0.0915	0.8278	0.1220
		0.9350	0.0000	0.9800	0.0000

Estimated plait point: $w_1=0.305$, $w_2=0.278$ ($x_1=0.155$, $x_2=0.117$, compiler).

Auxiliary Information

Method/Apparatus/Procedure:

The solubility curve was determined by the titration method. No details were reported.

Source and Purity of Materials:

(1) Source not specified, pure grade; distilled.
(2) Source not specified, pure grade; distilled.
(3) Doubly distilled.

Estimated Error:

Not reported.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Methyl-2-propanol; $C_4H_{10}O$; [75-65-0]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
N. V. Maslovskaya, dissertation, Kalinin University, 1974.

Variables:
T/K = 293 and 313

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, 2-methyl-2-propanol, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.0	313.2	0.0320	0.0000	0.1000	0.0000
		0.0483	0.0233	0.1378	0.0807
		0.0658	0.0429	0.1727	0.1367
		0.0992	0.0666	0.2326	0.1898
		0.1254	0.0853	0.2714	0.2243
		0.1491	0.0958	0.3053	0.2383
		0.1723	0.0981	0.3400	0.2350
		0.1998	0.1053	0.3750	0.2400
		0.2692	0.1229	0.4502	0.2496
		0.3088	0.1280	0.4897	0.2466
		0.3540	0.1315	0.5318	0.2400
		0.3990	0.1284	0.5745	0.2246
		0.5487	0.1228	0.6903	0.1877
		0.6575	0.0956	0.7767	0.1372
		0.7013	0.0819	0.8110	0.1150
		0.7261	0.0727	0.8310	0.1010
		0.7541	0.0546	0.8600	0.0756
		0.8760	0.0000	0.9600	0.0000

Estimated plait point: $w_1 = 0.271$, $w_2 = 0.224$ ($x_1 = 0.125$, $x_2 = 0.085$, compiler).

TABLE 2. Compositions of coexisting liquid phases

		Nitromethane-rich phase (compiler)		Water-rich phase (compiler)		Nitromethane-rich phase		Water-rich phase	
t/°C	T/K (compiler)	x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.0	293.2	0.917	0.012	0.030	0.009	0.963	0.015	0.092	0.032
		0.875	0.029	0.033	0.017	0.932	0.038	0.098	0.060
		0.785	0.070	0.036	0.027	0.860	0.093	0.104	0.093
		0.692	0.105	0.042	0.038	0.787	0.145	0.116	0.128
		0.582	0.141	0.049	0.049	0.697	0.205	0.130	0.160
		0.468	0.157	0.053	0.055	0.608	0.248	0.137	0.175
		0.443	0.157	0.060	0.065	0.589	0.254	0.152	0.198
		0.382	0.158	0.061	0.066	0.540	0.270	0.153	0.200
		0.287	0.152	0.081	0.081	0.450	0.290	0.190	0.230
40.0	313.2	0.864	0.007	0.035	0.005	0.949	0.009	0.107	0.020
		0.839	0.020	0.039	0.011	0.927	0.027	0.118	0.040
		0.790	0.041	0.043	0.016	0.888	0.056	0.126	0.056
		0.665	0.091	0.050	0.026	0.784	0.131	0.141	0.089
		0.497	0.132	0.064	0.040	0.648	0.209	0.170	0.130
		0.354	0.132	0.071	0.047	0.532	0.240	0.183	0.147
		0.310	0.129	0.078	0.052	0.490	0.248	0.196	0.159

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility curve was determined by the titration method. The analytical method was used, samples being withdrawn from coexisting liquid phases at equilibrium for analysis by refractometry.

Source and Purity of Materials:
(1) Source not specified, pure grade reagent; distilled; boiling point = 101.0 °C; n(20 °C,D) = 1.3818, d(20 °C,4 °C) = 1.1385.
(2) Purity not specified; dried and distilled; boiling point = 81.9 °C; n(20 °C,D) = 1.3882, d(20 °C,4 °C) = 0.7920.
(3) Doubly distilled.

Estimated Error:
Not reported.

5.14. +1-Butanol

Components:	Evaluator:
(1) Nitromethane; CH_3NO_2; [75-52-5] (2) 1-Butanol; $C_4H_{10}O$; [71-36-3] (3) Water; H_2O; [7732-18-5]	V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+1-butanol+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+1-butanol+water

Author(s)	T/K	Type of data[a]
Zhuravlev *et al.*[1]	274–371	Solubility curve (132)
	273	Equilibrium (13)
	281	Equilibrium (13)
	323	Equilibrium (13)
Marigliano *et al.*[2]	303.15	Solubility curve (24), Equilibrium (13)
	333.15	Solubility curve (24), Equilibrium (13)
	340.15	Solubility curve (24)
	341.15	Solubility curve (24), Equilibrium (8)
	348.15	Solubility curve (22), Equilibrium (8)
	363.15	Solubility curve (15), Equilibrium (8)
	388.15	Solubility curve (6)

[a]Number of experimental points in parentheses.

Solubility data

All three binary pairs of components, nitromethane+1-butanol, nitromethane+water and 1-butanol+water, are partially miscible. The data for first two systems were compiled and critically evaluated[3] and for 1-butanol+water system in Barton.[4] The values of UCST (upper critical solution temperatures) of the binary systems are reported in Zhuravlev *et al.*[1] and Marigliano *et al.*[2] and presented in Table 2.

TABLE 2. UCST (T/K) binary systems

Binary system	Ref. 1	Ref. 2	Recommended
Nitromethane+1-butanol	290.5	—	290.9±0.3 (Ref. 3)
Nitromethane+water	377.7	384	376.3±0.2 (Ref. 3)
Water+1-butanol	398	403	397.55 K to 398.5 K (Ref. 4)

The solubility curve for the ternary system at 303.15 K was obtained by the titration method (Marigliano *et al.*[2]) with an estimated accuracy in composition and temperature within ±0.0005 of mass fractions and ±0.05 K, respectively. The solubility temperatures of the liquid phases were determined[1,2] by the synthetic method in ternary mixtures with constant mass relationship of (1) and (2). The solubility curves at 283, 323, 343, and 353 K (Mel'nikova[1]) and at 333.15, 340.15, 341.15, 348.15, 363.15, and 388.15 K (Marigliano *et al.*[2]) were constructed by graphical interpretation of the cloud-point data. Experimental errors were reported in Marigliano *et al.*[2] to be ±0.1 K (temperature) and ±0.001 mass fractions (solubility). Depending on temperature the system nitromethane+1-butanol+water forms a miscibility gaps of Type I–III, Ref. 5. In the temperature range 273–290.5 K,[1] where the three binary systems are partially miscible, the solubility curves correspond to Type III.[5] A three-phase region occurs below 281 K.[1] Above 281 K two separate regions of immiscibility exist, one of which can be described by band type curves. In the temperature range 290.5 to 377.7 (Mel'nikova[1]) or at 384 K,[2] where two binary systems nitromethane+water and 1-butanol+water partially miscible, the solubility curves correspond to Type II,[5] while two separate solubility curves can be clearly observed above 341 K.

Below this temperature there are band type curves. Above 384 K this ternary system has only one partially miscible region.[2] Solubility data at 303.15, 333.15, 348.15, and 388.15 K are described by corresponding algebraic equations (Table 3). These smoothing equations give smaller standard deviations than any other tested equation. The equation parameters were calculated by the least squares method.

The solubilities calculated by the proposed equations are presented in Figs. 13 and 14 and in Table 3. Experimental solubility data, Mel'nikova[1] and Marigliano *et al.*[2], are presented in Figs. 13 and 14 for comparison.

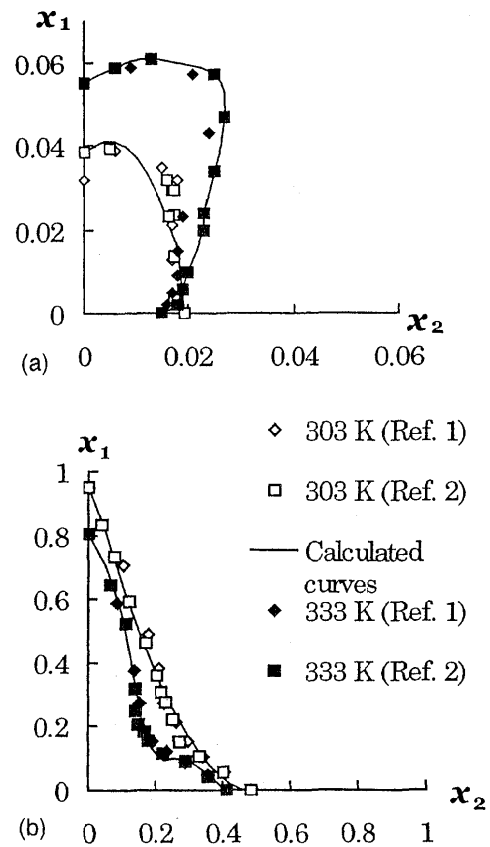

FIG. 13. Solubility curves of the system nitromethane+1-butanol+water, (mole fraction): (a) water-rich phase, (b) organic-rich phase at 303 and 333 K.

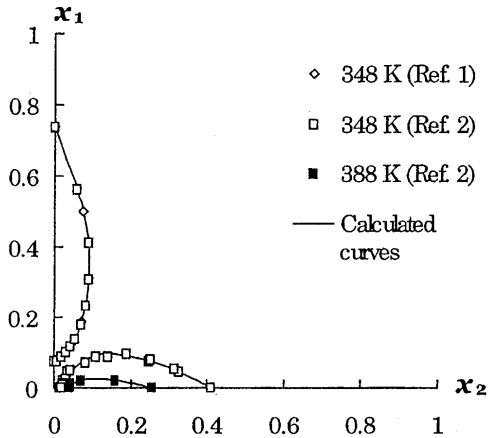

FIG. 14. Solubility curves of the system nitromethane+1-butanol+water at 348 and 388 K (mole fraction).

TABLE 3. Calculated mutual solubilities of nitromethane, 1-butanol, and water

T/K	x_1	x_2	x_3	w_1	w_2	w_3
	$x_1=1.0025-3.94\cdot x_2-3.8311\cdot(x_2)^2$ (organic-rich branch)					
303.2	0.000	0.484	0.516	0.000	0.794	0.206
	0.005	0.450	0.545	0.007	0.767	0.226
	0.039	0.400	0.561	0.056	0.704	0.240
	0.093	0.350	0.557	0.136	0.623	0.241
	0.165	0.300	0.535	0.240	0.530	0.230
	0.257	0.250	0.493	0.364	0.430	0.206
	0.368	0.200	0.432	0.498	0.329	0.173
	0.498	0.150	0.352	0.635	0.232	0.133
	0.647	0.100	0.253	0.767	0.144	0.089
	0.815	0.050	0.135	0.890	0.066	0.034
	0.917	0.000	0.083	0.974	0.000	0.026
	$x_1=0.0369+1.682\cdot x_2-162.6898\cdot(x_2)^2$ (water-rich branch)					
	0.000	0.018	0.982	0.000	0.071	0.929
	0.014	0.018	0.958	0.043	0.068	0.889
	0.022	0.016	0.955	0.068	0.060	0.872
	0.029	0.014	0.953	0.088	0.052	0.860
	0.034	0.012	0.952	0.103	0.044	0.853
	0.037	0.010	0.953	0.112	0.037	0.851
	0.040	0.008	0.954	0.121	0.029	0.850
	0.041	0.006	0.957	0.124	0.022	0.854
	0.041	0.004	0.962	0.125	0.015	0.860
	0.040	0.002	0.968	0.123	0.007	0.870
	0.038	0.000	0.962	0.118	0.000	0.882
	$x_1=[0.8018-9.8109\cdot x_2+39.749(x_2)^2-50.2742\cdot(x_2)^3]/[1-10.1633\cdot x_2+32.5541\cdot(x_2)^2]$ (organic-rich branch)					
333.2	0.000	0.439	0.561	0.000	0.763	0.237
	0.009	0.400	0.591	0.013	0.726	0.261
	0.057	0.350	0.593	0.087	0.647	0.266
	0.089	0.300	0.611	0.140	0.575	0.285
	0.097	0.250	0.653	0.163	0.512	0.325
	0.102	0.200	0.698	0.185	0.441	0.374
	0.264	0.150	0.586	0.427	0.294	0.279
	0.543	0.100	0.357	0.705	0.158	0.137
	0.705	0.050	0.245	0.841	0.072	0.087
	0.830	0.000	0.170	0.944	0.000	0.056
	$x_1=-0.1204-1.423\cdot x_2-0.0264\cdot(x_2)^2+1.107\cdot(x_2)^{1/2}$ (separate solubility curve)					
348.2	0.000	0.405	0.595	0.000	0.737	0.263
	0.006	0.400	0.594	0.009	0.728	0.263
	0.033	0.350	0.617	0.052	0.664	0.284
	0.057	0.300	0.643	0.093	0.596	0.311
	0.076	0.250	0.674	0.131	0.525	0.344
	0.089	0.200	0.711	0.164	0.448	0.388
	0.094	0.150	0.756	0.188	0.365	0.447
	0.087	0.100	0.813	0.194	0.271	0.535
	0.056	0.050	0.894	0.147	0.160	0.693
	0.000	0.018	0.982	0.000	0.069	0.931
	$x_2=-1.7995-15.7222\cdot x_3-5.221\cdot(x_3)^2+8.557\cdot(x_3)^{1/2}+14.144\cdot(x_3)^{3/2}$ (other separate solubility curve)					
	0.074	0.000	0.926	0.212	0.000	0.788
	0.084	0.016	0.900	0.227	0.053	0.720
	0.144	0.056	0.800	0.321	0.152	0.527
	0.220	0.080	0.700	0.420	0.185	0.395
	0.311	0.089	0.600	0.522	0.181	0.297
	0.414	0.086	0.500	0.621	0.157	0.222
	0.534	0.066	0.400	0.729	0.109	0.162
	0.675	0.025	0.300	0.850	0.038	0.112
	0.750	0.000	0.250	0.911	0.000	0.089
	$x_1=-0.4182-1.3623\cdot(x_2)^{1/2}+1.5564\cdot(x_2)^{1/4}$					
388.2	0.000	0.248	0.752	0.000	0.575	0.425
	0.001	0.250	0.749	0.002	0.577	0.421
	0.013	0.200	0.787	0.027	0.497	0.476
	0.023	0.150	0.827	0.051	0.405	0.544
	0.026	0.100	0.874	0.064	0.299	0.637
	0.013	0.050	0.937	0.037	0.173	0.790
	0.000	0.035	0.965	0.000	0.130	0.870

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+1-butanol+water were reported at 273.2, 281.2, and 323.2 (Mel'nikova[1]) in graphical form and at 303.15, 333.15, 341.15, 348.15, and 363.15 (Marigliano *et al.*[2]). Composition of each phase (Mel'nikova[1] and Marigliano *et al.*[2]) was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of the saturation curve measurements and also from the density–composition curve in Marigliano *et al.*[2] The compositions of three coexistent liquid phases at 273 K (Mel'nikova[1]) are presented in graphical form. Plait points were reported in Marigliano *et al.*[2] at 340.5, 341.15, 348.15, and 363.15 K. Experimental errors were reported in Marigliano *et al.*[2] as ±0.005 of mass fractions.

Recommended or tentative data

Solubility and liquid–liquid equilibrium data measured by different methods are in agreement with one another. Experimental data on solubility at some temperatures Mel'nikova[1] and Marigliano *et al.*[2] are presented in Figs. 13 and 14 in mole fractions. In view of the inaccurate results obtained in Mel'nikova[1] and Marigliano *et al.*[2] for the binary nitromethane+water, nitromethane+1-butanol, and 1-butanol+water systems, the evaluator considers the ternary system data to be tentative and concludes that new studies on the ternary system would be of value.

References:

[1]I. K. Mel'nikova, dissertation, Voronezh University, 1966; E. F. Zhuravlev, and I. K. Mel'nikova, Zh. Fiz. Khim. **41**, 1580 (1967).
[2]A. C. G. Marigliano, M. B. Gramajo de Doz, and H. N. Solimo, Fluid Phase Equilib. **149**, 309 (1998).
[3]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).
[4]A. F. M. Barton, *Alcohols with Water*, IUPAC Solubility Data Series, Vol. 15 (Pergamon, Oxford, 1984).
[5]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Butanol; $C_4H_{10}O$; [71-36-3]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
I. K. Mel'nikova, dissertation, Voronezh University, 1966.
E. F. Zhuravlev and I. K. Mel'nikova, Zh. Fiz. Khim. **41**, 1580–4 (1967).

Variables:
T/K=273–372

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2) as 10.0:90.0, 20.0:80.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 69.3:30.7, 85.0:15.0, and 90.0:10.0, respectively.

TABLE 1. Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
2.5	275.7	0.763	0.111	0.816	0.144
7.0	280.2	0.030	0.004	0.095	0.017
17.3	290.5	0.034	0.005	0.104	0.018
28.5	301.7	0.712	0.104	0.798	0.141
38.0	311.2	0.043	0.006	0.129	0.023
41.0	314.2	0.673	0.098	0.783	0.138
44.5	317.7	0.046	0.007	0.138	0.024
54.5	327.7	0.054	0.008	0.158	0.028
55.0	328.2	0.616	0.090	0.759	0.134
64.0	337.2	0.064	0.009	0.183	0.032
65.5	338.7	0.563	0.081	0.734	0.129
72.2	345.4	0.076	0.011	0.211	0.037
75.0	348.2	0.502	0.072	0.707	0.123
81.0	354.2	0.096	0.014	0.255	0.045
81.5	354.7	0.441	0.064	0.663	0.117
87.5	360.7	0.350	0.051	0.595	0.105
87.8	361.0	0.140	0.021	0.340	0.060
89.5	362.7	0.263	0.038	0.510	0.090
89.5	362.7	0.193	0.028	0.422	0.075
2.3	275.5	0.609	0.222	0.656	0.290
9.3	282.5	0.537	0.196	0.629	0.279
9.5	282.7	0.688	0.250	0.681	0.301
15.5	288.7	0.033	0.012	0.099	0.044
28.3	301.5	0.037	0.013	0.111	0.049
30.0	303.2	0.488	0.178	0.608	0.269
40.5	313.7	0.042	0.015	0.123	0.055
49.0	322.2	0.423	0.154	0.575	0.255
50.0	323.2	0.048	0.017	0.138	0.061
63.0	336.2	0.061	0.022	0.170	0.075
65.0	338.2	0.354	0.129	0.534	0.236
70.5	343.7	0.299	0.109	0.493	0.219
71.5	344.7	0.087	0.032	0.225	0.100
73.5	346.7	0.225	0.082	0.426	0.188
75.0	348.2	0.119	0.043	0.284	0.126
75.8	349.0	0.152	0.056	0.335	0.149
2.0	275.2	0.477	0.262	0.547	0.365
3.8	277.0	0.530	0.292	0.566	0.378
4.5	277.7	0.028	0.016	0.086	0.058
7.0	280.2	0.435	0.239	0.530	0.353

10.0	283.2	0.598	0.329	0.587	0.392
30.0	303.2	0.383	0.211	0.505	0.337
41.8	315.0	0.347	0.191	0.485	0.324
45.5	318.7	0.032	0.018	0.097	0.065
52.3	325.5	0.035	0.019	0.104	0.069
59.5	332.7	0.043	0.023	0.123	0.082
59.7	332.9	0.276	0.152	0.439	0.293
66.2	339.4	0.235	0.129	0.406	0.270
66.6	339.8	0.054	0.029	0.149	0.099
69.8	343.0	0.082	0.045	0.208	0.138
70.0	343.2	0.183	0.100	0.354	0.236
71.0	344.2	0.155	0.085	0.321	0.214
71.0	344.2	0.109	0.060	0.256	0.171
2.3	275.5	0.398	0.328	0.454	0.454
4.8	278.0	0.432	0.357	0.466	0.467
8.7	281.9	0.466	0.385	0.477	0.478
16.3	289.6	0.303	0.250	0.410	0.411
41.0	314.2	0.251	0.207	0.379	0.380
50.0	323.2	0.226	0.186	0.361	0.361
51.6	324.8	0.021	0.017	0.064	0.064
58.0	331.2	0.023	0.019	0.069	0.069
62.0	335.2	0.186	0.153	0.328	0.328
63.6	336.6	0.024	0.019	0.072	0.072
68.0	341.2	0.143	0.118	0.283	0.284
69.0	342.2	0.028	0.023	0.082	0.083
71.0	344.2	0.108	0.089	0.238	0.238
71.8	345.0	0.085	0.071	0.203	0.204
73.5	346.7	0.064	0.053	0.165	0.165
73.8	347.0	0.034	0.028	0.098	0.098
74.2	347.4	0.052	0.043	0.139	0.140
75.0	348.2	0.044	0.036	0.122	0.123
2.0	275.2	0.337	0.417	0.368	0.553
2.8	276.0	0.252	0.311	0.332	0.498
6.3	279.5	0.380	0.469	0.382	0.573
9.5	282.7	0.402	0.497	0.388	0.583
14.2	287.4	0.237	0.293	0.324	0.486
27.7	300.9	0.217	0.268	0.312	0.469
37.5	310.7	0.201	0.249	0.302	0.454
45.5	318.7	0.187	0.231	0.292	0.439
52.0	325.2	0.013	0.017	0.042	0.063
54.3	327.5	0.168	0.208	0.278	0.418
60.7	333.9	0.153	0.188	0.265	0.397
65.0	338.2	0.139	0.172	0.252	0.379
69.5	342.7	0.127	0.157	0.048	0.072
70.0	343.2	0.120	0.148	0.233	0.349
73.5	346.7	0.101	0.125	0.210	0.315
76.2	349.4	0.081	0.100	0.182	0.274
78.0	351.2	0.018	0.022	0.054	0.080
78.8	352.0	0.066	0.081	0.158	0.237
82.0	355.2	0.051	0.064	0.132	0.198
84.3	357.5	0.044	0.055	0.118	0.176
86.7	359.9	0.038	0.046	0.102	0.154
87.6	360.8	0.023	0.029	0.069	0.104
1.0	274.2	0.278	0.533	0.283	0.660
2.2	275.4	0.178	0.342	0.242	0.565
9.5	282.7	0.322	0.619	0.295	0.689
18.6	291.8	0.164	0.316	0.234	0.547
34.0	307.2	0.151	0.291	0.226	0.528
43.5	316.7	0.142	0.272	0.220	0.220
55.5	328.7	0.128	0.245	0.209	0.209
67.5	340.7	0.111	0.214	0.195	0.195
69.0	342.2	0.009	0.018	0.028	0.067
77.0	350.2	0.010	0.019	0.031	0.072
78.0	351.2	0.091	0.176	0.175	0.410
84.9	358.1	0.069	0.133	0.148	0.347
89.9	363.1	0.050	0.097	0.120	0.280
95.5	368.7	0.015	0.029	0.045	0.105
95.6	368.8	0.034	0.066	0.090	0.210
98.5	371.7	0.021	0.040	0.060	0.140
3.7	276.9	0.225	0.744	0.198	0.794
19.5	292.7	0.108	0.356	0.155	0.619
34.5	307.7	0.102	0.336	0.151	0.604
43.0	316.2	0.098	0.324	0.148	0.594
53.0	326.2	0.092	0.304	0.144	0.577
61.0	334.2	0.087	0.286	0.140	0.561
64.5	337.7	0.005	0.017	0.016	0.065
66.8	340.0	0.083	0.273	0.137	0.548
72.3	345.5	0.078	0.258	0.133	0.533
79.0	352.2	0.073	0.237	0.128	0.511
79.5	352.7	0.006	0.018	0.018	0.070
84.2	357.4	0.065	0.214	0.121	0.483
90.3	363.5	0.006	0.020	0.019	0.076
25.5	298.7	0.056	0.413	0.078	0.702
38.5	311.7	0.054	0.396	0.077	0.690
51.0	324.2	0.051	0.376	0.075	0.675
58.2	331.4	0.049	0.360	0.074	0.662
60.0	333.2	0.002	0.016	0.007	0.061
67.5	340.7	0.046	0.342	0.072	0.647
78.0	351.2	0.043	0.320	0.070	0.627
80.0	353.2	0.002	0.018	0.007	0.068
82.5	355.7	0.041	0.301	0.068	0.608
88.0	361.2	0.038	0.285	0.066	0.592
89.0	362.2	0.003	0.018	0.008	0.070

The compositions of coexistent two and three liquid phases at 0, 8, and 50 °C are also reported in graphical form.

TABLE 2. Compositions of three coexisting liquid phases for the system nitromethane+1-butanol+water*

		Nitromethane-rich phase (compiler)		Alcohol-rich phase (compiler)		Water-rich phase (compiler)	
t/°C	T/K (compiler)	x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
0	273	0.718	0.116	0.268	0.302	0.030	0.017

The same data are presented below in mass fraction

t/°C	T/K (compiler)	Nitromethane-rich phase w_1'	Nitromethane-rich phase w_2'	Alcohol-rich phase w_1''	Alcohol-rich phase w_2''	Water-rich phase w_1'''	Water-rich phase w_2'''
0	273	0.791	0.155	0.352	0.481	0.091	0.063

* These data were extracted graphically by the compiler.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phase were determined by the synthetic method.[1] The analytical method described in Mertslin *et al.*[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; freshly distilled.
(2) Source not specified, freshly distilled.
(3) Twice distilled.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]R. V. Mertslin, N. I. Nikurashina, and V. A. Petrov, Zh. Fiz. Khim. **35**, 2770 (1961).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Butanol; $C_4H_{10}O$; [71-36-3]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

A. C. G. Marigliano, M. B. Gramajo de Doz, and H. N. Solimo, Fluid Phase Equilib. **149**, 309–22 (1998).

Variables:

T/K = 303–388

Prepared By:

V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, 1-butanol, and water

t/°C (compiler)	T/K	x_1 (compiler)	x_2 (compiler)	w_1	w_2
30.0	303.15	0.0387	0.0000	0.1200	0.0000
		0.0395	0.0049	0.1205	0.0180
		0.0317	0.0159	0.0955	0.0580
		0.0295	0.0169	0.0890	0.0620
		0.0295	0.0172	0.0890	0.0630
		0.0238	0.0173	0.0725	0.0640
		0.0234	0.0164	0.0715	0.0610
		0.0136	0.0173	0.0425	0.0655
		0.0099	0.0196	0.0310	0.0745
		0.0038	0.0174	0.0120	0.0675
		0.0000	0.0193	0.0000	0.0750
		0.9509	0.0000	0.9850	0.0000
		0.8337	0.0401	0.9065	0.0530
		0.7355	0.0772	0.8315	0.1060
		0.5939	0.1221	0.7190	0.1795
		0.4620	0.1715	0.5935	0.2675
		0.3593	0.2043	0.4880	0.3370
		0.3078	0.2180	0.4320	0.3715
		0.2765	0.2303	0.3940	0.3985
		0.2225	0.2519	0.3255	0.4475
		0.1516	0.2720	0.2325	0.5065
		0.1067	0.3317	0.1580	0.5965
		0.0575	0.4024	0.0815	0.6925
		0.0000	0.4853	0.0000	0.7950
60.0	333.15	0.055	0.000	0.165	0.000
		0.059	0.006	0.171	0.022
		0.061	0.013	0.174	0.046
		0.057	0.025	0.158	0.085
		0.047	0.027	0.133	0.092
		0.034	0.025	0.100	0.088
		0.024	0.023	0.073	0.082
		0.020	0.023	0.061	0.084
		0.010	0.020	0.032	0.076
		0.006	0.019	0.019	0.074
		0.002	0.018	0.007	0.068
		0.000	0.015	0.000	0.060
		0.807	0.000	0.934	0.000
		0.646	0.066	0.796	0.099
		0.523	0.113	0.681	0.179
		0.318	0.140	0.490	0.263
		0.249	0.141	0.415	0.285
		0.206	0.149	0.357	0.313

		0.183	0.167	0.316	0.352
		0.156	0.179	0.274	0.381
		0.116	0.223	0.199	0.466
		0.091	0.290	0.145	0.563
		0.043	0.358	0.065	0.665
		0.000	0.412	0.000	0.742
67.0	340.15	0.059	0.000	0.175	0.000
		0.065	0.007	0.187	0.023
		0.069	0.015	0.194	0.051
		0.082	0.036	0.212	0.113
		0.081	0.045	0.205	0.140
		0.057	0.041	0.152	0.133
		0.002	0.019	0.007	0.073
		0.006	0.020	0.019	0.078
		0.011	0.020	0.033	0.077
		0.022	0.025	0.065	0.090
		0.028	0.026	0.083	0.092
		0.000	0.017	0.000	0.065
		0.773	0.000	0.920	0.000
		0.607	0.062	0.778	0.097
		0.486	0.104	0.662	0.173
		0.257	0.113	0.443	0.237
		0.186	0.105	0.356	0.244
		0.114	0.083	0.253	0.222
		0.040	0.343	0.063	0.652
		0.086	0.275	0.141	0.549
		0.106	0.204	0.190	0.445
		0.131	0.149	0.249	0.346
		0.133	0.121	0.265	0.295
		0.000	0.428	0.000	0.755
68.0	341.15	0.062	0.000	0.183	0.000
		0.065	0.007	0.187	0.023
		0.073	0.016	0.202	0.053
		0.087	0.039	0.223	0.120
		0.773	0.000	0.920	0.000
		0.595	0.061	0.772	0.096
		0.451	0.097	0.642	0.168
		0.245	0.110	0.430	0.235
		0.173	0.098	0.341	0.234
		0.100	0.057	0.240	0.165
		0.073	0.052	0.184	0.161
		0.029	0.026	0.084	0.094
		0.023	0.025	0.070	0.090
		0.011	0.021	0.034	0.079
		0.006	0.020	0.019	0.076
		0.005	0.017	0.016	0.064
		0.000	0.015	0.000	0.060
		0.091	0.065	0.216	0.189
		0.115	0.108	0.243	0.275
		0.128	0.150	0.244	0.349
		0.107	0.209	0.190	0.451
		0.086	0.273	0.141	0.547
		0.040	0.343	0.063	0.652
		0.000	0.428	0.000	0.755
75.00	348.15	0.073	0.000	0.210	0.000
		0.074	0.008	0.209	0.026
		0.087	0.019	0.234	0.061
		0.101	0.031	0.255	0.095
		0.115	0.042	0.278	0.122
		0.738	0.000	0.905	0.000
		0.563	0.058	0.756	0.094
		0.413	0.089	0.618	0.162
		0.309	0.088	0.520	0.180
		0.233	0.080	0.437	0.183
		0.178	0.069	0.368	0.172
		0.137	0.054	0.311	0.149
		0.025	0.030	0.073	0.107
		0.012	0.022	0.037	0.081
		0.007	0.022	0.021	0.082
		0.002	0.019	0.007	0.073
		0.000	0.017	0.000	0.065
		0.071	0.081	0.169	0.234
		0.086	0.138	0.178	0.347
		0.078	0.252	0.135	0.525
		0.053	0.315	0.085	0.615
		0.000	0.409	0.000	0.740
90.00	363.15	0.097	0.000	0.266	0.000
		0.108	0.011	0.282	0.036
		0.136	0.024	0.330	0.070
		0.626	0.000	0.850	0.000
		0.416	0.042	0.663	0.082
		0.258	0.043	0.500	0.100
		0.187	0.035	0.408	0.092
		0.015	0.028	0.044	0.104
		0.007	0.024	0.023	0.090
		0.003	0.023	0.009	0.089
		0.000	0.021	0.000	0.080
		0.048	0.093	0.116	0.272
		0.061	0.197	0.118	0.460
		0.032	0.273	0.057	0.583
		0.000	0.311	0.000	0.650
115.00	388.15	0.021	0.068	0.057	0.221
		0.013	0.042	0.038	0.150
		0.005	0.043	0.015	0.155
		0.000	0.037	0.000	0.135
		0.021	0.160	0.045	0.425
		0.000	0.255	0.000	0.585

TABLE 2. Compositions of coexisting liquid phases

		Nitromethane-rich phase (compiler)		Water-rich phase (compiler)		Nitromethane-rich phase		Water-rich phase	
t/°C	T/K	x_1	x_2	x_1	x_2	w_1	w_2	w_1	w_2
30.00	303.15	0.783	0.063	0.039	0.003	0.865	0.085	0.120	0.010
		0.691	0.101	0.038	0.013	0.790	0.140	0.115	0.045
		0.469	0.163	0.037	0.014	0.605	0.255	0.110	0.050
		0.399	0.192	0.035	0.015	0.530	0.310	0.105	0.055
		0.291	0.228	0.033	0.017	0.410	0.390	0.100	0.060
		0.234	0.237	0.032	0.018	0.345	0.425	0.095	0.065
		0.176	0.264	0.030	0.018	0.265	0.485	0.090	0.065
		0.141	0.357	0.026	0.013	0.195	0.600	0.080	0.050
		0.087	0.370	0.021	0.019	0.125	0.645	0.065	0.070
		0.043	0.431	0.011	0.019	0.060	0.725	0.035	0.070
60.00	333.15	0.609	0.090	0.061	0.013	0.755	0.135	0.175	0.045
		0.252	0.138	0.059	0.022	0.420	0.280	0.165	0.075
		0.177	0.165	0.044	0.026	0.310	0.350	0.125	0.090
		0.133	0.204	0.034	0.026	0.230	0.430	0.100	0.090
		0.096	0.277	0.015	0.021	0.155	0.545	0.045	0.080
68.00	341.15	0.632	0.049	0.064	0.004	0.805	0.075	0.185	0.015
		0.482	0.092	0.070	0.018	0.670	0.155	0.195	0.060
		0.307	0.111	0.079	0.028	0.500	0.220	0.210	0.090
		0.178	0.097	0.085	0.035	0.350	0.230	0.220	0.110
		0.120	0.119	0.047	0.036	0.245	0.295	0.130	0.120
		0.116	0.191	0.027	0.027	0.210	0.420	0.080	0.095
		0.097	0.245	0.016	0.022	0.165	0.505	0.050	0.080
		0.063	0.317	0.003	0.020	0.100	0.510	0.010	0.075
75.00	348.15	0.734	0.003	0.073	0.003	0.900	0.005	0.210	0.010
		0.660	0.032	0.075	0.010	0.835	0.050	0.210	0.035
		0.480	0.078	0.078	0.013	0.680	0.135	0.215	0.045
		0.289	0.086	0.087	0.023	0.500	0.180	0.230	0.075
		0.080	0.098	0.035	0.037	0.180	0.270	0.100	0.125
		0.082	0.234	0.022	0.029	0.145	0.500	0.065	0.105
		0.062	0.302	0.013	0.024	0.100	0.595	0.040	0.090
		0.023	0.370	0.005	0.020	0.035	0.690	0.015	0.075
90.00	363.15	0.595	0.012	0.103	0.006	0.820	0.020	0.275	0.020
		0.484	0.039	0.107	0.013	0.720	0.070	0.280	0.040
		0.402	0.049	0.120	0.021	0.645	0.095	0.300	0.065
		0.359	0.049	0.123	0.023	0.605	0.100	0.305	0.070
		0.045	0.249	0.022	0.034	0.080	0.545	0.065	0.120
		0.034	0.272	0.017	0.029	0.060	0.580	0.050	0.105
		0.018	0.305	0.018	0.024	0.030	0.630	0.030	0.090
		0.009	0.328	0.006	0.024	0.015	0.660	0.020	0.090

TABLE 3. Experimental plait points

t/°C (compiler)	T/K	x_1 (compiler)	x_2 (compiler)	w_1	w_2
67.3[a]	340.5	0.091	0.058	0.22	0.17
68.00	341.15	0.084	0.062	0.204	0.183
		0.096	0.050	0.234	0.150
75.00	348.15	0.065	0.073	0.158	0.218
		0.122	0.046	0.289	0.131
90.00	363.15	0.044	0.083	0.110	0.251
		0.158	0.029	0.366	0.366

[a]Estimated plait point.

Auxiliary Information

Method/Apparatus/Procedure:

Synthetic (cloud-point) and analytical methods were used. The binodal curve and tie line data at 303 K were obtained as described in Solimo *et al.*[1] The binodal curves at the higher temperatures were constructed by graphical interpolation of the cloud-point data. The analytical method described in Solimo and Gramajo de Doz[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases of equilibrium were analyzed by refractometry.

Source and Purity of Materials:

(1) Baker, A. R.; purity greater than 99 mass % by gas chromatography; not purified; n(25 °C,D) = 1.3798, ρ(25 °C) = 1129.8 g·L^{-1}.

(2) Mallinckrodt, A. R.; purity greater than 99 mass % by gas chromatography; not purified; n(25 °C,D) = 1.3974, ρ(25 °C) = 805.8 g·L^{-1}.

(3) Twice distilled; n(25 °C,D) = 1.3328, ρ(25 °C) = 997.1 g·L^{-1}.

Estimated Error:

Solubility: ±0.001 mass fraction;
Composition: ±0.005 mass fraction;
Temperature: control to ±0.05 K.

References:

[1]H. N. Solimo, H. E. Martinez, and R. Riggio, J. Chem. Eng. Data **34**, 176 (1989).
[2]H. N. Solimo and M. B. Gramajo de Doz, Fluid Phase Equilib. **107**, 213 (1995).

5.15. +N-Ethylethanamine

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) N-Ethylethanamine; $C_4H_{11}N$; [109-89-7]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
N. V. Maslovskaya, dissertation, Kalinin University, 1974.

Variables:
T/K=293

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, N-ethylethanamine, and water

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.0	293.2	0.0280	0.0000	0.0900	0.0000
		0.0315	0.0063	0.0975	0.0234
		0.0481	0.0269	0.1362	0.0910
		0.0648	0.0519	0.1671	0.1603
		0.0795	0.0665	0.1934	0.1936
		0.0943	0.0943	0.2111	0.2528
		0.0985	0.1227	0.2072	0.3092
		0.1418	0.1342	0.2746	0.3114
		0.1650	0.1465	0.3035	0.3227
		0.2218	0.1600	0.3721	0.3217
		0.2502	0.1831	0.3928	0.3445
		0.3292	0.1910	0.4705	0.3271
		0.3719	0.1983	0.5051	0.3226
		0.4314	0.1988	0.5540	0.3058
		0.4976	0.2030	0.6001	0.2933
		0.4135	0.1613	0.5647	0.2639
		0.4842	0.1570	0.6222	0.2417
		0.5732	0.1511	0.6860	0.2166
		0.6240	0.1302	0.7319	0.1830
		0.6940	0.1104	0.7850	0.1497
		0.7472	0.0851	0.8315	0.1134
		0.7255	0.0517	0.8503	0.0726
		0.7858	0.0304	0.8965	0.0416
		0.6403	0.0223	0.8352	0.0349
		0.8782	0.0306	0.9325	0.0389
		0.9350	0.0000	0.9800	0.0000

Auxiliary Information

Method/Apparatus/Procedure:
The solubility curve was determined by the titration method. No experimental details given.

Source and Purity of Materials:
(1) Source not specified, pure grade reagent; distilled; boiling point=101.0 °C; n(20 °C,D)=1.3818, d(20 °C,4 °C)=1.1385.
(2) Source not specified; purity not specified; dried and distilled.
(3) Doubly distilled.

Estimated Error:
Not reported.

5.16. +2-Methoxy-2-methylpropane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Methoxy-2-methylpropane; $C_5H_{12}O$; [1634-04-4]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
V. Kubicek, J. P. Novak, and J. Matous, Collect. Czech. Chem. Commun. **58**, 983–95 (1993).

Variables:
T/K=293

Prepared By:
N. V. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, 2-methoxy-2-methylpropane, and water

t/°C	T/K (compiler)	x_1	x_2	w_1 (compiler)	w_2 (compiler)
20	293	0.323	0.545	0.281	0.685
		0.521	0.535	0.488	0.477
		0.688	0.201	0.680	0.287
		0.005	0.011	0.016	0.051

TABLE 2. Compositions of equilibrium liquid phases ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase		Water-rich phase		Nitromethane-rich phase (compiler)		Water-rich phase (compiler)	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20	293	0.128	0.776	0.010	0.010	0.100	0.878	0.032	0.046
		0.225	0.660	0.015	0.009	0.186	0.786	0.047	0.041
		0.321	0.551	0.019	0.009	0.278	0.689	0.060	0.041
		0.579	0.296	0.027	0.006	0.555	0.410	0.084	0.027
		0.768	0.135	0.031	0.004	0.774	0.197	0.096	0.018

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility curve was determined by the titration method. The compositions of equilibrium liquid phases were determined by the analytical method with the apparatus described in Kubicek *et al.*[1]

Source and Purity of Materials:
(1) Xenon (Poland); dried with sodium and distilled on a packed column with 40 theoretical plates; n(20 °C,D)=1.3820, ρ(20 °C)=1138.2 g·L^{-1}.
(2) Obtained from the Synthetic Rubber Research Institute (Czech); dried with sodium and distilled on a packed column; 0.005 mass % of water by the Karl Fischer analysis; n(20 °C,D)=1.3688, ρ(20 °C)=740.3 g·L^{-1}.
(3) Twice distilled.

Estimated Error:
Composition: ±0.001 mole fraction.

References:
[1]V. Kubicek, J. Matous, and J. P. Novak, Collect. Czech. Chem. Commun. **57**, 2021 (1992).

5.17. +3-Methyl-1-butanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 3-Methyl-1-butanol; $C_5H_{12}O$; [123-51-3]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
I. K. Zhuravleva, E. F. Zhuravlev, and L. N. Salamatin, Zh. Fiz. Khim. 49, 2609–14 (1975).

Variables:
T/K = 264–358

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2) as 10.0:90.0, 20.0:80.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 69.3:30.7, 85.0:15.0, 90.0:10.0, 91.0:9.0, 92.5:7.5, 95.0:5.0, and 97.5:2.5, respectively.

TABLE 1. Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
13.0	286.2	0.819	0.063	0.867	0.096
36.0	309.2	0.747	0.058	0.841	0.094
48.0	321.2	0.031	0.002	0.097	0.011
49.0	322.2	0.705	0.054	0.825	0.092
50.0	323.2	0.029	0.002	0.091	0.010
54.0	327.2	0.028	0.002	0.087	0.010
59.0	332.2	0.027	0.002	0.085	0.009
68.0	341.2	0.675	0.052	0.813	0.090
5.0	278.2	0.695	0.120	0.753	0.188
6.0	279.2	0.759	0.131	0.774	0.193
7.5	280.7	0.770	0.133	0.777	0.194
8.0	281.2	0.736	0.128	0.766	0.192
8.5	281.7	0.782	0.135	0.781	0.195
10.5	283.7	0.802	0.139	0.786	0.197
15.0	288.2	0.831	0.144	0.794	0.199
23.0	296.2	0.704	0.122	0.756	0.189
38.5	311.7	0.666	0.116	0.742	0.186
50.0	323.2	0.628	0.109	0.728	0.182
54.0	327.2	0.610	0.106	0.721	0.180
60.5	333.7	0.591	0.102	0.713	0.178
65.5	338.7	0.569	0.099	0.703	0.176
72.0	345.2	0.547	0.095	0.693	0.173
7.5	280.7	0.649	0.193	0.666	0.286
8.0	281.2	0.019	0.006	0.062	0.027
9.0	282.2	0.625	0.195	0.659	0.282
10.0	283.2	0.689	0.205	0.678	0.291
15.0	288.2	0.016	0.005	0.052	0.022
15.5	288.7	0.735	0.218	0.691	0.296
23.5	296.7	0.602	0.179	0.651	0.279
32.5	305.7	0.580	0.172	0.643	0.276
50.0	323.2	0.538	0.160	0.627	0.269
68.5	341.7	0.495	0.147	0.609	0.261
85.0	358.2	0.013	0.004	0.041	0.018
6.5	279.7	0.569	0.262	0.570	0.380
6.5	279.7	0.524	0.242	0.556	0.371
12.5	285.7	0.603	0.278	0.580	0.386
21.5	294.7	0.497	0.229	0.547	0.364
40.5	313.7	0.456	0.210	0.531	0.354
55.0	328.2	0.422	0.194	0.517	0.344
68.0	341.2	0.387	0.179	0.500	0.334
7.0	280.2	0.446	0.309	0.463	0.462
7.0	280.2	0.005	0.004	0.017	0.017
10.5	283.7	0.492	0.340	0.476	0.476
14.5	287.7	0.536	0.371	0.488	0.487
15.0	288.2	0.420	0.291	0.454	0.454
19.5	292.7	0.563	0.390	0.494	0.494
26.0	299.2	0.005	0.003	0.015	0.014
27.5	300.7	0.395	0.274	0.445	0.445
31.0	304.2	0.004	0.003	0.013	0.013
35.0	308.2	0.004	0.003	0.012	0.011
40.0	313.2	0.003	0.002	0.010	0.009
42.0	315.2	0.003	0.002	0.008	0.008
49.5	322.7	0.364	0.251	0.433	0.432
53.0	326.2	0.002	0.001	0.006	0.005
67.0	340.2	0.330	0.228	0.418	0.417
5.0	278.2	0.351	0.365	0.365	0.548
6.0	279.2	0.358	0.372	0.367	0.551
6.5	279.7	0.342	0.356	0.362	0.544
7.2	280.4	0.385	0.400	0.375	0.563
9.5	282.7	0.398	0.413	0.379	0.568
11.0	284.2	0.409	0.424	0.382	0.572
12.0	285.2	0.419	0.436	0.384	0.577
13.0	286.2	0.336	0.349	0.360	0.540
15.0	288.2	0.440	0.457	0.389	0.584
17.5	290.7	0.462	0.479	0.394	0.591
20.5	293.7	0.479	0.497	0.398	0.596
23.0	296.2	0.323	0.335	0.356	0.533
40.0	313.2	0.302	0.313	0.348	0.521
54.0	327.2	0.286	0.297	0.341	0.512
65.5	338.7	0.269	0.279	0.334	0.500
3.0	276.2	0.268	0.433	0.273	0.637
4.0	277.2	0.279	0.451	0.276	0.645
5.0	278.7	0.291	0.469	0.280	0.652
5.0	278.2	0.258	0.416	0.270	0.629
5.0	278.2	0.004	0.007	0.014	0.034
6.0	279.2	0.300	0.484	0.282	0.658
8.0	281.2	0.312	0.503	0.285	0.665
10.5	283.7	0.327	0.527	0.289	0.673
13.0	286.2	0.337	0.545	0.291	0.679
13.0	286.2	0.004	0.006	0.012	0.028
14.0	287.2	0.250	0.404	0.267	0.624
16.0	289.2	0.357	0.577	0.295	0.689
20.0	293.2	0.003	0.005	0.009	0.022
25.0	298.2	0.002	0.004	0.008	0.018
34.0	307.2	0.235	0.381	0.262	0.612
40.0	313.2	0.001	0.002	0.005	0.012
57.0	330.2	0.215	0.347	0.254	0.593
61.0	334.2	$2.96 \cdot 10^{-4}$	$6.15 \cdot 10^{-4}$	0.001	0.003
−8.0	265.2	0.180	0.499	0.181	0.724
9.5	282.7	0.243	0.673	0.196	0.784
12.0	285.2	0.171	0.476	0.178	0.714
35.0	308.2	0.162	0.447	0.175	0.700
45.0	313.2	0.156	0.432	0.173	0.692
−9.0	264.2	0.132	0.823	0.099	0.891
2.0	275.2	0.087	0.537	0.089	0.797
16.0	289.2	0.082	0.513	0.087	0.786
31.0	304.2	0.081	0.505	0.087	0.783
49.0	322.2	0.076	0.475	0.085	0.767
69.0	342.2	0.074	0.455	0.084	0.756
4.4	277.6	0.855	0.015	0.934	0.024
5.0	278.2	0.859	0.059	0.887	0.088
5.0	278.2	0.827	0.046	0.888	0.072
5.5	278.7	0.804	0.029	0.898	0.047

The compositions of coexistent two and three liquid phases at 0, 5, 7, and 40 °C are also reported in graphical form.

TABLE 2. Compositions of three coexisting liquid phases system nitromethane+3-methyl-1-butanol+water*

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler) x_1'	x_2'	Alcohol-rich phase (compiler) x_1''	x_2''	Water-rich phase (compiler) x_1'''	x_2'''
0	273	0.811	0.033	0.268	0.456	0.021	0.006
5	278	0.822	0.033	0.356	0.369	0.019	0.006

The same data are presented below in mass fractions

t/°C	T/K (compiler)	Nitromethane-rich phase w_1'	w_2'	Alcohol-rich phase w_1''	w_2''	Water-rich phase w_1'''	w_2'''
0	273	0.897	0.052	0.266	0.653	0.065	0.026
5	278	0.901	0.052	0.367	0.549	0.061	0.026

* These data were extracted graphically by the compiler.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phase were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified, purity not specified; n(15 °C,D) = 1.4085, d(15 °C,4 °C) = 0.8129*.
(3) Twice distilled.
*Recorded as 1.8129 on original. Value corrected by compiler.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University, 1969).

5.18. +1-Pentanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Pentanol; $C_5H_{12}O$; [71-41-0]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

I. K. Zhuravleva, E. F. Zhuravlev, and N. G. Lomakina, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **18**, 449 (1975).
*Deposited Doc., VINITI 1566 (1974).

Variables:

T/K = 274–355

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2) as 10.0:90.0, 19.9:80.1, 29.9:70.1, 39.9:60.1, 50.0:50.0, 60.0:40.0, 69.9:30.1, 78.7:21.3, and 89.2:10.8, respectively.

TABLE 1. Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
1.5	274.7	0.847	0.071	0.870	0.105
2.0	275.2	0.861	0.072	0.874	0.106
5.0	278.2	0.876	0.073	0.879	0.106
15.0	288.2	0.827	0.069	0.864	0.105
26.0	299.2	0.808	0.068	0.857	0.104
32.0	305.2	0.792	0.066	0.852	0.103
43.0	316.2	0.769	0.065	0.844	0.102
47.0	320.2	0.757	0.063	0.839	0.102
51.0	324.2	0.737	0.062	0.832	0.101
56.0	329.2	0.714	0.060	0.823	0.100
58.0	331.2	0.709	0.059	0.822	0.099
59.0	332.2	0.027	0.002	0.086	0.010
63.0	336.2	0.696	0.058	0.816	0.099
67.0	340.2	0.681	0.057	0.810	0.098
10.0	283.2	0.749	0.141	0.761	0.206
12.0	285.2	0.732	0.137	0.756	0.205
12.0	285.2	0.776	0.145	0.769	0.208
15.0	288.2	0.801	0.150	0.776	0.210
18.0	291.2	0.824	0.154	0.782	0.212
21.5	294.7	0.712	0.134	0.749	0.203
29.8	303.0	0.693	0.130	0.743	0.201
35.9	309.1	0.675	0.127	0.737	0.199
42.0	315.2	0.660	0.124	0.731	0.198
48.0	321.2	0.644	0.121	0.726	0.196
52.0	325.2	0.630	0.118	0.721	0.195
58.0	331.2	0.618	0.116	0.716	0.194
60.0	333.2	0.606	0.114	0.711	0.192
63.0	336.2	0.595	0.112	0.706	0.191
63.0	336.2	0.021	0.004	0.068	0.019
66.0	339.2	0.583	0.109	0.701	0.190
67.0	340.2	0.024	0.004	0.075	0.020
69.5	342.7	0.571	0.107	0.696	0.188
12.0	285.2	0.657	0.196	0.668	0.288
13.0	286.2	0.674	0.201	0.673	0.290
15.0	288.2	0.708	0.211	0.683	0.294
15.5	288.7	0.637	0.190	0.662	0.285
17.0	290.2	0.717	0.215	0.686	0.295
19.0	292.2	0.734	0.219	0.690	0.297
21.0	294.2	0.622	0.185	0.657	0.283
22.0	295.2	0.751	0.231	0.696	0.308
26.0	299.2	0.610	0.182	0.653	0.281
35.0	308.2	0.589	0.176	0.646	0.278
40.0	313.2	0.576	0.172	0.641	0.276
44.0	317.2	0.565	0.168	0.637	0.274
49.0	322.2	0.552	0.164	0.632	0.272
53.0	326.2	0.539	0.161	0.627	0.270
58.0	331.2	0.519	0.155	0.619	0.266
60.5	333.7	0.517	0.154	0.618	0.266
11.5	284.7	0.536	0.247	0.560	0.373
12.0	285.2	0.551	0.254	0.565	0.376
13.0	286.2	0.563	0.260	0.568	0.379
15.0	288.2	0.583	0.269	0.574	0.383
16.0	289.2	0.594	0.274	0.577	0.385
18.0	291.2	0.618	0.285	0.584	0.389
18.0	291.2	0.519	0.240	0.554	0.370
20.5	293.7	0.641	0.297	0.590	0.393
23.0	296.2	0.661	0.305	0.595	0.396

26.0	299.2	0.509	0.235	0.551	0.367
30.0	303.2	0.497	0.229	0.547	0.364
42.0	315.2	0.471	0.217	0.537	0.358
50.5	323.7	0.456	0.210	0.531	0.354
57.7	330.9	0.428	0.198	0.520	0.346
71.0	344.2	0.393	0.181	0.503	0.336
12.5	285.7	0.464	0.321	0.468	0.468
13.0	286.2	0.572	0.396	0.496	0.496
13.0	286.2	0.476	0.329	0.471	0.471
14.0	287.2	0.490	0.339	0.475	0.475
14.5	287.7	0.453	0.313	0.464	0.464
15.0	288.2	0.505	0.349	0.479	0.479
17.0	290.2	0.522	0.361	0.484	0.484
17.0	290.2	0.438	0.304	0.460	0.460
19.0	292.2	0.542	0.375	0.489	0.489
20.0	293.2	0.426	0.295	0.456	0.456
20.5	293.7	0.551	0.381	0.491	0.491
25.0	298.2	0.412	0.285	0.451	0.451
31.0	304.2	0.405	0.280	0.448	0.448
36.0	309.2	0.397	0.275	0.445	0.445
41.5	314.7	0.385	0.266	0.441	0.441
47.0	320.2	0.377	0.261	0.438	0.438
52.0	325.2	0.370	0.256	0.435	0.435
62.0	335.2	0.358	0.248	0.430	0.430
66.0	339.2	0.352	0.244	0.427	0.427
69.0	342.2	0.342	0.237	0.423	0.423
82.0	355.2	0.011	0.008	0.035	0.035
11.5	284.7	0.356	0.371	0.366	0.551
12.0	285.2	0.368	0.383	0.369	0.557
12.0	285.2	0.345	0.359	0.362	0.546
13.0	286.2	0.380	0.396	0.373	0.562
14.0	287.2	0.394	0.411	0.377	0.568
15.0	288.2	0.408	0.425	0.381	0.573
17.0	290.2	0.419	0.437	0.383	0.578
19.0	292.2	0.434	0.452	0.387	0.583
20.0	293.2	0.336	0.351	0.359	0.542
20.5	293.7	0.448	0.467	0.390	0.588
22.5	295.7	0.462	0.482	0.393	0.593
24.0	297.2	0.479	0.500	0.397	0.598
26.0	299.2	0.324	0.339	0.355	0.536
35.0	308.2	0.320	0.332	0.353	0.532
35.0	308.2	0.320	0.332	0.353	0.532
39.8	313.0	0.312	0.326	0.351	0.529
44.0	317.2	0.306	0.319	0.349	0.525
54.0	327.2	0.295	0.308	0.344	0.519
61.0	334.2	0.282	0.293	0.339	0.510
66.0	339.2	0.277	0.289	0.337	0.507
8.0	281.2	0.269	0.437	0.273	0.639
9.0	282.2	0.284	0.462	0.277	0.650
11.5	284.7	0.308	0.500	0.283	0.665
15.0	288.2	0.330	0.535	0.289	0.676
19.0	292.2	0.355	0.576	0.294	0.689
21.0	294.2	0.251	0.408	0.267	0.626
33.5	306.7	0.243	0.395	0.264	0.620
38.0	311.2	0.237	0.384	0.262	0.614
44.0	317.2	0.233	0.379	0.261	0.611
52.0	325.2	0.228	0.370	0.259	0.606
61.0	334.2	0.221	0.359	0.256	0.600
68.0	341.2	0.215	0.349	0.254	0.594
3.0	276.2	0.206	0.574	0.187	0.754
4.0	277.2	0.177	0.495	0.179	0.723
5.0	278.2	0.216	0.600	0.189	0.763
7.0	280.2	0.224	0.625	0.191	0.771
9.0	282.2	0.233	0.649	0.193	0.778
11.0	284.2	0.244	0.680	0.195	0.787
14.0	287.2	0.252	0.701	0.197	0.792
19.0	292.2	0.171	0.477	0.177	0.715
26.0	299.2	0.166	0.463	0.176	0.708
31.0	304.2	0.165	0.459	0.176	0.706
43.0	316.2	0.160	0.447	0.174	0.700
50.0	323.2	0.158	0.440	0.173	0.697
60.5	333.7	0.151	0.422	0.171	0.687
3.0	276.2	0.095	0.591	0.091	0.820
12.0	285.2	0.091	0.569	0.090	0.811
30.5	303.7	0.089	0.554	0.089	0.805
47.0	320.2	0.087	0.542	0.089	0.799
52.0	325.2	0.085	0.530	0.088	0.794
61.0	334.2	0.083	0.518	0.088	0.788
67.0	340.2	0.081	0.508	0.087	0.787

The compositions of coexistent two and three liquid phases at 11 and 17 °C are also reported in graphical form.

TABLE 2. Compositions of three coexisting liquid phases system nitromethane+1-pentanol+water*

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Alcohol-rich phase (compiler)		Water-rich phase (compiler)	
		x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
11	284	0.545	0.265	0.426	0.313	0.016	0.006

The same data are presented below in mass fractions

t/°C	T/K (compiler)	Nitromethane-rich phase		Alcohol-rich phase		Water-rich phase	
		w_1'	w_2'	w_1''	w_2''	w_1'''	w_2'''
11	284	0.554	0.389	0.446	0.473	0.051	0.026

* These data were extracted graphically by the compiler.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phase were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purified; boiling point=101.3 °C; n(20 °C,D)=1.3820, d(20 °C,4 °C)=1.1320.
(2) Source not specified; purified; boiling point=138 °C; n(20 °C,D)=1.4100, d(20 °C,4 °C)=0.8144.
(3) Twice distilled; n(20 °C,D)=1.3333.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

5.19. +Cyclohexanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Cyclohexanol; $C_6H_{12}O$; [108-93-0]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
L. F. Erofeeva and N. V. Yunnikova, Sb. Nauch. Tr., Kuzbas. Polytekh. Inst. **26**, 1–6 (1971).

Variables:
T/K = 268–362

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2) as 10.0:90.0, 30.0:70.0, 50.0:50.0, 63.0:37.0, 65.0:35.0, 68.0:32.0, 70.0:30.0, and 90.0:10.0, and also in ternary mixtures with a constant mass content of (3), respectively, 1.0 mass %.

TABLE 1. Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
58.5	331.7	0.0799	0.4378	0.0849	0.7637
76.0	349.2	0.0755	0.4125	0.0833	0.7493
31.3	304.5	0.2345	0.3336	0.2579	0.6019
52.0	325.2	0.2200	0.3128	0.2525	0.5892
76.5	349.7	0.1957	0.2784	0.2423	0.5655
88.0	361.2	0.0048	0.0069	0.0157	0.0366
5.0	278.2	0.5572	0.3396	0.4867	0.4867
14.2	287.4	0.4247	0.2589	0.4504	0.4505
38.5	311.7	0.3888	0.2369	0.4378	0.4378
62.0	335.2	0.3422	0.2086	0.4188	0.4189
72.0	345.2	0.3262	0.1988	0.4115	0.4116
77.0	350.2	0.3039	0.1852	0.4006	0.4006
81.0	354.2	0.0300	0.0183	0.0880	0.0880
84.0	357.2	0.2828	0.1724	0.3893	0.3893
2.5	275.7	0.5907	0.2115	0.5930	0.3484
4.8	278.0	0.6401	0.2291	0.6069	0.3565
8.5	281.7	0.6796	0.2432	0.6170	0.3623
16.8	290.0	0.5606	0.2006	0.5838	0.3428
34.2	307.2	0.5275	0.1888	0.5727	0.3364
45.0	318.2	0.5016	0.1796	0.5634	0.3309
3.0	276.2	0.6000	0.1969	0.6103	0.3287
3.0	276.2	0.5976	0.1959	0.6098	0.3280
3.5	276.7	0.6315	0.2073	0.6196	0.3337
4.0	277.2	0.6407	0.2103	0.6222	0.3351
4.5	277.7	0.6550	0.2150	0.6261	0.3372
7.0	280.2	0.6790	0.2228	0.6324	0.3406
8.1	281.3	0.6859	0.2251	0.6342	0.3415
12.5	285.7	0.7242	0.2376	0.6435	0.3465
26.3	299.5	0.5595	0.1835	0.5974	0.3216
40.1	313.3	0.5272	0.1730	0.5860	0.3156
51.8	325.0	0.4962	0.1628	0.5743	0.3092
4.0	277.2	0.6563	0.1882	0.6491	0.3055
8.9	282.1	0.7143	0.2049	0.6649	0.3130
10.2	283.5	0.6177	0.1772	0.6375	0.3000
31.0	304.2	0.5769	0.1654	0.6241	0.2936
46.0	319.2	0.5389	0.1545	0.6103	0.2872
57.0	330.2	0.5043	0.1446	0.5966	0.2808
3.1	276.3	0.6875	0.1796	0.6731	0.2885
3.1	276.3	0.6667	0.1741	0.6671	0.2859
5.2	278.4	0.6940	0.1813	0.6749	0.2893
6.5	279.7	0.7140	0.1865	0.6804	0.2916
9.2	282.4	0.7395	0.1931	0.6871	0.2944
14.0	287.2	0.7720	0.2016	0.6951	0.2979
23.5	296.7	0.6184	0.1615	0.6521	0.2794
46.0	319.2	0.5559	0.1452	0.6300	0.2700
60.0	333.2	0.5141	0.1343	0.6133	0.2629
65.0	338.2	0.0263	0.0069	0.0815	0.0349
68.5	341.7	0.4791	0.1252	0.5979	0.2563
75.8	349.0	0.4459	0.1165	0.5820	0.2494
76.0	349.2	0.0289	0.0075	0.0887	0.0380
83.0	356.2	0.0315	0.0082	0.0960	0.0412
86.0	359.2	0.3910	0.1021	0.5521	0.2366
86.0	359.2	0.0341	0.0089	0.1030	0.0442
39.5	312.7	0.0528	0.7802	0.8516	0.0946
52.5	325.7	0.0030	0.0450	0.1359	0.0151
72.0	345.2	0.0041	0.0605	0.1762	0.0196
81.0	354.2	0.0403	0.5947	0.7738	0.0860
88.0	361.2	0.0054	0.0795	0.2218	0.0247
89.0	362.2	0.0361	0.5326	0.7406	0.0823
−5.0	268.2	0.0612	0.9044	0.8910	0.0990
2.8	276.0	0.0937	0.8712	0.8415	0.1485
3.0	276.2	0.5076	0.4485	0.3465	0.6435
6.0	279.2	0.4571	0.5001	0.3960	0.5940
7.0	280.2	0.1275	0.8367	0.7920	0.1980
8.5	281.7	0.4091	0.5492	0.4455	0.5445
10.0	283.2	0.3632	0.5960	0.4950	0.4950
11.0	284.2	0.1627	0.8008	0.7425	0.2475
11.5	284.7	0.3195	0.6407	0.5445	0.4455
12.0	285.2	0.1994	0.7633	0.6930	0.2970
12.5	285.7	0.2776	0.6834	0.5940	0.3960
13.0	286.2	0.2377	0.7242	0.6435	0.3465

The compositions of coexistent two and three liquid phases at 2, 3.5, and 20 °C are also reported in graphical form.

TABLE 2. Compositions of three coexisting liquid phases system nitromethane+cyclohexanol+water*

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Alcohol-rich phase (compiler)		Water-rich phase (compiler)	
		x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
2	275	0.741	0.140	0.489	0.247	0.028	0.005

The same data are presented below in mass fractions

t/°C	T/K (compiler)	Nitromethane-rich phase		Alcohol-rich phase		Water-rich phase	
		w_1'	w_2'	w_1''	w_2''	w_1'''	w_2'''
2	275	0.554	0.389	0.446	0.473	0.051	0.026

*These data were extracted graphically by the compiler.

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility temperatures of the liquid phase were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:
(1) Source not specified; pure grade; distilled.
(2) Source not specified; pure grade; distilled.
(3) Twice distilled.

Estimated Error:
Not specified.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova 8, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

5.20. +1-Hexanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Hexanol; $C_6H_{14}O$; [111-27-3]
(3) Water; H_2O; [7732-18-5]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of solubility and equilibrium of coexisting liquid phases for the system nitromethane+1-hexanol+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+1-hexanol+water

Author(s)	T/K	Type of Data[a]
Zhuravleva *et al.*[1]	280–379	Solubility curve liquid phase (120)
	283	Equilibrium (8)
	291	Equilibrium (8)
	293	Equilibrium (8)
	298	Equilibrium (10)
Sazonov *et al.*[2]	293	Solubility curve (24)
	294	Solubility curve (37)
	303	Solubility curve (30)
	313	Solubility curve (19)
Sazonov *et al.*[3]	294	Equilibrium (13)
	296	Equilibrium (12)
	313	Equilibrium (9)

[a]Number of experimental points in parentheses.

Solubility data

All three binary pairs of components, nitromethane+1-hexanol, nitromethane+water and 1-hexanol+water, are partially miscible. The data for first two systems were compiled and critically evaluated.[4] The values of UCST (upper critical solution temperature) of the binary systems are reported in Zhuravleva *et al.*[1] and Sazonov *et al.*,[2] and presented in Table 2. The 1-hexanol+water system was critically evaluated in Barton.[5]

TABLE 2. UCST (T/K) binary systems

Binary system	Ref. 1	Ref. 2	Recommended
Nitromethane+1-hexanol	308.8	308.7	308.6±0.3 (Ref. 4)
Nitromethane+water	377.7	—	376.3±0.2 (Ref. 4)
1-hexanol+water	—	—	495.4 (Ref. 5)

The solubility temperatures of the liquid phases were determined by the synthetic method in ternary mixtures with constant mass relationship of (1) and (2), and also in ternary mixtures with a constant mass content of (3).[1] The solubility curves at 293.2, 294.2, 303.2, and 313.2 K were determined by the titration method.[2] Experimental errors were not reported, but are estimated by the evaluator to be ±0.1 K (temperature) and ±0.001 mass fractions (solubility). The system nitromethane+1-hexanol+water includes a three-phase region. Depending on temperature the system nitromethane+1-hexanol+water forms a miscibility gaps of Type I–III, Treybal.[6] In the temperature range 273–308.6 K, where three binary systems are partially miscible, the solubility curves correspond to Type III.[6] A three-phase region occurs below 294.4 K.[1] Maximal temperature of the three-phase liquid equilibrium was reported to be 294.2 K (Ref. 1) and 294.5 K.[2] Thus, the recommended value is $T_c=(294.4\pm0.2)$ K. Two separate regions of immiscibility exist above 294.4 K, one of these can be described by band type curves. In the temperature range 308.6–377.7 K,[1–3] where two binary systems (nitromethane+water and 1-hexanol+water) are partially miscible, the solubility curves are Type II.[6] Above 377.7 K, this ternary system has only one partially miscible region, Zhuravleva *et al.*[1] Solubility data at 313 and 333 K[1,2] both separately and in common (only organic-rich branch) are described by an algebraic equation in the form:

$$x_1=a+b\cdot x_2+c\cdot(x_2)^2+d\cdot(x_2)^{1/2}+e\cdot(x_2)^{3/2}.$$

This smoothing equation gives a smaller standard deviation than any other tested equation. The equation parameters (*a*, *b*, *c*, *d* and *e*) were calculated by the least squares method and presented in Table 3.

TABLE 3. The equation parameters

T/K	a	b	c	d	e	St. dev.
313 K, Refs. 1 and 2	0.8752	−2.9943	−0.0287	0.2586	1.7364	0.0049
333 K, Ref. 1	0.8294	−2.3505	−0.1358	0.0153	1.4263	0.0088

The solubilities, calculated by the proposed equations, are presented in Fig. 15 and in Table 4. Experimental solubility data,[1,2] are presented in Fig. 15 for comparison.

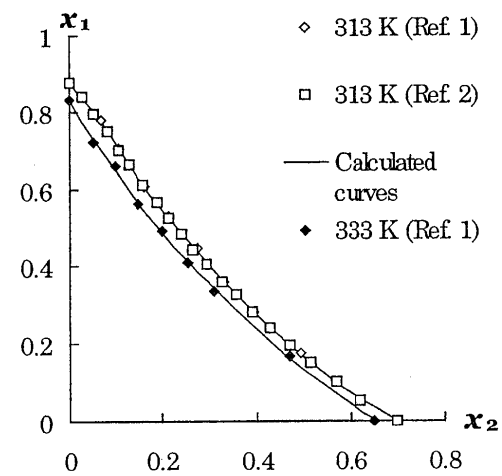

FIG. 15. Solubility curves (organic-rich branch only) of the system nitromethane+1-hexanol+water (mole fraction).

TABLE 4. Calculated solubility data (organic-rich branch only) of nitromethane, 1-hexanol, and water

T/K	x_1	x_2	x_3	w_1	w_2	w_3
313.2	0.000	0.698	0.302	0.000	0.929	0.071
	0.035	0.650	0.315	0.029	0.895	0.076
	0.076	0.600	0.324	0.065	0.854	0.081
	0.120	0.550	0.330	0.105	0.809	0.086
	0.168	0.500	0.332	0.152	0.759	0.089
	0.220	0.450	0.330	0.205	0.704	0.091
	0.276	0.400	0.324	0.265	0.643	0.092
	0.336	0.350	0.314	0.331	0.577	0.092
	0.401	0.300	0.299	0.404	0.507	0.089
	0.471	0.250	0.279	0.485	0.431	0.084
	0.546	0.200	0.254	0.571	0.350	0.079
	0.626	0.150	0.224	0.664	0.266	0.070
	0.712	0.100	0.188	0.762	0.179	0.059
	0.803	0.050	0.147	0.863	0.090	0.047
	0.890	0.000	0.110	0.965	0.000	0.035
333.2	0.000	0.652	0.348	0.000	0.914	0.086
	0.004	0.650	0.346	0.003	0.911	0.086
	0.045	0.600	0.355	0.039	0.870	0.091
	0.089	0.550	0.361	0.080	0.825	0.095
	0.135	0.500	0.365	0.125	0.775	0.100
	0.185	0.450	0.365	0.177	0.720	0.103
	0.238	0.400	0.364	0.235	0.660	0.105
	0.294	0.350	0.356	0.298	0.595	0.107
	0.355	0.300	0.345	0.370	0.524	0.106
	0.419	0.250	0.331	0.448	0.447	0.105
	0.488	0.200	0.312	0.533	0.366	0.101
	0.563	0.150	0.287	0.626	0.279	0.095
	0.643	0.100	0.257	0.726	0.189	0.085
	0.731	0.050	0.219	0.831	0.095	0.074
	0.830	0.000	0.170	0.944	0.000	0.056

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+1-hexanol+water were reported at 283, 291, 293, and 298 K (Zhuravleva *et al.*[1]) in graphical form and at 294.2, 296.2, and 313.2.[3] Composition of each phase[1] was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of saturation curve measurements and by gas chromatography.[3] The compositions of three coexisting liquid phases at 283, 291, and 293 K (Zhuravleva *et al.*[1]) are also reported in graphical form. These data and data from Sazonov *et al.*[3] at 294.2 K are presented in Table 5. Experimental errors were not reported. All experimental data are considered tentative.

TABLE 5. Compositions of three coexisting liquid phases system nitromethane+1-hexanol+water

	Nitromethane-rich phase		Alcohol-rich phase		Water-rich phase	
T/K	x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
283.2, Ref. 1	0.821	0.062	0.230	0.511	0.032	0.002
291.2, Ref. 1	0.684	0.131	0.370	0.349	0.033	0.002
293.2, Ref. 1	0.604	0.203	0.418	0.305	0.033	0.002
394.2, Ref. 3	0.620	0.183	0.446	0.296	0.034	0.001

References:

[1]I. K. Zhuravleva, E. F. Zhuravlev, and N. A. Rudakova, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **18**, 333 (1975); Deposited Doc., VINITI 1587 (1974).

[2]V. P. Sazonov, N. P. Markuzin, and V. V. Filippov, Zh. Prikl. Khim. (Leningrad) **49**, 784 (1976).

[3]V. P. Sazonov, N. P. Markuzin, and V. V. Filippov, Zh. Prikl. Khim. (Leningrad) **50**, 1524 (1977).

[4]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

[5]A. F. M. Barton, *Alcohols with Water*, IUPAC Solubility Data Series, Vol. 15 (Pergamon, Oxford, 1984).

[6]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Hexanol; $C_6H_{14}O$; [111-27-3]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

I. K. Zhuravleva, E. F. Zhuravlev, and N. A. Rudakova, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **18**, 333 (1975).
*Deposited Doc., VINITI 1587 (1974).

Variables:

T/K=280–379

Prepared By:

V. P. Sazonov and N. V. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2) as 17.6:82.4, 29.9:70.1, 39.5:60.5, 49.3:50.7, 59.5:40.5, 69.1:39.9, 70.9:20.1, 89.7:10.3 and also in ternary mixtures with a constant mass content of (3), respectively, 40.0 and 42.5 mass %.

TABLE 1. Solubility temperatures of the liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
9.5	282.7	0.858	0.059	0.875	0.100
12.0	285.2	0.900	0.062	0.877	0.102
32.5	305.2	0.813	0.056	0.860	0.099
43.0	316.2	0.784	0.054	0.850	0.098
50.0	323.2	0.764	0.053	0.843	0.097
57.0	330.2	0.744	0.051	0.836	0.096
57.5	330.7	0.018	0.001	0.058	0.007
63.0	336.2	0.714	0.049	0.824	0.095
67.0	340.2	0.707	0.048	0.822	0.094
72.0	345.2	0.694	0.048	0.816	0.094
19.0	292.2	0.767	0.115	0.771	0.194
20.0	293.2	0.780	0.117	0.775	0.195
23.0	296.2	0.800	0.120	0.781	0.196
23.0	296.2	0.741	0.111	0.763	0.192
24.0	297.2	0.814	0.122	0.785	0.197
25.5	298.7	0.826	0.124	0.788	0.198
27.0	300.2	0.844	0.127	0.783	0.199
29.0	302.2	0.860	0.129	0.797	0.200
29.0	302.2	0.731	0.110	0.760	0.191
33.0	306.2	0.718	0.108	0.756	0.190
41.0	314.2	0.706	0.106	0.752	0.189
47.0	320.2	0.692	0.104	0.747	0.188
51.5	324.7	0.681	0.102	0.743	0.187
55.0	328.2	0.672	0.101	0.740	0.186
60.0	333.2	0.658	0.099	0.735	0.185
61.0	334.2	0.008	0.001	0.026	0.007
64.0	337.2	0.643	0.097	0.729	0.184
67.0	340.2	0.637	0.096	0.727	0.183
21.0	294.2	0.653	0.175	0.656	0.293
22.0	295.2	0.675	0.180	0.662	0.296
23.0	296.2	0.685	0.183	0.665	0.297
24.0	297.2	0.697	0.186	0.668	0.299
25.0	298.2	0.718	0.192	0.674	0.301
26.0	299.2	0.723	0.193	0.675	0.302
26.0	299.2	0.642	0.172	0.652	0.292
28.0	301.2	0.734	0.196	0.678	0.303
29.0	302.2	0.748	0.200	0.681	0.305
31.0	304.2	0.757	0.202	0.683	0.306
31.0	304.2	0.631	0.168	0.649	0.290
32.0	305.2	0.768	0.205	0.686	0.307
33.0	306.2	0.780	0.208	0.689	0.308
35.0	308.2	0.618	0.165	0.645	0.288
39.0	312.2	0.609	0.163	0.642	0.287
51.0	324.2	0.585	0.156	0.634	0.283
57.0	330.2	0.571	0.152	0.629	0.281
62.0	335.2	0.554	0.148	0.623	0.278
66.0	339.2	0.547	0.146	0.620	0.277
21.0	294.2	0.571	0.232	0.561	0.382
22.0	295.2	0.580	0.236	0.564	0.384

23.0	296.2	0.599	0.244	0.569	0.387
23.0	296.2	0.561	0.228	0.558	0.380
24.0	297.2	0.611	0.248	0.572	0.389
25.0	298.2	0.625	0.254	0.575	0.392
26.0	299.2	0.635	0.258	0.578	0.393
27.5	300.7	0.553	0.225	0.556	0.378
28.0	301.2	0.644	0.262	0.580	0.395
29.0	302.2	0.649	0.264	0.581	0.396
30.0	303.2	0.665	0.270	0.585	0.398
33.0	306.2	0.688	0.280	0.590	0.402
34.0	307.2	0.702	0.286	0.593	0.404
36.0	309.2	0.535	0.218	0.550	0.375
43.0	316.2	0.522	0.213	0.546	0.372
51.0	324.2	0.506	0.206	0.541	0.368
57.0	330.2	0.497	0.202	0.538	0.366
67.0	340.2	0.475	0.193	0.530	0.361
72.0	345.2	0.471	0.191	0.528	0.360
21.0	294.2	0.480	0.295	0.461	0.475
21.0	294.2	0.473	0.290	0.459	0.473
22.0	295.2	0.493	0.303	0.465	0.478
22.0	295.2	0.485	0.298	0.463	0.476
23.0	396.2	0.500	0.307	0.467	0.480
24.0	297.2	0.508	0.312	0.469	0.482
24.5	297.7	0.464	0.285	0.457	0.470
25.0	298.2	0.520	0.319	0.472	0.485
26.0	299.2	0.530	0.326	0.474	0.488
28.5	301.7	0.570	0.350	0.483	0.497
28.5	301.7	0.462	0.284	0.457	0.469
33.5	306.7	0.587	0.360	0.487	0.500
38.5	311.7	0.449	0.276	0.453	0.465
54.5	327.7	0.419	0.258	0.443	0.456
67.0	340.2	0.402	0.247	0.437	0.450
75.0	348.2	0.002	0.001	0.005	0.005
19.5	292.7	0.388	0.355	0.367	0.561
20.0	293.2	0.394	0.360	0.368	0.564
21.0	294.2	0.400	0.366	0.370	0.566
21.5	294.7	0.408	0.373	0.372	0.569
22.0	295.2	0.414	0.379	0.373	0.572
23.5	296.7	0.380	0.348	0.365	0.558
24.0	297.2	0.431	0.395	0.377	0.578
26.0	299.2	0.449	0.411	0.381	0.584
29.0	302.2	0.478	0.438	0.387	0.593
30.0	303.2	0.374	0.343	0.363	0.556
32.0	305.2	0.502	0.459	0.391	0.600
41.0	314.2	0.362	0.331	0.359	0.551
51.0	324.2	0.349	0.319	0.356	0.545
61.0	334.2	0.337	0.309	0.352	0.539
71.0	344.2	0.329	0.301	0.349	0.535
17.0	290.2	0.314	0.439	0.280	0.655
18.0	291.2	0.324	0.454	0.282	0.661
19.5	292.7	0.298	0.414	0.276	0.646
20.5	293.7	0.339	0.476	0.285	0.669
23.0	296.2	0.360	0.505	0.289	0.679
27.5	300.7	0.389	0.544	0.295	0.697
44.5	317.7	0.280	0.392	0.271	0.635
50.0	323.2	0.277	0.389	0.270	0.634
53.0	326.2	0.276	0.387	0.270	0.633
7.0	280.2	0.195	0.545	0.165	0.770
10.0	283.2	0.211	0.589	0.168	0.785
13.0	286.2	0.224	0.625	0.170	0.796
20.0	293.2	0.187	0.522	0.163	0.762
49.0	322.2	0.175	0.489	0.160	0.749
66.0	339.2	0.165	0.462	0.158	0.738
104.5	377.7	0.304	0.002	0.594	0.006
104.5	377.7	0.283	0.002	0.569	0.006
105.0	378.2	0.302	0.004	0.588	0.012
105.0	378.2	0.280	0.003	0.564	0.012
105.5	378.7	0.299	0.006	0.582	0.018
105.5	378.7	0.278	0.005	0.558	0.017
106.0	379.2	0.296	0.007	0.576	0.024
106.0	379.2	0.275	0.007	0.552	0.023

The compositions of coexistent two and three liquid phases at 10, 18, 20, and 25 °C are also presented in graphical form.

TABLE 2. Compositions of three coexisting liquid phases system nitromethane+1-hexanol+water*

t/°C	T/K (compilers)	Nitromethane-rich phase (compilers) x_1'	x_2'	Alcohol-rich phase (compilers) x_1''	x_2''	Water-rich phase (compilers) x_1'''	x_2'''
10	283	0.821	0.062	0.230	0.511	0.032	0.002
18	291	0.684	0.131	0.370	0.349	0.033	0.002
20	293	0.604	0.203	0.418	0.305	0.033	0.002

The same data are presented below in mass fractions

t/°C	T/K (compilers)	Nitromethane-rich phase w_1'	w_2'	Alcohol-rich phase w_1''	w_2''	Water-rich phase w_1'''	w_2'''
10.0	283.2	0.856	0.108	0.198	0.736	0.100	0.009
18.0	291.2	0.714	0.229	0.357	0.563	0.102	0.009
20.0	293.2	0.604	0.339	0.414	0.505	0.102	0.009

* These data were extracted graphically by the compilers.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phase were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purified; boiling point = 101.3 °C; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified; purified; boiling point = 157.2 °C; n(20 °C,D) = 1.4190, d(20 °C,4 °C) = 0.8186.
(3) Twice distilled; n(20 °C,D) = 1.3333.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Hexanol; $C_6H_{14}O$; [111-27-3]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

V. P. Sazonov, N. P. Markuzin, and V. V. Filippov, Zh. Prikl. Khim. (Leningrad) **49**, 784–8 (1976).

Variables:

$T/K = 293-313$

Prepared By:

V. P. Sazonov and N. V. Sazonov

Experimental Data

Mutual solubility of nitromethane, 1-hexanol, and water

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
20.0	293.2	0.261	0.625	0.195	0.780
		0.327	0.454	0.284	0.660
		0.357	0.398	0.326	0.608
		0.386	0.340	0.372	0.550
		0.772	0.114	0.775	0.191
		0.852	0.089	0.836	0.147
		0.056	0.645	0.046	0.882
		0.132	0.558	0.114	0.807
		0.203	0.483	0.184	0.733
		0.297	0.412	0.277	0.643
		0.337	0.375	0.321	0.598
		0.745	0.110	0.767	0.189
		0.792	0.083	0.818	0.144
		0.846	0.056	0.873	0.097
		0.887	0.029	0.924	0.050
		0.465	0.289	0.455	0.474
		0.563	0.224	0.563	0.374
		0.651	0.169	0.660	0.286
		0.109	0.017	0.277	0.070
		0.292	0.051	0.511	0.149
		0.103	0.069	0.222	0.250
		0.241	0.200	0.325	0.452
		0.160	0.026	0.361	0.098
		0.146	0.111	0.265	0.337
21.0	294.2	0.451	0.289	0.446	0.478
		0.648	0.166	0.660	0.284
		0.660	0.158	0.675	0.270
		0.685	0.143	0.703	0.245
		0.734	0.115	0.756	0.198
		0.781	0.088	0.807	0.153
		0.828	0.061	0.860	0.106
		0.871	0.035	0.910	0.061
		0.445	0.299	0.436	0.490
		0.433	0.302	0.426	0.497
		0.428	0.309	0.418	0.506
		0.416	0.317	0.406	0.517
		0.380	0.340	0.368	0.552
		0.339	0.373	0.323	0.596
		0.294	0.405	0.277	0.639
		0.255	0.441	0.235	0.682
21.0	294.2	0.201	0.474	0.184	0.728
		0.107	0.577	0.092	0.828
		0.060	0.627	0.050	0.873
		0.698	0.145	0.707	0.246
		0.768	0.120	0.766	0.201
		0.843	0.095	0.826	0.156
		0.424	0.323	0.408	0.520
		0.396	0.355	0.372	0.559
		0.365	0.402	0.330	0.608
		0.338	0.464	0.288	0.662
		0.309	0.535	0.247	0.716
		0.272	0.644	0.198	0.784
		0.476	0.128	0.589	0.266
		0.286	0.073	0.479	0.204
		0.160	0.036	0.352	0.132
		0.569	0.216	0.572	0.364
		0.076	0.032	0.193	0.137
		0.135	0.074	0.274	0.252
		0.606	0.191	0.615	0.324
		0.012	0.001	0.040	0.005
		0.034	0.001	0.105	0.005
30.0	303.2	0.055	0.631	0.046	0.877
		0.104	0.574	0.090	0.828
		0.152	0.516	0.136	0.776
		0.198	0.474	0.182	0.729
		0.240	0.428	0.227	0.680
		0.284	0.395	0.273	0.636
		0.332	0.359	0.323	0.586
		0.373	0.332	0.367	0.547
		0.420	0.301	0.417	0.501
		0.455	0.273	0.459	0.460
		0.501	0.243	0.509	0.414
		0.545	0.214	0.559	0.368
		0.587	0.190	0.605	0.327
		0.626	0.160	0.654	0.280
		0.684	0.136	0.709	0.236
		0.724	0.108	0.758	0.190
		0.770	0.082	0.810	0.144
		0.818	0.054	0.865	0.095
		0.859	0.027	0.916	0.048
		0.355	0.635	0.250	0.748
		0.400	0.555	0.298	0.692
		0.441	0.490	0.344	0.640
		0.485	0.431	0.394	0.586
		0.533	0.382	0.445	0.534
		0.569	0.340	0.488	0.489
		0.618	0.300	0.540	0.439
		0.663	0.261	0.591	0.389
		0.705	0.228	0.637	0.345
		0.752	0.193	0.689	0.296
		0.804	0.160	0.743	0.247
40.0	313.2	0.055	0.622	0.046	0.874
		0.103	0.569	0.089	0.827
		0.152	0.516	0.136	0.776
		0.196	0.471	0.181	0.728
		0.241	0.430	0.228	0.680
		0.281	0.391	0.272	0.634
		0.327	0.359	0.320	0.589
		0.362	0.326	0.362	0.546
		0.404	0.295	0.410	0.500
		0.443	0.264	0.456	0.455
		0.485	0.485	0.501	0.415
		0.524	0.524	0.548	0.370
		0.567	0.567	0.595	0.329
		0.609	0.609	0.646	0.281
		0.664	0.664	0.706	0.229
		0.699	0.699	0.750	0.188
		0.749	0.749	0.803	0.143
		0.794	0.794	0.857	0.094
		0.841	0.841	0.909	0.049

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Hexanol; $C_6H_{14}O$; [111-27-3]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

V. P. Sazonov, N. P. Markuzin, and V. V. Filippov, Zh. Prikl. Khim. (Leningrad) **50**, 1524–8 (1977).

Variables:

T/K = 294–313

Prepared By:

V. P. Sazonov and N. V. Sazonov

Experimental Data

TABLE 1. Compositions of two and three coexisting liquid phases

t/°C	T/K (compilers)	Nitromethane-rich phase		Alcohol-rich phase		Water-rich phase	
		x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
21.0	294.2	—	—	0.066	0.631	0.015	0.001
		—	—	0.154	0.528	0.023	0.001
		—	—	0.270	0.423	0.028	0.001
		0.620	0.183	0.446	0.296	0.034	0.001
		0.738	0.113	—	—	0.0342	0.0008
		0.814	0.070	—	—	0.0336	0.0004
		0.886	0.084	0.260	0.677	—	—
		0.849	0.095	0.286	0.594	—	—
		0.817	0.103	0.312	0.525	—	—
		0.774	0.116	0.343	0.452	—	—
		0.744	0.128	0.364	0.410	—	—
		0.701	0.144	0.399	0.352	—	—
		0.620	0.183	0.446	0.296	—	—
23.0	296.2	—	—	0.070	0.622	0.015	0.001
		—	—	0.153	0.527	0.023	0.001
		—	—	0.268	0.422	0.028	0.001
		0.502	0.256	—	—	0.035	0.001
		0.612	0.187	—	—	0.035	0.001
		0.736	0.113	—	—	0.0344	0.0006
		0.812	0.070	—	—	0.0347	0.0003
		0.877	0.096	0.285	0.652	—	—
		0.830	0.111	0.313	0.570	—	—
		0.792	0.125	0.346	0.499	—	—
		0.730	0.150	0.400	0.407	—	—
		0.675	0.179	0.440	0.355	—	—

Auxiliary Information

Method/Apparatus/Procedure:

The solubility curves were determined by the titration method. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and repeatedly distilled in a packed column of 25 theoretical plates; no impurities detectable by gas chromatography.
(2) Source not specified; pure grade reagent; dried and repeatedly fractionated in a packed column of 50 theoretical plates; purity 99.95 mole % by GLC.
(3) Twice distilled.

Estimated Error:

Not specified.

The same data are presented below in mass fraction

t/°C	T/K (compilers)	Nitromethane-rich phase (compilers) w_1'	w_2'	Alcohol-rich phase (compilers) w_1''	w_2''	Water-rich phase (compilers) w_1'''	w_2'''
21.0	294.2	—	—	0.054	0.872	0.049	0.005
		—	—	0.136	0.781	0.074	0.005
		—	—	0.253	0.663	0.089	0.005
		0.630	0.311	0.438	0.487	0.106	0.005
		0.760	0.195	—	—	0.107	0.004
		0.843	0.121	—	—	0.105	0.002
		0.856	0.136	0.184	0.803	—	—
		0.829	0.155	0.217	0.756	—	—
		0.806	0.170	0.252	0.709	—	—
		0.773	0.194	0.296	0.652	—	—
		0.747	0.215	0.326	0.614	—	—
		0.710	0.244	0.376	0.555	—	—
		0.630	0.311	0.438	0.487	—	—
23.0	296.2	—	—	0.058	0.866	0.049	0.005
		—	—	0.135	0.781	0.074	0.005
		—	—	0.251	0.663	0.089.	0.005
		0.501	0.428	—	—	0.109	0.005
		0.622	0.318	—	—	0.109	0.005
		0.759	0.195	—	—	0.107	0.003
		0.842	0.122	—	—	0.108	0.002
		0.839	0.154	0.204	0.782	—	—
		0.803	0.180	0.240	0.733	—	—
		0.772	0.204	0.282	0.681	—	—
		0.718	0.247	0.351	0.599	—	—
		0.663	0.295	0.402	0.543	—	—

TABLE 2. Compositions of two coexisting liquid phases

t/°C	T/K (compilers)	Organic-rich phase x_1'	x_2'	Water-rich phase x_1''	x_2''	Organic-rich phase (compilers) w_1'	w_2'	Water-rich phase (compilers) w_1''	w_2''
40.0	313.2	0.063	0.616	0.0151	0.0009	0.053	0.867	0.049	0.005
		0.138	0.530	0.0241	0.0009	0.123	0.790	0.077	0.005
		0.224	0.445	0.0281	0.0009	0.210	0.698	0.089	0.005
		0.291	0.384	0.0331	0.0009	0.283	0.624	0.103	0.005
		0.403	0.295	0.0361	0.0009	0.409	0.501	0.112	0.005
		0.500	0.228	0.0431	0.0009	0.520	0.397	0.132	0.005
		0.593	0.169	0.0434	0.0006	0.627	0.299	0.133	0.003
		0.685	0.114	0.0426	0.0004	0.732	0.204	0.131	0.002
		0.763	0.070	0.0428	0.0002	0.821	0.126	0.131	0.001

Auxiliary Information

Method/Apparatus/Procedure:

The analytical method was used for determining of equilibrium compositions of liquid phases. The initial mixtures were kept for (3–3.5 h) in a water thermostat at a given temperature to attain equilibrium and complete phase separation. Analytical samples were taken by microsyringe through a rubber stopper. The compositions of the liquid phases were determined by gas chromatography.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and repeatedly distilled in a packed column of 25 theoretical plates; no impurities detectable by gas chromatography.
(2) Source not specified; pure grade reagent; dried and repeatedly fractionated in a packed column of 50 theoretical plates; purity 99.95 mole % by GLC.
(3) Twice distilled.

Estimated Error:

Not specified.

5.21. +N,N-Diethylethanamine

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) N,N-Diethylethanamine; $C_6H_{15}N$; [121-44-8]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

E. F. Zhuravlev and R. I. Burdykina, Zh. Fiz. Khim. **43**, 895–900 (1969).

Variables:

T/K = 265–360

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2) as 10.7:89.3, 20.9:79.1, 34.6:65.4, 50.5:49.5, 64.9:35.1, 79.6:20.4, and 89.4:10.6, respectively.

Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
19.5	292.7	0.035	0.003	0.108	0.013
29.4	302.6	0.787	0.056	0.849	0.101
31.7	304.9	0.039	0.003	0.120	0.014
46.5	319.7	0.050	0.004	0.149	0.018
48.7	321.9	0.752	0.054	0.837	0.099
60.0	333.2	0.721	0.052	0.825	0.098
65.0	338.2	0.069	0.005	0.198	0.023
66.0	339.2	0.683	0.049	0.810	0.096
71.0	344.2	0.670	0.048	0.805	0.095
85.5	358.7	0.598	0.043	0.772	0.091
86.3	359.5	0.112	0.008	0.291	0.035
12.0	285.2	0.034	0.005	0.103	0.027
25.8	299.0	0.038	0.006	0.116	0.030
35.3	308.5	0.689	0.107	0.744	0.191
37.7	310.9	0.046	0.007	0.137	0.035
44.3	317.5	0.675	0.105	0.739	0.190
48.0	321.2	0.055	0.009	0.159	0.041
52.5	325.7	0.656	0.102	0.732	0.188
56.5	329.7	0.652	0.101	0.731	0.187
57.5	330.7	0.060	0.009	0.172	0.044
62.5	335.7	0.637	0.099	0.735	0.186
70.0	343.2	0.071	0.011	0.197	0.051
72.2	345.4	0.606	0.094	0.713	0.183
80.0	353.2	0.587	0.097	0.705	0.181
86.5	359.7	0.576	0.089	0.700	0.180
1.8	275.0	0.743	0.243	0.646	0.350
10.0	283.2	0.044	0.014	0.127	0.069
20.0	293.2	0.058	0.019	0.160	0.087
51.0	324.2	0.088	0.029	0.223	0.120
52.5	325.7	0.541	0.176	0.590	0.319
59.0	332.2	0.533	0.174	0.587	0.318
75.8	349.0	0.528	0.173	0.585	0.317
82.0	355.2	0.518	0.168	0.582	0.314
−8.0	265.2	0.587	0.347	0.497	0.487
1.2	274.4	0.612	0.362	0.502	0.492
9.5	282.7	0.618	0.365	0.503	0.493
15.0	288.2	0.071	0.042	0.177	0.173
19.0	292.2	0.392	0.232	0.442	0.433
22.0	295.2	0.063	0.037	0.161	0.157

27.8	301.0	0.396	0.235	0.443	0.435
36.2	309.4	0.402	0.238	0.445	0.437
59.0	332.2	0.035	0.021	0.100	0.099
−4.0	269.2	0.455	0.518	0.344	0.650
5.3	278.5	0.462	0.527	0.345	0.652
13.5	286.7	0.266	0.303	0.297	0.561
30.0	303.2	0.278	0.318	0.301	0.570
49.5	322.7	0.299	0.342	0.308	0.583
59.5	332.7	0.301	0.343	0.309	0.583
61.7	334.9	0.312	0.356	0.312	0.590
14.5	287.7	0.010	0.022	0.029	0.111
17.0	290.2	0.172	0.393	0.181	0.684
22.3	295.5	0.186	0.425	0.185	0.701
23.0	296.2	0.007	0.016	0.022	0.083
29.0	302.2	0.203	0.461	0.190	0.717
29.5	302.7	0.006	0.013	0.018	0.070
36.0	309.2	0.005	0.012	0.017	0.062
39.0	312.2	0.226	0.518	0.195	0.740
41.5	314.7	0.230	0.524	0.196	0.742
43.0	316.2	0.004	0.009	0.014	0.051
45.8	319.0	0.234	0.536	0.197	0.746
55.5	328.7	0.240	0.550	0.198	0.751
84.0	357.2	0.248	0.564	0.200	0.755
6.5	279.7	0.086	0.433	0.091	0.759
9.5	282.7	0.096	0.484	0.094	0.785
10.0	283.2	0.005	0.027	0.016	0.132
12.5	285.7	0.104	0.518	0.096	0.800
14.5	287.7	0.004	0.020	0.012	0.101
15.5	288.7	0.112	0.561	0.098	0.817
18.5	291.7	0.003	0.016	0.010	0.082
19.3	292.5	0.117	0.593	0.099	0.829
30.0	303.2	0.002	0.009	0.006	0.046
42.0	315.2	0.136	0.685	0.103	0.857
43.3	316.5	0.001	0.005	0.004	0.029

Auxiliary Information

Method/Apparatus/Procedure:
The solubility temperatures of the liquid phase were determined by the synthetic method.[1] No experimental details were given.

Source and Purity of Materials:
(1) Source not specified; purified; boiling point= 101.2 °C.
(2) Source not specified; purified; boiling point= 89.4 °C.
(3) Not specified.

Estimated Error:
Not specified.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

5.22. +Heptane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Heptane; C_7H_{16}; [142-82-5]
(3) Water; H_2O; [7732-18-5]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of solubility (soly) and equilibrium of coexisting liquid phases (equil.) for the system nitromethane+heptane+water is given in table.

Summary of experimental data for the system nitromethane+heptane+water

Author(s)	T/K	Type of data[a]
Malesinska and Malesinska[1 b]	396	Solubility three liquid phases (1)
Zhilyaeva *et al.*[2]	307–392	Solubility three liquid phases (131)
	354–424	Solubility two liquid phases (34)
Rezanova *et al.*[3]	298, 303, 313, 323, and 333	Equilibrium three liquid phases (15)

[a] Number of experimental points in parentheses.
[b]Data of Malesinska are presented further in the table titled Nitromethane+Hydrocarbons+Water.

Solubility data

All three binary pairs of components, nitromethane+heptane, nitromethane+water and heptane+water, are partially miscible. The data for the first two systems were compiled and critically evaluated.[4] The system heptane+water was critically evaluated in Shaw.[5] The UCST (upper critical solution temperature) binary system nitromethane+heptane has been reported in Zhilyaeva *et al.*[2] as 381.5 K and to agree with recommended value in Sazonov *et al.*[4]

The solubility temperatures of the three and two liquid phases were determined in Zhilyaeva *et al.*[2] by the synthetic method in ternary mixtures with constant mass content of heptane, and also in ternary mixtures with a constant mass content of water. The system nitromethane+heptane+water includes a three-phase region. Depending on temperature the system nitromethane+heptane+water forms a miscibility gaps of Type I–III, Treybal.[6] In the temperature range 273–376.5 K, where three binary systems partially miscible, the solubility curves correspond to Type III (Treybal[6]). A three-phase region occurs below 391.6 K.[2] Maximal temperature of the three-phase liquid equilibrium was reported to be 391.6 K (Zhilyaeva *et al.*[2]) and 395.65 K.[1] In the temperature range 376.5–381.5 K (Fig. 16) where two binary systems nitromethane+heptane and heptane+water are partially miscible, the solubility curves correspond to Type II (Treybal[6]). Above 381.5 K this ternary system has only one partially miscible region, Zhilyaeva *et al.*[2] Experimental errors were not reported, but are estimated by the evaluator to be ±0.1 K (temperature) and ±0.002 mass fractions (solubility).

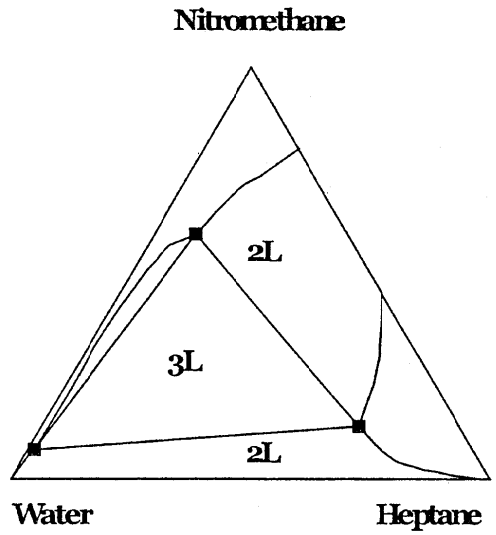

FIG. 16. Phase diagram for the ternary system nitromethane+heptane+water at 378 K (mole fraction).

Liquid–liquid equilibrium data

Compositions of three coexisting liquid phases for the ternary system nitromethane+heptane+water were reported at 368 and 378 K in graphical form (Zhilyaeva *et al.*[2]), and also at 298.15, 303.15 313.15, 323.15, and 333.15 K.[3] These data are obtained by interpretation of the graphical cloud-point data in Zhilyaeva *et al.*[2] and presented in Fig. 16, and also by titration method.[3] The area of the three-phase region decreases with increasing temperature. Experimental errors were reported in Ref. 3 as ±0.02 K (temperature) and ±0.003 mole fractions (composition).

All experimental data are considered tentative.

References:

[1]B. Malesinska and W. Malesinski, Bull. Acad. Pol. Sci., Ser. Sci. Chim. **11**, 475 (1963).

[2]I. N. Zhilyaeva, V. P. Sazonov, and A. G. Sarkisov, Khimiya, Nephtekhimiya, Nephtedobycha, Kuibyshev 16 (1971); I. N. Zhilyaeva, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1972.

[3]E. H. Rezanova, A. M. Toikka, and N. P. Markuzin, Vest Leningr. Univ., Fiz., Khim. **18**, 53 (1991).

[4]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

[5]D. G. Shaw, *Hydrocarbons with Water and Seawater*, Part I: *Hydrocarbons C5 to C7*, IUPAC Solubility Data Series, Vol. 37 (Pergamon, Oxford, 1989).

[6]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Heptane; C_7H_{16}; [142-82-5]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
I. N. Zhilyaeva, V. P. Sazonov, and A. G. Sarkisov, Khimiya, Nephtekhimiya, Nephtedobycha, Kuibyshev 16–9 (1971).
I. N. Zhilyaeva, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1972.

Variables:
T/K=307–424

Prepared By:
V. P. Sazonov and N. V. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant weight content of (2), respectively, 1.0, 5.0, and 10.0 mass %, and also in ternary mixtures with a constant mass content of (3), respectively, 2.0, 5.0, 9.0, 17.0, 23.0, and 33.0 mass %. L_1 nitromethane-rich phase, L_2 heptane-rich phase, L_3 water-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
74.7(L_2)	347.9	0.069	0.002	0.198	0.010
87.8(L_2)	360.0	0.089	0.002	0.247	0.010
98.3(L_2)	371.5	0.112	0.002	0.297	0.010
106.8(L_2)	380.0	0.137	0.002	0.346	0.010
108.4(L_2)	381.6	0.194	0.003	0.445	0.010
74.6(L_1)	347.8	0.068	0.011	0.190	0.050
87.5(L_3)	360.7	0.708	0.025	0.855	0.050
88.7(L_1)	361.9	0.089	0.011	0.238	0.050
98.4(L_1)	372.6	0.111	0.012	0.285	0.050
102.8(L_3)	376.0	0.611	0.023	0.807	0.050
106.2(L_1)	379.4	0.136	0.012	0.332	0.050
111.2(L_3)	384.4	0.530	0.021	0.760	0.050
112.0(L_1)	385.2	0.162	0.013	0.380	0.050
115.0(L_1)	388.2	0.192	0.014	0.428	0.050
115.2(L_3)	388.4	0.460	0.020	0.712	0.050
116.8(L_1)	390.0	0.225	0.014	0.475	0.050
117.6(L_3)	390.8	0.401	0.018	0.665	0.050
118.0(L_1)	391.2	0.261	0.015	0.522	0.050
118.2(L_3)	391.4	0.348	0.017	0.617	0.050
118.3(L_1)	391.5	0.302	0.016	0.570	0.050
118.4[a]	391.6	0.325	0.017	0.594	0.050
72.7(L_1)	345.9	0.067	0.023	0.180	0.100
87.4(L_1)	360.6	0.087	0.024	0.225	0.100
90.0(L_3)	363.2	0.689	0.052	0.810	0.100
97.8(L_1)	371.0	0.110	0.025	0.270	0.100
104.3(L_3)	377.5	0.596	0.047	0.765	0.100
104.6(L_1)	377.9	0.134	0.026	0.315	0.100
110.2(L_1)	383.4	0.160	0.027	0.360	0.100
112.8(L_3)	386.0	0.518	0.044	0.720	0.100
114.2(L_1)	387.4	0.189	0.028	0.405	0.100
116.6(L_1)	389.8	0.221	0.030	0.450	0.100
116.8(L_3)	390.0	0.450	0.041	0.675	0.100
118.0(L_3)	391.2	0.392	0.038	0.650	0.100
118.0(L_1)	391.2	0.257	0.032	0.495	0.100
118.3(L_3)	391.5	0.341	0.036	0.585	0.100
118.4[a]	391.6	0.323	0.035	0.567	0.100
33.4(L_3)	306.6	0.735	0.192	0.686	0.294
41.4(L_3)	314.6	0.657	0.267	0.588	0.392
46.2(L_3)	319.4	0.616	0.307	0.539	0.441
50.0(L_3)	323.2	0.572	0.349	0.490	0.490
55.0(L_3)	328.2	0.527	0.392	0.441	0.539
61.3(L_3)	334.5	0.479	0.438	0.392	0.588

69.3(L_3)	342.5	0.429	0.486	0.343	0.637
77.1(L_3)	350.3	0.377	0.536	0.294	0.686
85.2(L_1)	358.4	0.139	0.764	0.098	0.882
86.7(L_3)	359.9	0.322	0.589	0.245	0.735
95.0(L_3)	368.2	0.295	0.615	0.222	0.758
108.0(L_1)	381.2	0.203	0.703	0.147	0.833
114.6(L_1)	387.8	0.234	0.673	0.171	0.809
118.4[a]	391.6	0.264	0.644	0.196	0.784
64.9(L_3)	338.1	0.759	0.082	0.807	0.143
66.6(L_3)	339.8	0.727	0.111	0.760	0.190
70.5(L_3)	343.7	0.684	0.150	0.698	0.252
73.1(L_3)	346.3	0.660	0.172	0.665	0.285
76.0(L_3)	349.2	0.624	0.205	0.617	0.333
80.0(L_3)	353.2	0.587	0.238	0.570	0.380
84.0(L_3)	357.2	0.549	0.273	0.523	0.427
86.0(L_1)	359.2	0.132	0.653	0.104	0.846
88.4(L_3)	361.6	0.509	0.310	0.475	0.475
93.8(L_3)	367.0	0.457	0.348	0.427	0.523
99.0(L_3)	372.7	0.424	0.387	0.380	0.570
104.2(L_1)	377.4	0.177	0.612	0.142	0.808
105.2(L_3)	378.4	0.379	0.428	0.333	0.617
112.8(L_3)	386.0	0.332	0.471	0.285	0.665
115.8(L_1)	389.0	0.231	0.563	0.190	0.760
116.4(L_3)	389.6	0.307	0.494	0.261	0.689
117.4(L_1)	390.6	0.252	0.544	0.209	0.741
118.4[a]	391.6	0.283	0.516	0.238	0.712
80.0(L_1)	353.2	0.117	0.545	0.105	0.805
91.6(L_3)	364.8	0.666	0.071	0.774	0.136
95.0(L_3)	368.2	0.637	0.097	0.728	0.182
96.6(L_1)	369.8	0.150	0.516	0.137	0.773
97.6(L_3)	370.8	0.606	0.123	0.682	0.227
99.8(L_3)	373.0	0.575	0.150	0.637	0.273
103.2(L_3)	376.4	0.542	0.178	0.591	0.319
105.2(L_3)	378.4	0.509	0.207	0.546	0.364
108.6(L_3)	381.8	0.475	0.236	0.501	0.409
109.0(L_1)	382.2	0.196	0.477	0.182	0.728
111.6(L_3)	384.8	0.439	0.267	0.455	0.455
114.4(L_3)	387.6	0.402	0.299	0.410	0.500
116.4(L_1)	389.6	0.240	0.439	0.227	0.683
116.6(L_3)	389.8	0.371	0.326	0.373	0.537
117.6(L_3)	390.8	0.344	0.349	0.341	0.569
117.6(L_1)	390.8	0.261	0.420	0.250	0.660
118.2(L_3)	391.4	0.324	0.366	0.319	0.591
118.3(L_3)	391.5	0.304	0.384	0.296	0.614
118.4[a]	391.6	0.283	0.402	0.273	0.637
96.2(L_1)	369.4	0.145	0.353	0.166	0.664
107.8(L_1)	381.0	0.179	0.326	0.208	0.622
110.0(L_3)	383.2	0.544	0.037	0.747	0.083
112.0(L_3)	385.2	0.519	0.056	0.705	0.125
112.8(L_3)	386.0	0.495	0.076	0.664	0.166
114.0(L_3)	387.2	0.470	0.095	0.623	0.207
114.6(L_1)	387.8	0.211	0.300	0.249	0.581
115.6(L_3)	388.8	0.444	0.116	0.581	0.249
116.6(L_3)	389.8	0.417	0.137	0.291	0.291
117.2(L_3)	390.4	0.390	0.158	0.332	0.332
117.6(L_1)	390.8	0.243	0.275	0.539	0.539
118.2(L_1)	39126	0.274	0.251	0.498	0.498
118.2(L_3)	391.2	0.362	0.181	0.374	0.374
118.3(L_3)	391.5	0.334	0.203	0.415	0.415
118.4[a]	391.6	0.304	0.227	0.457	0.457
89.6(L_1)	362.8	0.118	0.287	0.616	0.616
100.0(L_1)	373.2	0.145	0.266	0.578	0.578
108.8(L_1)	382.0	0.173	0.245	0.539	0.539
110.4(L_3)	383.6	0.456	0.031	0.077	0.077
113.4(L_1)	386.6	0.199	0.225	0.500	0.500
116.4(L_1)	389.6	0.225	0.206	0.462	0.462
117.4(L_3)	390.6	0.414	0.063	0.154	0.154
117.6(L_3)	390.8	0.392	0.079	0.192	0.192
117.6(L_1)	390.8	0.250	0.187	0.424	0.424
118.0(L_1)	391.2	0.275	0.168	0.385	0.385
118.1(L_3)	391.3	0.369	0.096	0.231	0.231
118.2(L_3)	391.4	0.347	0.114	0.270	0.270
118.2(L_1)	391.4	0.300	0.149	0.346	0.346
118.3(L_3)	391.5	0.323	0.131	0.308	0.308
118.4[a]	391.6	0.312	0.140	0.327	0.327
76.8(L_1)	350.0	0.085	0.207	0.536	0.536
87.9(L_1)	361.1	0.105	0.193	0.503	0.503
95.6(L_1)	368.8	0.125	0.178	0.469	0.469
102.6(L_1)	375.8	0.145	0.164	0.435	0.435
108.8(L_1)	382.0	0.164	0.150	0.402	0.402
111.8(L_1)	385.0	0.183	0.137	0.369	0.369
114.8(L_1)	388.0	0.203	0.122	0.335	0.335
116.2(L_1)	389.4	0.221	0.110	0.301	0.301
117.4(L_1)	390.6	0.239	0.097	0.268	0.268
117.8(L_1)	391.0	0.257	0.084	0.234	0.234
118.2(L_1)	391.4	0.274	0.072	0.201	0.201
118.2(L_3)	391.4	0.342	0.023	0.067	0.067
118.3(L_1)	391.5	0.309	0.047	0.134	0.134
118.4[a]	391.6	0.326	0.035	0.100	0.100

TABLE 2. Solubility temperatures of two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
80.8	354.0	0.723	0.005	0.891	0.010
100.8	374.0	0.539	0.004	0.792	0.010
104.8	378.0	0.468	0.004	0.743	0.010
106.6	379.8	0.406	0.004	0.693	0.010
107.6	380.8	0.353	0.003	0.644	0.010
108.1	381.3	0.306	0.003	0.594	0.010
108.3	381.5	0.264	0.003	0.544	0.010
108.6[a]	381.8	0.227	0.003	0.495	0.010
85.5	358.7	0.874	0.059	0.882	0.098
106.0	379.2	0.807	0.123	0.784	0.196
114.5	387.7	0.735	0.192	0.686	0.294
119.0	392.2	0.657	0.267	0.588	0.392
120.5	393.7	0.616	0.307	0.539	0.441
121.8[a]	395.0	0.572	0.349	0.490	0.490
124.2	397.4	0.527	0.392	0.441	0.539
126.6	399.8	0.479	0.438	0.392	0.588
129.0	402.2	0.429	0.486	0.343	0.637
132.5	405.7	0.377	0.536	0.294	0.686
137.3	410.5	0.322	0.589	0.245	0.735
139.0	412.2	0.295	0.615	0.222	0.758
143.2	416.4	0.264	0.644	0.196	0.784
147.0	420.2	0.234	0.673	0.171	0.808
151.0	424.2	0.203	0.703	0.147	0.833
108.6	381.8	0.759	0.082	0.807	0.143
118.0	391.2	0.727	0.111	0.760	0.190
126.6	399.8	0.684	0.150	0.698	0.252
129.4	402.6	0.660	0.172	0.665	0.285
133.2	406.4	0.624	0.205	0.617	0.333
136.6[a]	409.8	0.587	0.238	0.570	0.380
140.6	413.8	0.549	0.273	0.523	0.427
146.2	419.4	0.509	0.310	0.475	0.475
122.6	395.8	0.666	0.071	0.774	0.136
134.0	407.2	0.637	0.097	0.728	0.182
143.0	416.2	0.606	0.123	0.682	0.227

[a] Critical opalescence.

The compositions of coexistent three liquid phases at 95 and 105 °C are also presented in graphical form.

TABLE 3. Compositions of three coexisting liquid phases system nitromethane+heptane+water*

t/°C	T/K (compilers)	Nitromethane-rich phase (compilers) x_1'	x_2'	Heptane-rich phase (compilers) x_1''	x_2''	Water-rich phase (compilers) x_1'''	x_2'''
95	368	0.652	0.032	0.088	0.771	0.049	0.005
105	378	0.595	0.041	0.130	0.662	0.070	0.010

The same data are presented below in mass fractions

t/°C	T/K (compilers)	Nitromethane-rich phase w_1'	w_2'	Heptane-rich phase w_1''	w_2''	Water-rich phase w_1'''	w_2'''
95	368	0.818	0.065	0.063	0.907	0.146	0.022
105	378	0.773	0.087	0.102	0.850	0.196	0.044

* These data were extracted graphically by the compilers.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. Mixtures of (1), (2), and (3) of mass 10 g were heated with vigorous stirring to a temperature higher than homogenization temperature, then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and repeatedly distilled in a packed glass column; n(20 °C,D) = 1.3819, d(20 °C,4 °C) = 1.1380.
(2) Source not specified; analytical purity; dried and repeatedly fractionated in a packed glass column; n(20 °C,D) = 1.3877, d(20 °C,4 °C) = 0.6837.
(3) Twice distilled.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Heptane; C_7H_{16}; [142-82-5]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

E. H. Rezanova, A. M. Toikka, and N. P. Markuzin, Vest. Leningr. Univ., Fiz., Khim. **18**, 53–6 (1991).

Variables:

T/K = 298–333

Prepared By:

V. P. Sazonov

Experimental Data

Compositions of three coexisting liquid phases for the system nitromethane+heptane+water

t/°C (compiler)	T/K	Nitromethane-rich phase x_1'	x_2'	Heptane-rich phase x_1''	x_2''	Water-rich phase x_1'''	x_2'''
25.0	298.2	0.970	0.002	0.032	0.941	0.034	0.002
30.0	303.2	0.958	0.005	0.037	0.925	0.038	0.004
40.0	313.2	0.936	0.007	0.043	0.903	0.042	0.007
50.0	323.2	0.920	0.012	0.048	0.885	0.047	0.010
60.0	333.2	0.904	0.015	0.052	0.865	0.051	0.013

The same data are presented below in mass fraction

t/°C (compilers)	T/K	Nitromethane-rich phase (compiler) w_1'	w_2'	Heptane-rich phase (compiler) w_1''	w_2''	Water-rich phase (compiler) w_1'''	w_2'''
25.0	298.2	0.988	0.003	0.020	0.975	0.106	0.010
30.0	303.2	0.980	0.008	0.024	0.969	0.116	0.020
40.0	313.2	0.971	0.012	0.028	0.962	0.126	0.034
50.0	323.2	0.959	0.020	0.032	0.955	0.138	0.048
60.0	333.2	0.949	0.021	0.035	0.949	0.146	0.061

Auxiliary Information

Method/Apparatus/Procedure:

The titration method was used. A glass flask with volume 100 mL and a microburette with scale division 0.01 mL were used. Five heterogeneous mixtures of two components were prepared and titrated by the third component until the third liquid phase separated. The solutions were mixed by a magnetic stirrer. The tie lines were plotted across the points obtained by titration. These five points corresponded the five initial solutions. The compositions of three coexisting liquid phases were determined by the crossing of the above mentioned tie lines.

Source and Purity of Materials:

(1) Source not specified, pure grade reagent; dried over $CaCl_2$ and repeatedly distilled in a laboratory packed column of 20 theoretical plates; boiling point = 101.20 °C; n(20 °C,D) = 1.3820.
(2) Source not specified, CP reagent; distilled; boiling point = 98.42 °C; n(20 °C,D) = 1.3877.
(3) Twice distilled.

Estimated Error:

Temperature: control to ±0.02 K;
Solubility: ±0.003 mole fraction.

5.23. +1-Heptanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Heptanol; $C_7H_{16}O$; [111-70-6]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
V. P. Sazonov, Zh. Fiz. Khim. **42**, 3094–6 (1968).

Variables:
T/K = 292–313

Prepared By:
V. P. Sazonov and N. V. Sazonov

Experimental Data

The temperature of phase transitions were determined in ternary mixtures with a constant weight content of (3), respectively 1.0, 2.0, 4.0, 5.0, 6.0, 20.0, 40.0, and 60.0 mass %. L_1 nitromethane-rich phase; L_2 alcohol-rich phase; L_3 water-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
23.05(L_2)	296.20	0.7945	0.0736	0.8160	0.1440
25.45(L_2)	298.60	0.7767	0.0896	0.7872	0.1728
23.05(L_2)	296.20	0.7678	0.0712	0.8075	0.1425
26.60(L_2)	299.75	0.7385	0.0970	0.7600	0.1900
28.45(L_2)	301.60	0.7078	0.1239	0.7125	0.2375
23.06(L_2)	296.21	0.7424	0.0588	0.7990	0.1410
26.60(L_2)	299.75	0.7135	0.0937	0.7520	0.1880
28.45(L_2)	301.60	0.6834	0.1196	0.7050	0.2350
29.32(L_2)	302.47	0.6519	0.1467	0.6580	0.2820
29.64(L_2)	302.79	0.6190	0.1751	0.6110	0.3290
29.70(L_2)	302.85	0.5846	0.2047	0.5640	0.3760
29.72(L_2)	302.87	0.5668	0.2201	0.5405	0.3995
29.72[a]	302.87	0.5486	0.2357	0.5170	0.4230
21.90(L_1)	295.05	0.1677	0.2643	0.2000	0.6000
23.40(L_2)	296.55	0.4787	0.0444	0.6800	0.1200
24.85(L_1)	298.00	0.1981	0.2428	0.2400	0.5600
26.74(L_2)	299.89	0.4566	0.0500	0.6400	0.1600
27.05(L_1)	300.20	0.2275	0.2220	0.2800	0.5200
28.42(L_1)	301.57	0.2561	0.2018	0.3200	0.4800
28.51(L_2)	301.66	0.4340	0.0760	0.6000	0.2000
29.21(L_1)	302.36	0.2838	0.1822	0.3600	0.4400
29.39(L_2)	302.54	0.4107	0.0925	0.5600	0.2400
29.54(L_1)	302.69	0.3107	0.1632	0.4000	0.4000
29.66(L_2)	302.81	0.3867	0.1094	0.5200	0.2800
29.70(L_1)	302.85	0.3368	0.1447	0.4400	0.3600
29.70(L_2)	302.85	0.3621	0.1268	0.4800	0.3200
29.72[a]	302.87	0.3495	0.1357	0.4600	0.3400
20.40(L_1)	293.55	0.0862	0.1357	0.1500	0.4500
23.30(L_1)	296.45	0.1025	0.1257	0.1800	0.4200
24.00(L_2)	297.15	0.2667	0.0247	0.5100	0.0900
26.45(L_1)	299.60	0.1187	0.1157	0.2100	0.3900
27.24(L_2)	300.39	0.2529	0.0332	0.4800	0.1200
27.61(L_1)	300.76	0.1345	0.1060	0.2400	0.3600
28.78(L_1)	301.93	0.1501	0.0964	0.2700	0.3300
28.88(L_2)	302.03	0.2389	0.0418	0.4500	0.1500
29.39(L_1)	302.54	0.1655	0.0869	0.3000	0.3000
29.51(L_2)	302.66	0.2247	0.0505	0.4200	0.1800
29.66(L_1)	302.81	0.1807	0.0776	0.3300	0.2700
29.70(L_2)	302.85	0.2102	0.0595	0.3900	0.2100
29.71(L_1)	302.86	0.1881	0.0730	0.3450	0.2550
29.71(L_2)	302.86	0.2044	0.0630	0.3780	0.2220
29.72[a]	302.87	0.1955	0.0685	0.3600	0.2400
19.10(L_2)	292.25	0.1492	0.0087	0.3600	0.0400
21.05(L_1)	294.20	0.0606	0.0592	0.1400	0.2600
24.40(L_1)	297.55	0.0690	0.0544	0.1600	0.2400
25.31(L_2)	298.46	0.1414	0.0131	0.3400	0.0600
26.95(L_1)	300.10	0.0773	0.0496	0.1800	0.2200
28.15(L_2)	301.30	0.1336	0.0176	0.3200	0.0800
28.48(L_1)	301.63	0.0856	0.0449	0.2000	0.2000
29.33(L_1)	302.48	0.0937	0.0403	0.2200	0.1800
29.34(L_2)	302.49	0.1258	0.0220	0.3000	0.1000
29.70(L_2)	302.85	0.1179	0.0265	0.2800	0.1200
29.71(L_1)	302.86	0.1059	0.0334	0.2500	0.1500
29.71(L_2)	302.86	0.1139	0.0288	0.2700	0.1300
29.72[a]	302.87	0.1099	0.0311	0.2600	0.1400

[a] Critical opalescence.

TABLE 2. Solubility temperatures of two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
21.55	294.70	0.9121	0.0532	0.8910	0.0990
23.15	296.30	0.2378	0.7079	0.1485	0.8415
29.30	302.45	0.8827	0.0818	0.8415	0.1485
29.98	303.13	0.3056	0.6421	0.1980	0.7920
34.14	307.29	0.3686	0.5809	0.2475	0.7425
34.21	307.36	0.8517	0.1119	0.7920	0.1980
36.90	310.05	0.4274	0.5238	0.2970	0.6930
37.05	310.20	0.8192	0.1434	0.7425	0.2475
38.48	311.63	0.4823	0.4705	0.3465	0.6435
38.57	311.72	0.7849	0.1767	0.6930	0.2970
39.34	312.49	0.5338	0.4205	0.3960	0.5940
39.40	312.55	0.7488	0.2118	0.6435	0.3465
39.58	312.73	0.7300	0.2301	0.6188	0.3712
39.71	312.86	0.5821	0.3737	0.4455	0.5445
39.72	312.87	0.7106	0.2489	0.5940	0.3960
39.82	312.97	0.6275	0.3296	0.4950	0.4950
39.86	313.01	0.6907	0.2682	0.5692	0.4208
39.88	313.03	0.6701	0.2882	0.5445	0.4455
18.40	291.55	0.8810	0.0514	0.8820	0.0980
20.15	293.30	0.2254	0.6708	0.1470	0.8330
25.15	298.30	0.2901	0.6096	0.1960	0.7840
26.65	299.80	0.8518	0.0790	0.8330	0.1470
31.35	304.50	0.8212	0.1078	0.7840	0.1960
31.84	304.99	0.3506	0.5525	0.2450	0.7350
34.18	307.33	0.7891	0.1382	0.7350	0.2450
34.25	307.40	0.4072	0.4990	0.2940	0.6860
35.79	308.94	0.7554	0.1700	0.6860	0.2940
35.90	309.05	0.4601	0.4490	0.3430	0.6370
36.62	309.77	0.7198	0.2036	0.6370	0.3430
36.90	310.05	0.5100	0.4018	0.3920	0.5880
36.92	310.07	0.7014	0.2210	0.6125	0.3675
37.10	310.25	0.6824	0.2390	0.5880	0.3920

37.15	310.30	0.5569	0.3575	0.4410	0.5390
37.17	310.32	0.6629	0.2574	0.5635	0.4165
37.20	310.35	0.6011	0.3158	0.4900	0.4900
37.23	310.38	0.6429	0.2763	0.5390	0.4410
22.35	295.50	0.2433	0.5694	0.1760	0.7840
26.90	300.05	0.3184	0.5018	0.2400	0.7200
27.03	300.18	0.7747	0.0914	0.7840	0.1760
29.72	302.87	0.7335	0.1285	0.7200	0.2400
29.96	303.11	0.3709	0.4546	0.2880	0.6720
31.29	304.44	0.7009	0.1578	0.6720	0.2880
31.65	304.80	0.4204	0.4101	0.3360	0.6240
32.22	305.37	0.6667	0.1886	0.6240	0.3360
32.55	305.70	0.4671	0.3681	0.3840	0.5760
32.64	305.79	0.6307	0.2209	0.5760	0.3840
32.73	305.88	0.6121	0.2376	0.5520	0.4080
32.81	305.96	0.5930	0.2548	0.5280	0.4320
32.95	306.10	0.5113	0.3283	0.4320	0.5280
33.00	306.15	0.5734	0.2725	0.5040	0.4560
33.07	306.22	0.5532	0.2906	0.4800	0.4800
20.58	293.73	0.2505	0.5262	0.1900	0.7600
25.15	298.30	0.3041	0.4791	0.2375	0.7125
28.02	301.17	0.3546	0.4346	0.2850	0.6650
29.59	302.74	0.6758	0.1521	0.6650	0.2850
29.74	302.89	0.4024	0.3926	0.3325	0.6175
30.43	303.58	0.6422	0.1816	0.6175	0.3325
30.79	303.94	0.4477	0.3527	0.3800	0.5700
30.84	303.99	0.6070	0.2126	0.5700	0.3800
31.00	304.15	0.5888	0.2286	0.5462	0.4038
31.11	304.26	0.5702	0.2450	0.5225	0.4275
31.24	304.39	0.5510	0.2619	0.4988	0.4512
31.28	304.43	0.4906	0.3150	0.4275	0.5225
31.32	304.47	0.5313	0.2793	0.4750	0.4750
19.20	292.35	0.2391	0.5024	0.1880	0.7520
23.63	296.78	0.2906	0.4580	0.2350	0.7050
26.52	299.67	0.3394	0.4160	0.2820	0.6580
28.48	301.63	0.3856	0.3762	0.3290	0.6110
29.49	302.64	0.4295	0.3384	0.3760	0.5640
29.87	303.02	0.5299	0.2518	0.4935	0.4465
29.90	303.05	0.4711	0.3025	0.4230	0.5170
29.93	303.08	0.5108	0.2683	0.4700	0.4700

The compositions of coexistent three liquid phases at 22, 25, and 29 °C are also presented in graphical form.

TABLE 3. Compositions of three coexistent liquid phases system nitromethane+1-heptanol+water*

t/°C	T/K (compilers)	Nitromethane-rich phase (compilers)		Alcohol-rich phase (compilers)		Water-rich phase (compilers)	
		x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
22	295	0.786	0.065	0.276	0.461	0.035	0.002
25	298	0.781	0.086	0.327	0.433	0.035	0.002
29	302	0.696	0.140	0.436	0.333	0.035	0.002

The same data are presented below in mass fractions

t/°C	T/K (compilers)	Nitromethane-rich phase		Alcohol-rich phase		Water-rich phase	
		w_1'	w_2'	w_1''	w_2''	w_1'''	w_2'''
22	295	0.824	0.130	0.224	0.713	0.108	0.001
25	298	0.794	0.166	0.268	0.674	0.108	0.001
29	302	0.688	0.264	0.383	0.557	0.109	0.001

* These data were extracted graphically by the compilers.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. Ampoules with given amount of (1), (2), and (3) were heated with vigorous stirring to a temperature somewhat higher than the phase transition temperature and then were slowly cooled till turbidity appeared. Then the turbidity disappearance temperature was determined when heated at a slow rate.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and repeatedly distilled in a packed glass column; n(20 °C,D) = 1.3819, d(20 °C,4 °C) = 1.1380.
(2) Source not specified; pure grade reagent; dried and repeatedly distilled at vacuum; n(20 °C,D) = 1.4248, d(20 °C,4 °C) = 0.8219.
(3) Twice distilled.

Estimated Error:

Temperature: ±0.01 K.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

5.24. +Octanoic Acid

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Octanoic acid; $C_8H_{16}O_2$; [124-07-2]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
V. P. Sazonov, Zh. Fiz. Khim. **45**, 473–4 (1971).
*Deposited Doc., VINITI 2282 (1970).

Variables:
T/K=278–304

Prepared By:
V. P. Sazonov and N. V. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass content of (3), respectively 1.25, 2.50, 3.75, 5.0, 10.0, 20.0, 40.0, and 70.0 mass %, and also in ternary mixtures with a constant mass relationship of (1) and (2), respectively, 45.0:55.0, 57.5:42.5, and 70.0:30.0. L_1 nitromethane-rich phase; L_2 acid-rich phase; L_3 water-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of three liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
6.75(L_2)	279.90	0.7869	0.0833	0.7699	0.1926
8.65(L_2)	281.80	0.7592	0.1072	0.7218	0.2407
5.70(L_1)	278.85	0.4356	0.3425	0.3324	0.6176
6.75(L_2)	279.90	0.7522	0.0800	0.7593	0.1907
7.60(L_1)	280.75	0.4809	0.3049	0.3803	0.5697
8.65(L_2)	281.80	0.7254	0.1022	0.7128	0.2372
8.70(L_1)	281.85	0.5228	0.2702	0.4277	0.5223
9.20(L_1)	282.35	0.5619	0.2378	0.4751	0.4749
9.40(L_2)	282.55	0.6965	0.1262	0.6652	0.2848
9.45(L_1)	282.60	0.6002	0.2060	0.5246	0.4254
9.50(L_2)	282.65	0.6658	0.1516	0.6176	0.3324
9.55[a]	282.70	0.6333	0.1786	0.5702	0.3798
5.60(L_1)	278.75	0.3500	0.2743	0.3156	0.5844
6.75(L_2)	279.90	0.6345	0.0671	0.7201	0.1799
7.50(L_1)	280.65	0.3883	0.2464	0.3601	0.5399
8.65(L_1)	281.80	0.4252	0.2195	0.4054	0.4946
8.70(L_2)	281.85	0.6086	0.0859	0.6749	0.2251
9.15(L_1)	282.30	0.4595	0.1946	0.4499	0.4501
9.40(L_2)	282.55	0.5819	0.1054	0.6303	0.2697
9.45(L_1)	282.60	0.4924	0.1706	0.4949	0.4051
9.50(L_2)	282.65	0.5534	0.1261	0.5850	0.3150
9.55[a]	282.70	0.5236	0.3285	0.5398	0.3602
5.30(L_1)	278.45	0.2379	0.1868	0.2802	0.5198
6.80(L_2)	279.95	0.4620	0.0489	0.6399	0.1601
7.35(L_1)	280.50	0.2665	0.1692	0.3199	0.4801
8.50(L_1)	281.65	0.2942	0.1522	0.3600	0.4400
8.80(L_2)	281.95	0.4405	0.0621	0.6000	0.2000
9.05(L_2)	282.20	0.3210	0.1357	0.4002	0.3998
9.35(L_1)	282.50	0.3465	0.1200	0.4399	0.3601
9.45(L_2)	282.60	0.4181	0.0759	0.5598	0.2402
9.50(L_2)	282.65	0.3952	0.0900	0.5201	0.2799
9.55[a]	282.70	0.3713	0.1047	0.4800	0.3200
6.80(L_1)	279.95	0.1373	0.0872	0.2399	0.3601
6.90(L_2)	280.05	0.2546	0.0269	0.4801	0.1199
8.10(L_1)	281.25	0.1530	0.0792	0.2700	0.3300
8.90(L_2)	282.05	0.1683	0.0713	0.2999	0.3001
8.90(L_2)	282.05	0.2408	0.0340	0.4499	0.1501
9.30(L_1)	282.45	0.1835	0.0635	0.3301	0.2699
9.40(L_2)	282.55	0.2269	0.0412	0.4200	0.1800
9.50[a]	282.65	0.2126	0.0485	0.3899	0.2101
9.50[a]	282.65	0.1982	0.0559	0.3600	0.2400
5.80(L_1)	278.95	0.0524	0.0271	0.1350	0.1650
7.20(L_2)	280.35	0.0910	0.0097	0.2400	0.0600
8.15(L_1)	281.25	0.0580	0.0246	0.1500	0.1500
9.00(L_2)	282.15	0.0856	0.0121	0.2250	0.0750
9.00(L_1)	282.15	0.0637	0.0220	0.1651	0.1349
9.40(L_2)	282.55	0.0802	0.0145	0.2101	0.0899
9.40(L_1)	282.55	0.0692	0.0195	0.1800	0.1200
9.55[a]	282.70	0.0747	0.0170	0.1950	0.1050

[a]Critical opalescence.

TABLE 2. Solubility temperatures of two liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
10.65	283.80	0.4098	0.5200	0.2470	0.7405
15.35	288.50	0.8884	0.0667	0.8387	0.1488
16.50	289.65	0.4694	0.4635	0.2963	0.6913
20.50	293.65	0.5238	0.4120	0.3455	0.6420
20.98	294.13	0.8572	0.0963	0.7803	0.2072
22.98	296.13	0.5737	0.3647	0.3947	0.5928
23.72	296.87	0.8357	0.1166	0.7426	0.2449
24.31	297.46	0.6203	0.3206	0.4446	0.5429
25.17	298.32	0.8047	0.1460	0.6912	0.2963
25.24	298.39	0.6627	0.2805	0.4938	0.4938
25.65	298.80	0.7006	0.2446	0.5411	0.4464
25.68[a]	298.83	0.7207	0.2256	0.5677	0.4198
25.73	298.88	0.7727	0.1763	0.6416	0.3459
25.80	298.95	0.7390	0.2082	0.5928	0.3947
4.70	277.85	0.8497	0.0635	0.8288	0.1463
6.45[b]	279.60	0.3820	0.4852	0.2437	0.7313
7.60[b]	280.75	0.2521	0.6024	0.1467	0.8283
8.70[b]	281.85	0.1765	0.6706	0.0977	0.8773
9.10	282.25	0.4392	0.4337	0.2925	0.6825
10.40[b]	283.55	0.0929	0.7460	0.0488	0.9262
10.80	283.95	0.8235	0.0871	0.7801	0.1949
13.10	286.25	0.4916	0.3864	0.3413	0.6337
14.55	287.70	0.7957	0.1122	0.7313	0.2437
15.32	288.47	0.5397	0.3430	0.3897	0.5853
16.56	289.71	0.7660	0.1389	0.6825	0.2925
16.71	289.86	0.5847	0.3024	0.4388	0.5362
17.36	290.51	0.6262	0.2650	0.4875	0.4875
17.48	290.63	0.7345	0.1674	0.6338	0.3413
17.51	290.66	0.6648	0.2302	0.5363	0.4387
17.64	290.79	0.7009	0.1977	0.5851	0.3899
17.67[a]	290.82	0.6852	0.2118	0.5635	0.4115
7.90	281.05	0.4624	0.3633	0.3370	0.6255
10.0	283.15	0.5094	0.3227	0.3855	0.5770
10.03	283.18	0.7299	0.1325	0.6737	0.2888
10.92	284.07	0.6996	0.1586	0.6267	0.3358
11.22	284.37	0.5527	0.2854	0.4336	0.5289

11.49	284.64	0.6657	0.1878	0.5775	0.3850
11.62[a]	284.77	0.6489	0.2024	0.5541	0.4084
11.78	284.93	0.6304	0.2183	0.5293	0.4332
11.79	284.94	0.5926	0.2510	0.4811	0.4814
10.03	283.18	0.7302	0.1325	0.6738	0.2888
10.29	283.44	0.7330	0.1330	0.6745	0.2891
11.32	284.47	0.7398	0.1342	0.6762	0.2898
13.95	287.10	0.7542	0.1368	0.6797	0.2913
16.57	289.72	0.7660	0.1389	0.6825	0.2925
18.23	291.38	0.7735	0.1403	0.6843	0.2933
19.49	292.64	0.7796	0.1414	0.6857	0.2939
23.31	296.46	0.7961	0.1444	0.6894	0.2954
25.18	298.33	0.8042	0.1457	0.6911	0.2962
27.51	300.66	0.8145	0.1477	0.6934	0.2972
30.76	303.91	0.8290	0.1504	0.6964	0.2985
10.45	283.60	0.6414	0.2007	0.5519	0.4080
10.70	283.85	0.6423	0.2009	0.5521	0.4081
11.62	284.77	0.6483	0.2029	0.5534	0.4091
12.61	285.76	0.6559	0.2052	0.5550	0.4103
14.90	288.05	0.6695	0.2094	0.5579	0.4123
17.67	290.82	0.6843	0.2140	0.5607	0.4144
17.71	290.86	0.6840	0.2140	0.5608	0.4145
20.91	294.06	0.6987	0.2186	0.5637	0.4166
24.38	297.53	0.7148	0.2237	0.5667	0.4189
25.69	298.84	0.7205	0.2254	0.5678	0.4196
27.41	300.56	0.7280	0.2278	0.5691	0.4207
31.22	304.37	0.7453	0.2331	0.5722	0.4229
9.42	282.57	0.5380	0.2783	0.4305	0.5261
9.80	282.95	0.5413	0.2800	0.4311	0.5269
10.68	283.83	0.5482	0.2835	0.4324	0.5284
10.70	283.85	0.5489	0.2839	0.4325	0.5286
11.22	284.37	0.5523	0.2857	0.4331	0.5294
11.31	284.46	0.5538	0.2865	0.4334	0.5297
12.47	285.62	0.5611	0.2903	0.4347	0.5313
14.36	287.51	0.5725	0.2961	0.4367	0.5337
16.52	289.67	0.5839	0.3020	0.4386	0.5361
16.71	289.86	0.5850	0.3026	0.4388	0.5363
19.72	292.87	0.5993	0.3100	0.4411	0.5392
22.38	295.53	0.6116	0.3164	0.4431	0.5415
24.31	287.46	0.6195	0.3205	0.4443	0.5430
25.66	298.81	0.6270	0.3244	0.4454	0.5444
29.60	302.75	0.6424	0.3323	0.4477	0.5471

[a]Critical opalescence.
[b]Solubility temperature of solid phase.

TABLE 3. Composition of three coexisting liquid phases system nitromethane+octanoic acid+water*

		Nitromethane-rich phase (compilers)		Acid-rich phase (compilers)		Water-rich phase (compilers)	
t/°C	T/K (compiler)	x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
9	282	0.637	0.106	0.499	0.228	0.0097	0.0001

The same data are presented below in mass fractions

		Nitromethane-rich phase		Acid-rich phase		Water-rich phase	
t/°C	T/K (compiler)	w_1'	w_2'	w_1''	w_2''	w_1'''	w_2'''
9	282	0.662	0.259	0.446	0.482	0.032	0.001

*These data were extracted graphically by the compilers.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. Ampoules with given amount of (1), (2), and (3) were heated with vigorous stirring to a temperature somewhat higher than the phase transition temperature and then were slowly cooled till turbidity appeared. Then the turbidity disappearance temperature was determined when heated at a slow rate.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and repeatedly distilled in a packed glass column; n(20 °C,D) = 1.3819, d(20 °C,4 °C) = 1.1380.
(2) Source not specified; pure grade reagent; dried and repeatedly distilled at vacuum; n(20 °C,D) = 1.4279, d(20 °C,4 °C) = 0.9090.
(3) Twice distilled.

Estimated Error:

Temperature: ±0.01K.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

5.25. +1-Octanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Octanol; $C_8H_{18}O$; [111-87-5]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
I. K. Zhuravleva, E. F. Zhuravlev, and G. Lomakina, Zh. Fiz. Khim. **51**, 1700–7 (1977).

Variables:
T/K = 284–347

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2) as 10.0:90.0, 20.0:80.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, respectivley.

TABLE 1. Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
25.0	298.2	0.862	0.045	0.875	0.097
26.0	299.2	0.892	0.046	0.884	0.098
27.0	300.2	0.904	0.047	0.887	0.099
28.5	301.7	0.933	0.049	0.895	0.100
30.5	303.7	0.870	0.046	0.877	0.098
36.5	309.7	0.856	0.044	0.873	0.097
49.0	322.2	0.827	0.043	0.864	0.096
53.0	326.2	0.814	0.042	0.860	0.095
62.0	335.2	0.787	0.041	0.851	0.094
64.0	337.2	0.774	0.040	0.846	0.094
69.5	342.7	0.762	0.039	0.842	0.093
73.0	346.2	0.737	0.038	0.833	0.092
35.0	308.2	0.773	0.091	0.768	0.192
35.5	308.7	0.767	0.090	0.766	0.192
36.5	309.7	0.787	0.092	0.772	0.193
37.5	310.7	0.816	0.096	0.780	0.195
39.5	312.7	0.846	0.099	0.788	0.197
39.5	312.7	0.759	0.089	0.764	0.191
41.0	314.2	0.862	0.101	0.792	0.198
42.0	315.2	0.746	0.087	0.760	0.190
48.0	321.2	0.733	0.086	0.756	0.189
55.0	328.2	0.721	0.084	0.752	0.188
56.5	329.7	0.708	0.083	0.748	0.187
68.0	341.2	0.685	0.080	0.740	0.185
38.5	311.7	0.699	0.141	0.668	0.287
39.5	312.7	0.726	0.146	0.675	0.290
39.5	312.7	0.687	0.138	0.665	0.285
41.5	314.7	0.740	0.149	0.679	0.291
45.0	318.2	0.800	0.161	0.693	0.297
46.0	319.2	0.816	0.164	0.696	0.299
46.0	319.2	0.674	0.136	0.661	0.284
55.0	328.2	0.650	0.131	0.654	0.281
60.0	333.2	0.639	0.128	0.651	0.279
66.0	339.2	0.617	0.124	0.644	0.276
72.0	345.2	0.606	0.122	0.640	0.275
10.0	288.2	$1.8\cdot10^{-5}$	$0.5\cdot10^{-5}$	$0.6\cdot10^{-4}$	$0.4\cdot10^{-4}$
38.5	311.7	0.621	0.194	0.570	0.380
39.0	312.2	0.634	0.198	0.573	0.382
40.0	313.2	0.646	0.202	0.576	0.384
41.5	314.7	0.672	0.210	0.582	0.388
42.0	315.2	0.617	0.192	0.569	0.379
43.5	316.7	0.700	0.219	0.588	0.392
44.0	317.2	0.609	0.190	0.567	0.378
45.5	318.7	0.730	0.228	0.594	0.396
47.0	320.2	0.746	0.233	0.597	0.398
53.0	326.2	0.587	0.183	0.561	0.374
58.0	331.2	$3.54\cdot10^{-5}$	$1.11\cdot10^{-5}$	$0.12\cdot10^{-3}$	$0.8\cdot10^{-4}$
66.5	339.7	0.565	0.176	0.555	0.370
70.0	343.2	$5.32\cdot10^{-3}$	$1.66\cdot10^{-5}$	$0.18\cdot10^{-3}$	$0.12\cdot10^{-3}$
72.5	345.7	0.544	0.170	0.549	0.366
38.5	311.7	0.548	0.257	0.475	0.475
39.5	312.7	0.560	0.262	0.478	0.477
40.5	313.7	0.537	0.251	0.473	0.472
41.0	314.2	0.571	0.268	0.480	0.480
42.0	315.2	0.596	0.278	0.485	0.485
42.0	315.2	0.533	0.249	0.472	0.471
44.0	317.2	0.622	0.292	0.490	0.490
45.5	318.7	0.637	0.298	0.493	0.492
48.0	321.2	0.666	0.311	0.498	0.497
49.0	322.2	0.516	0.241	0.468	0.467
56.5	329.7	0.496	0.232	0.463	0.462
64.5	337.7	0.477	0.223	0.458	0.457
73.0	346.2	0.459	0.215	0.453	0.452
37.5	310.7	0.460	0.323	0.379	0.568
38.0	311.2	0.454	0.318	0.378	0.566
38.5	311.7	0.465	0.327	0.380	0.570
39.5	312.7	0.476	0.334	0.382	0.573
40.5	313.7	0.497	0.350	0.386	0.579
42.0	315.2	0.521	0.366	0.390	0.585
44.5	317.7	0.546	0.384	0.394	0.591
46.0	319.2	0.446	0.313	0.376	0.564
58.0	331.2	0.436	0.307	0.374	0.561
60.0	333.2	$2.36\cdot10^{-5}$	$1.66\cdot10^{-5}$	$0.08\cdot10^{-3}$	$0.12\cdot10^{-3}$
73.0	346.2	0.410	0.288	0.368	0.552
34.0	307.2	0.363	0.398	0.283	0.662
35.0	308.7	0.372	0.407	0.285	0.665
37.0	310.2	0.390	0.427	0.288	0.672
38.5	311.7	0.409	0.448	0.291	0.679
40.5	313.7	0.355	0.389	0.282	0.658
41.0	314.2	0.430	0.471	0.294	0.686
43.5	316.7	0.453	0.495	0.297	0.693
56.0	329.2	0.340	0.372	0.279	0.651
63.0	336.2	0.332	0.364	0.277	0.648
74.0	347.2	0.325	0.356	0.276	0.644
28.0	301.2	0.272	0.511	0.191	0.764
30.0	303.2	0.279	0.524	0.192	0.768
30.5	303.7	0.259	0.486	0.189	0.756
31.5	304.7	0.294	0.552	0.194	0.776
33.0	307.2	0.302	0.566	0.195	0.780
35.5	308.7	0.319	0.598	0.197	0.788
48.5	321.7	0.253	0.474	0.188	0.752
54.0	327.2	0.247	0.463	0.187	0.748
67.0	340.2	0.452	0.241	0.186	0.744
73.0	346.2	$1.11\cdot10^{-5}$	$5.91\cdot10^{-6}$	$0.2\cdot10^{-4}$	$0.8\cdot10^{-4}$
11.0	284.2	0.636	0.151	0.096	0.864
11.0	284.2	0.629	0.149	0.096	0.862
14.0	287.2	0.673	0.159	0.097	0.873
17.0	290.2	0.714	0.169	0.098	0.882
20.0	293.3	0.735	0.175	0.099	0.886
31.0	304.2	0.602	0.143	0.095	0.855
43.0	316.2	0.587	0.138	0.094	0.851
55.0	328.2	0.572	0.135	0.094	0.846
62.0	335.2	0.565	0.134	0.094	0.844
64.5	337.7	0.558	0.131	0.093	0.842

The compositions of coexistent two and three liquid phases at 36, 38, and 39 °C are also presented in graphical form.

TABLE 2. Compositions of three coexisting liquid phases system nitromethane+1-octanol+water*

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler) x_1'	x_2'	Alcohol-rich phase (compiler) x_1''	x_2''	Water-rich phase (compiler) x_1'''	x_2'''
36	309	0.833	0.068	0.398	0.388	0.013	0.0001
38	311	0.785	0.078	0.451	0.352	0.013	0.0001
39	312	0.745	0.091	0.480	0.279	0.013	0.0001

The same data are presented below in mass fraction

t/°C	T/K (compiler)	Nitromethane-rich phase w_1'	w_2'	Alcohol-rich phase w_1''	w_2''	Water-rich phase w_1'''	w_2'''
36	309	0.827	0.144	0.309	0.642	0.043	0.001
38	311	0.792	0.167	0.358	0.596	0.043	0.001
39	312	0.755	0.196	0.419	0.519	0.043	0.001

*These data were extracted graphically by the compiler.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phase were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.130*.
(2) Source not specified; purity not specified; n(20 °C,D) = 1.4395, d(20 °C,4 °C) = 0.8240.
(3) n(20 °C,D) = 1.333.
*Recorded as 1.330 on original. Value corrected by compiler.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

5.26. +1-Nonanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(3) Water; H_2O; [7732-18-5]

Evaluator:

V. P. Sazonov, Technical University, Samara, Russia, May, 2000.

Critical Evaluation

A survey of solubility and equilibrium of coexisting liquid phases for the system nitromethane+1-nonanol+water is given in the following table.

Summary of experimental data for the system nitromethane+1-nonanol+water

Author(s)	T/K	Type of data[a]
Sazonov and Chernysheva[1]	293–318	Solubility three liquid phases (49)
	307–439	Solubility two liquid phases (64)
Sazonov and Chernysheva[2]	293	Equilibrium (5)
	296	Equilibrium (8)
	318	Equilibrium (12)

[a]Number of experimental points in parentheses.

Solubility data

The system nitromethane+1-nonanol+water includes a three-phase region. All three binary pairs of components, nitromethane+1-nonanol, nitromethane+water, and 1-nonanol+water, are partially miscible. The data for the first two systems were compiled and critically evaluated.[3] The UCST (upper critical solution temperature) of the binary system nitromethane+1-nonanol has been reported in Sazonov and Chernysheva[2] as 327.96 K and to agree with recommended value in Sazonov *et al.*[3] The 1-nonanol+water system has been critically evaluated in Barton.[4]

The solubility temperatures of the three and two liquid phases portions of the ternary system were determined by the synthetic method in ternary mixtures with constant mass relationship of (1) and (2), Sazonov and Chernysheva.[1] Experimental errors were not reported, but are estimated by the evaluator to be ±0.1 K (temperature) and ±0.002 mass fractions (solubility). Depending on temperature the system nitromethane+1-nonanol+water forms a miscibility gaps of Type I–III, Treybal.[5] In the temperature range 273–328 K, where three binary systems are partially miscible, the solubility curves correspond to Type III.[5] A three-phase region occurs below 318.3 K.[1] Maximal temperature of the three-phase liquid equilibrium was reported to be 318.3 K.[1] Two separate regions of immiscibility exist above 318.3 K, one of these is described by band type curves. In the temperature range 328–376.3 K (UCST of binary nitromethane+water system), where two binary systems nitromethane+water and 1-nonanol+water are partially miscible, the solubility curves correspond to Type II.[5] Above 376.3 K this ternary system has only one partially miscible region.[1]

Liquid–liquid equilibrium data

Compositions of coexisting two and three liquid phase regions of the ternary system nitromethane+1-nonanol+water were determined at 293.15, 296.15, and 318.25 K by gas chromatography[2] and presented in Fig. 17. Experimental errors were not reported, but are estimated by the evaluator to be ±0.002 mass fractions (composition).

All experimental data are considered tentative.

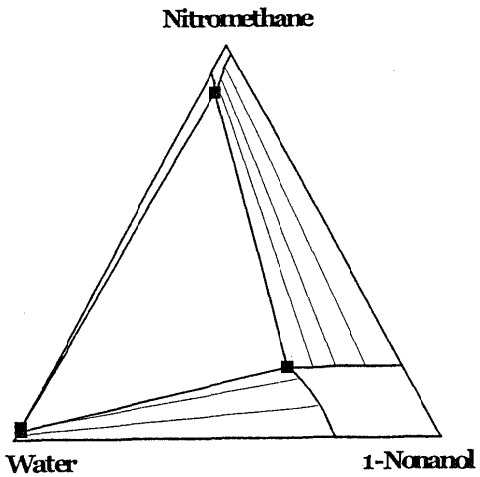

FIG. 17. Phase diagram of the ternary system nitromethane+1-nonanol+water at 296.15 K (mole fraction).

References:

[1]V. P. Sazonov and M. F. Chernysheva, Zh. Fiz. Khim. **49**, 2463 (1975); V. P. Sazonov and M. F. Chernysheva, Zh. Obshch. Khim. **46**, 997 (1976).

[2]V. P. Sazonov and M. F. Chernysheva, Zh. Prikl. Khim. (Leningrad) **51**, 1764 (1978).

[3]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

[4]A. F. M. Barton, *Alcohols with Water*, IUPAC Solubility Data Series, Vol. 15 (Pergamon, Oxford, 1984).

[5]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
V. P. Sazonov and M. F. Chernysheva, Zh. Fiz. Khim. **49**, 463–4 (1975).
V. P. Sazonov and M. F. Chernysheva, Zh. Obshch. Khim. **46**, 997–1000 (1976).

Variables:
T/K=293–439

Prepared By:
V. P. Sazonov and N. V. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass relationship of (1) and (2), respectively, 20.0:80.0, 40.0:60.0, 55.0:45.0, 70.0:30.0, and 85.0:15.0. L_1 nitromethane-rich phase; L_2 alcohol-rich phase; L_3 water-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
20.30(L_3)	293.45	0.2911	0.4927	0.1916	0.7664
23.71(L_1)	296.86	0.0715	0.1210	0.1200	0.4800
30.00(L_3)	303.15	0.2800	0.4740	0.1901	0.7606
30.02(L_1)	303.17	0.1195	0.2023	0.1498	0.5992
33.10(L_1)	306.25	0.2186	0.3700	0.1800	0.7200
33.60(L_1)	306.75	0.2552	0.4319	0.1865	0.7460
33.65(L_1)	306.80	0.2672	0.4525	0.1883	0.7534
33.71(L_1)	306.86	0.2695	0.4561	0.1887	0.7546
24.60(L_3)	297.75	0.5136	0.3259	0.3858	0.5786
30.06(L_3)	303.21	0.4987	0.3166	0.3832	0.5749
34.85(L_3)	308.00	0.4855	0.3081	0.3809	0.5713
38.16(L_1)	311.31	0.0700	0.0444	0.1604	0.2406
41.04(L_3)	314.19	0.4726	0.2999	0.3785	0.5677
42.53(L_1)	315.68	0.1383	0.0877	0.2408	0.3612
43.50(L_1)	316.65	0.2251	0.1429	0.3004	0.4506
43.90(L_1)	317.05	0.3867	0.2454	0.3596	0.5394
43.90(L_1)	317.05	0.4422	0.2807	0.3724	0.5587
43.90(L_1)	317.05	0.4597	0.2918	0.3760	0.5640
22.82(L_3)	295.97	0.6363	0.2203	0.5306	0.4341
24.78(L_1)	377.93	0.0389	0.0135	0.1111	0.0909
33.32(L_3)	306.47	0.6195	0.2145	0.5271	0.4312
39.51(L_3)	312.66	0.6039	0.2090	0.5237	0.4284
44.06(L_3)	317.21	0.5898	0.2041	0.5205	0.4258
44.44(L_1)	317.5	0.0949	0.0328	0.2206	0.1805
44.97(L_1)	318.12	0.1840	0.0637	0.3306	0.2705
44.98(L_1)	318.13	0.2942	0.1018	0.4125	0.3375
44.98(L_1)	318.13	0.4925	0.1705	0.4950	0.4050
44.98(L_1)	318.13	0.5552	0.1922	0.5122	0.4190
44.98(L_1)	318.13	0.5676	0.1965	0.5152	0.4216
22.50(L_3)	295.65	0.7539	0.1367	0.6796	0.2913
30.13(L_3)	303.28	0.7359	0.1334	0.6752	0.2894
37.60(L_3)	310.75	0.7157	0.1298	0.6701	0.2872
42.25(L_1)	315.40	0.0504	0.0091	0.1442	0.0618
42.59(L_2)	315.74	0.6982	0.1266	0.6655	0.2852
44.50(L_2)	317.65	0.6856	0.1243	0.6621	0.2837
44.50(L_2)	317.65	0.6732	0.1221	0.6586	0.2823
44.51(L_2)	317.66	0.5797	0.1051	0.6293	0.2697
44.66(L_2)	317.81	0.3579	0.0649	0.5250	0.2250
44.76(L_2)	317.91	0.2276	0.0413	0.4207	0.1803
44.93(L_2)	318.08	0.1185	0.0215	0.2800	0.1200
32.43(L_3)	305.58	0.8190	0.0612	0.8199	0.1447
37.60(L_3)	310.75	0.8018	0.0599	0.8147	0.1438
38.23(L_2)	311.38	0.7935	0.0592	0.8122	0.1433
38.23(L_2)	311.38	0.7733	0.0577	0.8058	0.1422
38.41(L_2)	311.56	0.6797	0.0508	0.7731	0.1364
38.98(L_2)	312.13	0.4363	0.0326	0.6511	0.1149
40.92(L_2)	314.07	0.2704	0.0202	0.5125	0.0905
41.01(L_2)	314.16	0.1413	0.0105	0.3392	0.0598
44.94(L_2)	315.09	0.0615	0.0046	0.1768	0.0312

TABLE 2. Solubility temperatures of two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
34.22	307.37	0.2800	0.4740	0.1901	0.7606
35.22	308.37	0.2911	0.4927	0.1916	0.7664
36.72	309.87	0.3027	0.5124	0.1930	0.7722
37.41	310.56	0.3093	0.5236	0.1938	0.7753
38.83	311.98	0.3210	0.5435	0.1951	0.7806
40.12	313.27	0.3327	0.5629	0.1964	0.7854
41.62	314.77	0.3442	0.5826	0.1975	0.7901
43.11	316.26	0.3563	0.6030	0.1987	0.7946
52.22	325.37	0.2695	0.4561	0.1887	0.7546
57.05	330.20	0.2672	0.4525	0.1883	0.7534
81.55	351.70	0.2552	0.4319	0.1865	0.7460
139.2	412.4	0.2186	0.3700	0.1800	0.7200
44.22	317.37	0.4726	0.2999	0.3785	0.5677
45.12	318.27	0.4855	0.3081	0.3809	0.5713
45.97	319.12	0.4987	0.3166	0.3832	0.5749
46.95	320.10	0.5136	0.3259	0.3858	0.5786
47.89	321.04	0.5275	0.3348	0.3880	0.5821
48.67	321.82	0.5382	0.3416	0.3897	0.5846
50.31	323.46	0.4597	0.2918	0.3760	0.5640
50.32	323.47	0.5603	0.3557	0.3930	0.5896
51.62	324.77	0.5764	0.3658	0.3953	0.5930
52.80	325.95	0.5935	0.3767	0.3976	0.5965
65.45	338.60	0.4422	0.2807	0.3724	0.5587
105.6	378.8	0.3867	0.2454	0.3596	0.5394
45.14[a]	318.29	0.5898	0.2041	0.5205	0.4258
45.93[a]	319.12	0.6039	0.2090	0.5237	0.4284
46.73[a]	319.88	0.6196	0.2145	0.5271	0.4312
47.77[a]	320.92	0.6363	0.2203	0.5306	0.4341
48.59[a]	321.74	0.6491	0.2247	0.5332	0.4362
49.83[a]	322.98	0.6688	0.2316	0.5370	0.4394
50.83[a]	323.98	0.6838	0.2368	0.5398	0.4417
52.33[a]	325.48	0.7025	0.2432	0.5432	0.4444
53.69[a]	326.84	0.7265	0.2515	0.5473	0.4478
54.55	327.70	0.5676	0.1965	0.5152	0.4216
60.55	333.70	0.5552	0.1922	0.5122	0.4190
91.5	364.7	0.4925	0.1705	0.4950	0.4050
160.4	433.6	0.2942	0.1018	0.4125	0.3375
44.84	317.99	0.6982	0.1266	0.6655	0.2852
45.62	318.77	0.7157	0.1298	0.6701	0.2872
46.82	319.97	0.7359	0.1243	0.6752	0.2894
46.97	320.12	0.6856	0.1243	0.6621	0.2837
48.00	321.15	0.7539	0.1367	0.6796	0.2913
49.49	322.64	0.7781	0.1411	0.6853	0.2937
50.32	323.47	0.7911	0.1435	0.6882	0.2950
51.19	324.34	0.8051	0.1460	0.6913	0.2963
52.14	315.29	0.6732	0.1221	0.6586	0.2823
53.09	316.24	0.8301	0.1505	0.6966	0.2986
85.5	358.7	0.5797	0.1051	0.6293	0.2697
134.2	407.4	0.3579	0.0649	0.5250	0.2250
160.2	433.4	0.2276	0.0413	0.4207	0.1803
38.24	311.39	0.8018	0.0599	0.8147	0.1438
39.19	312.34	0.8190	0.0612	0.8199	0.1447
40.03	313.18	0.8324	0.0622	0.8238	0.1454
41.54	314.69	0.8622	0.0644	0.8322	0.1469
42.33	315.48	0.7935	0.0592	0.8122	0.1433
42.73	315.88	0.8817	0.0659	0.8375	0.1478
43.80	316.95	0.9002	0.0672	0.8424	0.1487
44.52	317.67	0.9098	0.0679	0.8448	0.1491
45.03	318.18	0.9203	0.0687	0.8475	0.1495
49.48	322.63	0.7733	0.0577	0.8058	0.1422
76.8	350.0	0.6797	0.0508	0.7731	0.1364
113.8	387.0	0.4363	0.0326	0.6511	0.1149
127.6	400.8	0.2704	0.0202	0.5126	0.0905
166.0	439.2	0.1413	0.0106	0.3592	0.0599

[a]Critical opalescence.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method was used. Ampoules containing mixtures were suspended from a vertical roller linked to a shaking machine, which switched on at definite time intervals. Water bath temperature was controlled with a proportional temperature regulator and checked with mercury thermometers. Close to a phase transition, heating or cooling was effected at 0.03°/h. Solubility temperature of the liquid phase was determined both with heating and cooling, and the average taken. The thermostat contained silicone oil above 80 °C.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and repeatedly distilled in a packed glass column; no impurities detectable by gas chromatography.
(2) Source not specified; pure grade reagent; dried and repeatedly distilled at vacuum; 99.5 mole % purity.
(3) Twice distilled.

Estimated Error:

Temperature: taking ±0.01 K (293–323 K); ±0.05 K (323–373 K), and ±0.2 K (above 373 K).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

V. P. Sazonov and M. F. Chernysheva, Zh. Prikl. Khim. (Leningrad) **51**, 1764–9 (1976).

Variables:

T/K = 293–318

Prepared By:

V. P. Sazonov

Experimental Data

Compositions of two and three coexisting liquid phases for the system nitromethane + 1-nonanol + water

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler) x_1'	x_2'	Alcohol-rich phase (compiler) x_1''	x_2''	Water-rich phase (compiler) x_1'''	x_2'''
20.00	293.15	0.952	0.021	0.158	0.749	—	—
		0.929	0.024	0.155	0.675	—	—
		0.906	0.027	0.165	0.608	—	—
		0.889	0.028	0.166	0.566	0.032	0.00001
		0.910	0.020	—	—	0.033	0.00001
23.00	296.15	0.944	0.025	0.184	0.731	—	—
		0.915	0.031	0.184	0.659	—	—
		0.894	0.035	0.188	0.598	—	—
		0.878	0.035	0.182	0.549	0.033	0.00001
		0.910	0.018	—	—	0.035	0.00001
		0.900	0.024	—	—	0.034	0.00001
		—	—	0.153	0.593	0.026	0.00001
		—	—	0.081	0.676	0.013	0.00001
45.10	318.25	0.891	0.072	0.367	0.558	—	—
		0.854	0.081	0.390	0.487	—	—
		0.813	0.094	0.390	0.444	—	—
		0.772	0.106	0.406	0.399	—	—
		0.693	0.135	0.436	0.336	—	—
		0.851	0.019	—	—	0.044	0.00001
		0.779	0.065	—	—	0.042	0.00001
		0.588	0.199	—	—	0.041	0.00001
		—	—	0.416	0.324	0.040	0.00001
		—	—	0.296	0.444	0.037	0.00001
		—	—	0.164	0.580	0.025	0.00001
		—	—	0.066	0.671	0.009	0.00001

The same data are presented below in mass fractions

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler) w_1'	w_2'	Alcohol-rich phase (compiler) w_1''	w_2''	Water-rich phase (compiler) w_1'''	w_2'''
20.00	293.15	0.944	0.048	0.081	0.905	—	—
		0.929	0.057	0.086	0.886	—	—
		0.916	0.064	0.099	0.861	—	—
		0.907	0.068	0.105	0.845	0.101	0.0001
		0.930	0.049	—	—	0.103	0.0001
23.0	295.15	0.932	0.059	0.095	0.892	—	—
		0.912	0.072	0.103	0.871	—	—
		0.897	0.082	0.113	0.849	—	—
		0.891	0.083	0.117	0.832	0.105	0.0001
		0.935	0.043	—	—	0.109	0.0001
		0.919	0.058	—	—	0.106	0.0001
		—	—	0.094	0.860	0.084	0.0001
		—	—	0.046	0.913	0.043	0.0001
45.10	318.25	0.831	0.159	0.215	0.772	—	—
		0.803	0.179	0.247	0.730	—	—
		0.765	0.209	0.262	0.705	—	—
		0.730	0.236	0.289	0.670	—	—
		0.652	0.300	0.336	0.612	—	—
		0.911	0.048	—	—	0.134	0.0001
		0.795	0.158	—	—	0.130	0.0001
		0.524	0.420	—	—	0.127	0.0001
		—	—	0.331	0.608	0.124	0.0001
		—	—	0.208	0.738	0.115	0.0001
		—	—	0.102	0.851	0.080	0.0001
		—	—	0.038	0.917	0.031	0.0001

Auxiliary Information

Method/Apparatus/Procedure:

The analytical method was used. Compositions of equilibrium liquid phases were determined by gas chromatography. Mixtures were stirred periodically while kept in a water bath at the specified temperature. Equilibrium time was 2–4 h. Samples for analysis were withdrawn with the aid of a MSh-10 microsyringe through a rubber stopper.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and repeatedly distilled in a packed column of 20 theoretical plates; no impurities detectable by gas chromatography.
(2) Source not specified; pure grade reagent; dried and repeatedly distilled at vacuum; 99.5 mole % purity.
(3) Twice distilled.

Estimated Error:

Temperature: control to ±0.02 K.

5.27. +Naphthalene

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Naphthalene; $C_{10}H_8$; [91-20-3]
(3) Water, H_2O; [7732-18-5]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, March, 2000.

Critical Evaluation

A survey of solubility and equilibrium of coexisting liquid phases for the system nitromethane+naphthalene+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+naphthalene+water

Author(s)	T/K	Type of data[a]
Sazonov and Chernysheva[1]	287–350	Solubility three phases (77)
	311–449	Solubility two phases (30)
Sazonov and Chernysheva[2]	293	Equilibrium (5)
	295	Equilibrium (5)
	313	Equilibrium (7)

[a]Number of experimental points in parentheses.

Solubility data

The system nitromethane+naphthalene+water includes a three-phase region, although only two binary pairs of components, nitromethane+water and naphthalene+water, are partially miscible. The data for first system were compiled and critically evaluated.[3] The naphthalene+water system was critically evaluated in Shaw.[4]

The solubility temperatures of the liquid or solid phases were determined by the synthetic method in ternary mixtures with constant mass relationship of (1) and (2), of (1) and (3), and of (2) and (3).[1] Experimental errors were not reported, but are estimated by the evaluator to be ±0.1 K (temperature) and ±0.002 mass fractions (solubility). Maximal temperature of the three-phase equilibrium was reported to be 352.6 K.[1] Two separate two-phase regions exist above 352.6 K, one of these can be described by band type curves. In the temperature range 353.4 (melting point of naphthalene) to 376.3 K (UCST of the binary system nitromethane+water), where two binary systems nitromethane+water and naphthalene+water are partially miscible, the solubility curves correspond to Type II (Treybal[5]). Above 376.3 K this ternary system has only one partially miscible region. Solubility data at 383 K (Sazonov and Chernysheva[1]) are described by an algebraic equation:

$$x_1 = -0.7003 - 3.88\cdot(x_2)^{1/2} + 4.5589\cdot(x_2)^{1/4}.$$

This smoothing equation gives a smaller standard deviation than any other tested equation. The equation parameters were calculated by the least squares method.

The solubilities calculated by the proposed equation are presented in Fig. 18 and in Table 2. Experimental solubility data, Sazonov and Chernysheva,[1] are presented in Fig. 18 for comparison.

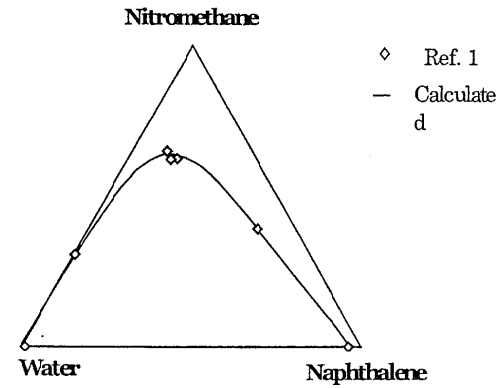

FIG. 18. Solubility curve of the ternary system nitromethane+naphthalene+water at 383 K (mole fraction).

TABLE 2. Calculated solubilities nitromethane, naphthalene, and water at 383 K

x_1	x_2	x_3	w_1	w_2	w_3
0.353	0.010	0.637	0.628	0.037	0.335
0.465	0.020	0.515	0.706	0.064	0.230
0.525	0.030	0.445	0.730	0.088	0.182
0.563	0.040	0.397	0.737	0.110	0.153
0.588	0.050	0.362	0.735	0.131	0.134
0.637	0.100	0.263	0.689	0.227	0.084
0.613	0.200	0.187	0.563	0.386	0.051
0.549	0.300	0.151	0.449	0.515	0.036
0.471	0.400	0.129	0.349	0.623	0.028
0.390	0.500	0.110	0.265	0.713	0.022
0.307	0.600	0.093	0.193	0.790	0.017
0.223	0.700	0.077	0.130	0.857	0.013
0.141	0.800	0.059	0.077	0.914	0.009
0.059	0.900	0.041	0.030	0.964	0.006
0.019	0.950	0.031	0.009	0.986	0.005

Liquid–liquid equilibrium data

Compositions of coexisting two and three phase regions of the ternary system nitromethane+naphthalene+water were determined at 293.2, 295.2, and 313.2 K by gas chromatography.[2] Experimental errors were reported as ±0.02 K.

All experimental data are considered tentative.

References:

[1]V. P. Sazonov and M. F. Chernysheva, Zh. Obshch. Khim. **47**, 534 (1977); M. F. Chernysheva, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1982.

[2]V. P. Sazonov and M. F. Chernysheva, Zh. Prikl. Khim. (Leningrad) **52**, 2710 (1979).

[3]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

[4]D. G. Shaw, *Hydrocarbons with Water and Seawater*, Part II: *Hydrocarbons C8 to C36*, IUPAC Solubility Data Series, Vol. 38 (Pergamon, Oxford, 1989).

[5]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Naphthalene; $C_{10}H_8$; [91-20-3]
(3) Water, H_2O; [7732-18-5]

Original Measurements:
V. P. Sazonov and M. F. Chernysheva, Zh. Obshch. Khim **47**, 534–6 (1977).
*M. F. Chernysheva, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1982.

Variables:
T/K = 287–449

Prepared By:
V. P. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass relationship of (1) and (3), respectively, 20.0:80.0, 40.0:60.0, 90.0:10.0; with a constant mass relationship of (1) and (2), respectively, 70.0:30.0, 75.0:25.0; and also with a constant mass relationship of (2) and (3), respectively, 10.0:90.0 and 15.0:85.0. L_1 nitromethane-rich phase; L_3 water-rich phase; S naphthalene. The phase which is being dissolved is indicated in the tables.

TABLE 1. Solubility temperatures of three phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
42.40(S)	315.55	0.0681	0.0089	0.1896	0.0520
49.60(S)	322.75	0.0675	0.0179	0.1800	0.1000
53.75(S)	326.90	0.0668	0.0285	0.1696	0.1520
56.15(S)	329.30	0.0661	0.0390	0.1603	0.1986
59.10(S)	332.25	0.0652	0.0515	0.1502	0.2490
61.15(S)	334.30	0.0643	0.0655	0.1401	0.2997
64.60(S)	337.75	0.0620	0.0984	0.1200	0.4000
66.15(S)	339.30	0.0606	0.1181	0.1100	0.4500
67.40(S)	340.55	0.0593	0.1375	0.1013	0.4934
70.20(S)	343.35	0.0547	0.2035	0.0781	0.6095
72.60(S)	345.75	0.0499	0.2737	0.0606	0.6972
74.60(S)	347.75	0.0429	0.3761	0.0427	0.7865
76.75(S)	349.90	0.0285	0.5851	0.0208	0.8960
14.00(S)	287.15	0.3029	0.0132	0.5688	0.0520
28.35(S)	301.50	0.2986	0.0269	0.5388	0.1020
36.00(S)	309.15	0.2937	0.0429	0.5066	0.1556
40.75(S)	313.90	0.2892	0.0576	0.4796	0.2006
43.45(S)	316.60	0.2838	0.0752	0.4498	0.2503
45.95(S)	319.10	0.2780	0.0940	0.4208	0.2986
50.50(S)	323.65	0.2640	0.1397	0.3600	0.4000
52.50(S)	325.65	0.2563	0.1651	0.3312	0.4480
54.80(S)	327.95	0.2462	0.1978	0.2982	0.5030
58.10(S)	331.25	0.2268	0.2612	0.2448	0.5920
63.85(S)	337.00	0.1944	0.3668	0.1776	0.7040
67.80(S)	340.95	0.1546	0.4960	0.1190	0.8016
72.85(S)	346.00	0.0974	0.6831	0.0610	0.8984
19.65(S)	292.80	0.6958	0.0423	0.8073	0.1030
27.90(S)	301.05	0.6803	0.0636	0.7648	0.1502
33.90(S)	307.05	0.6633	0.0871	0.7210	0.1989
37.45(S)	310.60	0.6446	0.1129	0.6763	0.2486
40.80(S)	313.95	0.6241	0.1412	0.6304	0.2996
45.45(S)	318.60	0.5783	0.2040	0.5400	0.4000
47.90(S)	321.05	0.5522	0.2400	0.4941	0.4510
50.15(S)	323.30	0.5201	0.2842	0.4428	0.5080
51.80(S)	324.95	0.4959	0.3173	0.4074	0.5473
53.95(S)	327.10	0.4619	0.3645	0.3613	0.5986
59.80(S)	332.95	0.4101	0.4353	0.2994	0.6673
63.80(S)	336.95	0.2863	0.5060	0.1800	0.8000
69.5(S)	342.7	0.1813	0.7506	0.1020	0.8867
39.40(S)	312.55	0.7792	0.1591	0.6887	0.2952
39.40(S)	312.55	0.7705	0.1573	0.6867	0.2943
39.40(S)	312.55	0.7384	0.1507	0.6789	0.2910
39.40(S)	312.55	0.7103	0.1450	0.6717	0.2879
39.50(S)	312.65	0.6800	0.1388	0.6635	0.2843
39.50(S)	312.65	0.5771	0.1178	0.6311	0.2705
35.95(S)	309.10	0.8107	0.1287	0.7378	0.2459
36.05(S)	309.20	0.7846	0.1246	0.7312	0.2438
36.10(S)	309.25	0.7184	0.1140	0.7132	0.2377
36.10(S)	309.25	0.7974	0.1265	0.7345	0.2448
36.10(S)	309.25	0.7653	0.1215	0.7262	0.2421
36.30(S)	309.45	0.6851	0.1086	0.7031	0.2344
52.55(S)	325.70	0.0537	0.0145	0.1495	0.0850
56.20(S)	329.35	0.0458	0.0147	0.1295	0.0870
59.60(S)	332.75	0.0422	0.0153	0.1160	0.0884
61.35(S)	334.50	0.0356	0.0148	0.1025	0.0898
63.05(S)	336.20	0.0326	0.0149	0.0946	0.0905
63.15(S)	336.25	0.0322	0.0149	0.0934	0.0907
68.30(S)	341.45	0.0230	0.0150	0.0678	0.0932
69.70(S)	342.85	0.0198	0.0151	0.0590	0.0941
75.25(S)	348.40	0.0097	0.0152	0.0295	0.0970
54.90(S)	328.05	0.0565	0.0228	0.1503	0.1275
60.10(S)	333.25	0.0433	0.0232	0.1179	0.1323
63.95(S)	337.10	0.0354	0.0234	0.0976	0.1354
63.95(S)	337.10	0.0340	0.0234	0.0942	0.1359
65.60(S)	338.75	0.0306	0.0235	0.0853	0.1372
73.25(S)	346.40	0.0181	0.0238	0.0515	0.1423
17.63(L_3)	290.78	0.7968	0.1627	0.6927	0.2969
25.71(L_3)	293.86	0.7918	0.1615	0.6916	0.2964
32.28(L_3)	305.43	0.7853	0.1603	0.6901	0.2958
14.05(L_3)	287.20	0.8290	0.1316	0.7422	0.2474
21.26(L_3)	294.41	0.8224	0.1306	0.7406	0.2469
22.60(L_1)	295.75	0.0322	0.0149	0.0934	0.0907
24.72(L_1)	297.87	0.0326	0.0149	0.0946	0.0905
49.92(L_1)	323.07	0.0356	0.0148	0.1025	0.0898
14.74(L_1)	287.89	0.0306	0.0235	0.0853	0.1372
33.53(L_1)	305.68	0.0340	0.0234	0.0942	0.1359
50.68(L_1)	323.83	0.0354	0.0234	0.0976	0.1354

[a]Critical opalescence.

TABLE 2. Solubility temperatures of two phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
125.7[a]	398.9	0.3029	0.0132	0.5688	0.0520
144.4[a]	417.6	0.2986	0.0269	0.5388	0.1020
175.9[a]	449.1	0.2937	0.0429	0.5066	0.1556
90.6(L_3)	363.8	0.6958	0.0423	0.8073	0.1030
95.3(L_3)	368.5	0.6803	0.0636	0.7648	0.1502
100.3(L_3)	373.5	0.6633	0.0871	0.7210	0.1989
104.3(L_3)	377.5	0.6446	0.1129	0.6763	0.2486
109.4(L_3)	382.6	0.6241	0.1412	0.6304	0.2996
119.6(L_3)	392.8	0.1813	0.7506	0.1020	0.8867
126.5(L_3)	399.6	0.5522	0.2400	0.4941	0.4510
130.0(L_3)	403.2	0.5201	0.2842	0.4428	0.5080
131.1(L_3)	404.3	0.4959	0.3173	0.4074	0.5473
132.9(L_3)	406.1	0.4619	0.3645	0.3613	0.5986
139.2(L_3)	412.4	0.2863	0.6060	0.1800	0.8000
141.9(L_3)	415.1	0.4101	0.4353	0.2994	0.6673
43.73(L_3)	316.88	0.7792	0.1591	0.6887	0.2952
49.02(L_3)	322.17	0.7705	0.1573	0.6867	0.2943
69.9(L_3)	343.1	0.7384	0.1507	0.6789	0.2910
83.3(L_3)	356.5	0.7103	0.1450	0.6717	0.2879
93.4(L_3)	366.6	0.6800	0.1388	0.6635	0.2843
122.2(L_3)	395.5	0.5771	0.1178	0.6311	0.2705
38.2(L_3)	311.37	0.8107	0.1287	0.7378	0.2459
48.40(L_3)	321.55	0.7974	0.1265	0.7345	0.2449
58.60(L_3)	331.75	0.7846	0.1246	0.7313	0.2438
64.90(L_3)	338.05	0.7653	0.1215	0.7262	0.2421
85.2(L_3)	358.4	0.7184	0.1140	0.7132	0.2377
95.8(L_3)	369.0	0.6851	0.1086	0.7031	0.2344
38.68(S)	311.83	0.7968	0.1627	0.6927	0.2969
38.98(S)	312.13	0.7918	0.1616	0.6916	0.2964
39.20(S)	312.35	0.7853	0.1603	0.6001	0.2958

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method was used. Ampoules containing mixtures were suspended from a vertical roller linked to a shaking machine, which switched on at definite time intervals. Water bath temperature was controlled with a proportional temperature regulator and checked with mercury thermometers. Close to a phase transition, heating or cooling was effected at 0.03°/h. Solubility temperature of the liquid phase was determined both with heating and cooling, and the average taken. The thermostat contained silicone oil above 80 °C.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and repeatedly distilled in a packed glass column; no impurities detectable by gas chromatography.
(2) Source not specified; analytical purity; purified by recrystallization; melting point = 80.2 °C.
(3) Twice distilled.

Estimated Error:

Temperature: taking ±0.02 K for liquid phase; ±0.05 K for solid phase; ±0.2 K (above 373 K).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Naphthalene; $C_{10}H_8$; [91-20-3]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

V. P. Sazonov and M. F. Chernysheva, Zh. Prikl. Khim. (Leningrad) **52**, 2710–3 (1979).

Variables:

T/K = 293–313

Prepared By:

V. P. Sazonov

Experimental Data

Compositions of coexisting phases

		Nitromethane-rich phase (compiler)		Water-rich phase (compiler)		Nitromethane-rich phase		Water-rich phase	
t/°C	T/K	x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.0	293.2	0.918	0.019	0.033	0.0001	0.940	0.041	0.103	0.0001
		0.904	0.035	0.031	0.001	0.908	0.074	0.099	0.001
		0.893	0.051	0.029	0.001[a]	0.878	0.106	0.094	0.001[a]
		0.907	0.054[b]	—	—	0.879	0.110[b]	—	—
		—	—	0.018	0.0001[b]	—	—	0.056	0.001[b]
23.0	295.2	0.918	0.016	0.034	0.0001	0.946	0.034	0.107	0.0001
		0.906	0.033	0.031	0.001	0.912	0.070	0.101	0.001
		0.885	0.059	0.030	0.001[a]	0.862	0.122	0.096	0.001[a]
		0.899	0.065[b]	—	—	0.859	0.132[b]	—	—
		—	—	0.116	0.0001[b]	—	—	0.053	0.001[b]
40.0	313.2	0.868	0.017	0.043	0.0001	0.925	0.039	0.131	0.0001
		0.849	0.034	0.042	0.001	0.889	0.075	0.128	0.001
		0.837	0.065	0.041	0.001	0.835	0.136	0.126	0.001
		0.809	0.105	0.040	0.002	0.767	0.209	0.123	0.002
		0.765	0.166	0.039	0.002[a]	0.675	0.307	0.121	0.002[a]
		0.787	0.181[b]	—	—	0.669	0.323[b]	—	—
		—	—	0.015	0.001[b]	—	—	0.050	0.001[b]

[a]Equilibrium of two liquid phases with the solid phase.
[b]Equilibrium of liquid phase with the solid phase.

Auxiliary Information

Method/Apparatus/Procedure:

The analytical method was used. Thermostated glass vessels (15 mL capacity) were agitated with the aid of a sealed magnetic stirrer. Mixtures were held 1.5–2 h with periodic stirring, and samples of liquid phases were taken with a MSh-10 microsyringe through a rubber stopper. Compositions of equilibrium liquid phases were determined by gas chromatography.

Source and Purity of Materials:

(1) Source not specified, pure grade reagent; dried and twice distilled in packed column of 20 theoretical plates; no impurities detectable by GLC.
(2) Source not specified, analytical purity; purified recrystallization; melting point = 80.2 °C.
(3) Twice distilled.

Estimated Error:

Temperature: control to ±0.02 K.

5.28. +1-Decanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Decanol; $C_{10}H_{22}O$; [112-30-1]
(3) Water; H_2O; [7732-18-5]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, March, 2000.

Critical Evaluation

A survey of solubility and equilibrium of coexisting liquid phases for the system nitromethane+1-decanol+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+1-decanol+water

Author(s)	T/K	Type of data[a]
Zhuravleva *et al.*[1]	292–375	Solubility liquid phases (92)
	324	Equilibrium (12)
Sazonov and Gromakovskaya[2]	286–325	Solubility three liquid phases (54)
	314–343	Solubility two liquid phases (47)

[a]Number of experimental points in parentheses.

Solubility data

The system nitromethane+1-decanol+water includes a three-phase region. All three binary pairs of components, nitromethane+1-decanol, nitromethane+water, and 1-decanol+water, are partially miscible. The data for the first two systems were compiled and critically evaluated in Sazonov *et al.*[3] The 1-decanol+water system has been critically evaluated in Barton.[4] The recommended values of UCST (upper critical solution temperature) of binary the systems are also reported in Zhuravleva *et al.*[1] and Sazonov and Gromakovskaya[2] and presented in Table 2.

TABLE 2. UCST (T/K) binary systems

Binary system	Ref. 1	Ref. 2	Recommended (Ref. 3)
Nitromethane+1-decanol	330.7	332.90	332.5 (tentative)
Nitromethane+water	377.7	—	376.3±0.2

The solubility temperatures of liquid phases were determined by the synthetic method in ternary mixtures with constant mass relationship of (1) and (2)[1,2] and also in ternary mixtures with a constant mass content of water.[2] Experimental errors were not reported, but are estimated by the evaluator to be ±0.1 K (temperature) and ±0.002 mass fractions (solubility). Depending on temperature the system nitromethane+1-decanol+water forms a miscibility gaps of Type I–III, Treybal.[5] In the temperature range 273–332.9 K, where three binary systems are partially miscible, the solubility curves correspond to Type III.[5] A three-phase region occurs below 325.2 K.[2] Maximal temperature of the three-phase liquid equilibrium was reported to be as 324.7 K (Zhuravleva *et al.*[1]) and 325.2 K.[2] Thus, the recommended value is: $T_c=(325.0\pm0.3)$ K. Two separate regions of immiscibility exist above 325 K, one of these can be described by band type curves. In the temperature range 332.9–377.7 K,[1,2] where the two binary systems nitromethane+water and 1-decanol+water are partially miscible, the solubility curves correspond to Type II.[5] Above 377.7 K this ternary system has only one partially miscible region. Solubility data at 333 K[1,2] in common (organic-rich branch only) are described by the algebraic equation:

$$x_1=[0.8349-1.2353\cdot x_2][1-0.3869\cdot x_2-2.8109\cdot(x_2)^2+9.0113\cdot(x_2)^3-12.0365\cdot(x_2)^4].$$

This smoothing equation gives a smaller standard deviation than any other tested equation. The equation parameters were calculated by the least squares method.

The solubilities calculated by the proposed equation are presented in Fig. 19 and in Table 3. Experimental solubility data, Zhuravleva *et al.*[1] and Sazonov and Gromakovskaya,[2] are presented in Fig. 19 for comparison.

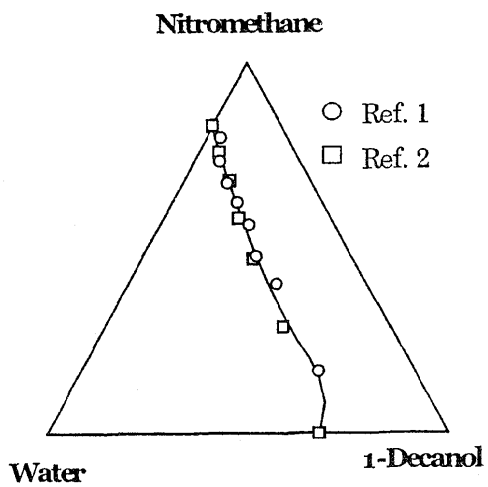

FIG. 19. Solubility curve (organic-rich branch only) for the ternary system nitromethane+1-decanol+water at 333 K (mole fraction).

TABLE 3. Calculated solubilities for the ternary system nitromethane+1-decanol+water at 333.2 K

x_1	x_2	x_3	w_1	w_2	w_3
0.000	0.670	0.330	0.000	0.949	0.051
0.026	0.670	0.304	0.014	0.938	0.048
0.082	0.650	0.268	0.044	0.913	0.043
0.154	0.600	0.246	0.086	0.873	0.041
0.204	0.550	0.246	0.120	0.838	0.042
0.251	0.500	0.249	0.155	0.800	0.045
0.299	0.450	0.251	0.194	0.758	0.048
0.350	0.400	0.250	0.240	0.710	0.050
0.404	0.350	0.246	0.292	0.656	0.052
0.460	0.300	0.240	0.351	0.594	0.055
0.518	0.250	0.232	0.420	0.525	0.055
0.578	0.200	0.222	0.497	0.446	0.057
0.637	0.150	0.213	0.585	0.357	0.058
0.699	0.100	0.201	0.687	0.255	0.058
0.763	0.050	0.187	0.805	0.137	0.058
0.830	0.000	0.170	0.944	0.000	0.056

Liquid–liquid equilibrium data

Compositions of coexisting two and three liquid phase regions of the ternary system nitromethane+1-decanol+water determined at 323.7 K and presented in graphical form.[1] Composition of each phase was calculated from the index of refraction-composition curve of saturated mixtures prepared at the time of the saturation curve measurements. Experimental errors were not reported, but are estimated by the evaluator to be ±0.005 mass fractions (composition).

All experimental data are considered tentative.

References:

[1]I. K. Zhuravleva, E. F. Zhuravlev, and N. G. Lomakina, Zh. Fiz. Khim. **51**, 1700 (1977).
[2]V. P. Sazonov and A. G. Gromakovskaya, Zh. Obshch. Khim. **47**, 2168 (1977).
[3]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).
[4]A. F. M. Barton, *Alcohols with Water*, IUPAC Solubility Data Series, Vol. 15 (Pergamon, Oxford, 1984).
[5]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Decanol; $C_{10}H_{22}O$; [112-30-1]
(3) Water; H_2O; [7732-18-5]

Original Measurements:
I. K. Zhuravleva, E. F. Zhuravlev, and N. G. Lomakina, Zh. Fiz. Khim. **51**, 1700–7 (1977).

Variables:
T/K = 292–375

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperature of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2) as 10.0:90.0, 20.0:80.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, respectively.

TABLE 1. Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
38.5	311.7	0.893	0.038	0.882	0.098
39.0	312.2	0.925	0.040	0.891	0.099
39.5	312.7	0.877	0.038	0.877	0.098
40.0	313.2	0.942	0.041	0.895	0.100
41.0	314.2	0.863	0.037	0.873	0.097
42.5	315.7	0.853	0.037	0.870	0.097
47.0	320.2	0.834	0.036	0.864	0.096
49.0	322.2	0.828	0.036	0.862	0.096
52.5	325.7	0.820	0.035	0.860	0.095
60.0	333.2	0.800	0.035	0.853	0.095
65.0	338.2	0.779	0.033	0.846	0.094
75.0	348.2	$7.97\cdot10^{-5}$	$3.42\cdot10^{-6}$	0.00027	0.00003
48.0	321.2	0.786	0.076	0.768	0.192
49.0	322.2	0.800	0.077	0.772	0.193
51.5	324.7	0.868	0.083	0.790	0.197
53.0	326.2	0.758	0.073	0.760	0.190
56.5	329.7	0.745	0.072	0.756	0.189
63.0	335.2	0.719	0.069	0.748	0.187
71.5	344.7	0.695	0.067	0.740	0.185
76.0	349.2	0.683	0.066	0.736	0.184
99.5	372.7	0.617	0.060	0.712	0.178
50.5	323.7	0.717	0.119	0.668	0.287
51.0	324.2	0.732	0.121	0.672	0.288
51.5	324.7	0.705	0.116	0.665	0.285
52.5	325.7	0.775	0.128	0.682	0.293
54.0	327.2	0.699	0.115	0.664	0.284
55.0	328.2	0.824	0.136	0.693	0.297
56.0	329.2	0.840	0.139	0.696	0.299
60.0	333.2	0.678	0.112	0.658	0.282
69.0	342.2	0.664	0.110	0.654	0.280
77.0	350.2	0.654	0.108	0.651	0.279
90.0	363.2	$5.32\cdot10^{-5}$	$1.37\cdot10^{-5}$	0.00018	0.00012
50.5	323.7	0.670	0.172	0.576	0.384
51.5	324.7	0.656	0.169	0.573	0.382
52.0	325.2	0.684	0.176	0.579	0.386
53.0	326.2	0.713	0.183	0.585	0.390
55.0	328.2	0.738	0.190	0.590	0.393
55.5	328.7	0.643	0.165	0.570	0.380
56.0	329.2	0.761	0.196	0.594	0.396
57.0	330.2	0.778	0.200	0.597	0.398
63.0	336.2	0.618	0.159	0.564	0.376
73.5	346.7	0.606	0.156	0.561	0.374
102.0	375.2	0.583	0.150	0.555	0.370
50.5	323.7	0.613	0.236	0.483	0.482
51.0	324.2	0.599	0.231	0.480	0.480
52.0	325.2	0.642	0.247	0.488	0.487
53.0	326.2	0.656	0.253	0.490	0.490
54.5	327.7	0.672	0.259	0.493	0.492
54.5	327.7	0.587	0.226	0.478	0.477
56.0	329.2	0.705	0.271	0.498	0.497
66.0	339.2	0.718	0.262	0.475	0.475
90.0	363.2	$5.91\cdot10^{-5}$	$2.27\cdot10^{-5}$	0.0002	0.0002
49.0	322.2	0.506	0.293	0.382	0.573
50.0	323.2	0.518	0.300	0.384	0.576
50.0	323.2	0.494	0.286	0.380	0.570
51.0	324.2	0.543	0.314	0.388	0.582
52.5	325.7	0.571	0.330	0.392	0.588
54.0	327.2	0.601	0.348	0.396	0.594
55.0	328.2	0.617	0.357	0.398	0.597
58.5	331.7	0.483	0.279	0.378	0.567
69.5	342.7	0.481	0.278	0.378	0.566
79.0	352.2	0.472	0.273	0.376	0.564
45.5	318.7	0.429	0.385	0.289	0.674
46.5	319.7	0.432	0.390	0.289	0.676
47.0	320.2	0.422	0.380	0.288	0.672
47.5	320.7	0.456	0.412	0.292	0.683
48.5	321.7	0.469	0.422	0.294	0.686
49.5	322.7	0.496	0.447	0.295	0.690
51.0	324.2	0.497	0.447	0.297	0.693
54.5	327.7	0.412	0.370	0.287	0.668
60.0	333.2	$2.96\cdot10^{-5}$	$4.56\cdot10^{-5}$	0.0001	0.0004
68.0	341.2	0.401	0.361	0.285	0.665
77.5	350.7	0.391	0.352	0.283	0.662
38.0	311.2	0.317	0.489	0.193	0.772
39.0	312.2	0.326	0.503	0.194	0.776
42.0	315.2	0.346	0.534	0.196	0.784
43.0	316.2	0.353	0.551	0.197	0.788
44.0	317.2	0.381	0.587	0.199	0.796
54.5	327.7	0.311	0.481	0.192	0.770
64.0	337.2	0.309	0.478	0.192	0.769
72.0	345.2	0.308	0.475	0.192	0.768
19.0	292.2	0.175	0.610	0.096	0.869
20.0	293.2	0.181	0.629	0.097	0.873
21.0	294.2	0.188	0.649	0.098	0.877
22.5	295.7	0.194	0.672	0.098	0.882
23.5	296.7	0.201	0.695	0.099	0.886
25.0	298.2	0.208	0.721	0.099	0.891
26.5	299.7	0.216	0.747	0.100	0.895
35.0	308.2	0.173	0.602	0.096	0.867
54.5	327.7	0.172	0.598	0.096	0.866
66.0	339.2	0.168	0.582	0.096	0.862
75.0	348.2	0.167	0.575	0.096	0.860

The compositions of coexistent two and three liquid phases at 50.5 °C are also presented in a graphical form.

TABLE 2. Composition of three coexistent liquid phases system nitromethane+1-decanol+water*

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler) x_1'	x_2'	Alcohol-rich phase (compiler) x_1''	x_2''	Water-rich phase (compiler) x_1'''	x_2'''
50.5	323.7	0.789	0.063	0.371	0.422	0.016	0.0001

The same data are presented below in mass fractions

t/°C	T/K (compiler)	Nitromethane-rich phase w_1'	w_2'	Alcohol-rich phase w_1''	w_2''	Water-rich phase w_1'''	w_2'''
50.5	323.7	0.792	0.164	0.243	0.717	0.051	0.001

*These data were extracted graphically by the compiler.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phase were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.130.*
(2) Source not specified; purity not specified; n(20 °C,D) = 1.4370, d(20 °C,4 °C) = 0.8300.
(3) n(20 °C,D) = 1.333.
*Recorded as 1.330 on original. Value corrected by compiler.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Decanol; $C_{10}H_{22}O$; [112-30-1]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

V. P. Sazonov and A. G. Gromakovskaya, Zh. Obshch. Khim. **47**, 2168–72 (1977).

Variables:

T/K = 286–343

Prepared By:

V. P. Sazonov and N. V. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass content of (3), respectively, 10.0 and 40.0 mass %, and also in ternary mixtures with constant mass relationship of (1) and (2), respectively, 20.0:80.0, 40.0:60.0, 55.0:45.0, 70.0:30.0, and 85.0:15.0. L_1 nitromethane-rich phase; L_2 alcohol-rich phase; L_3 water-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
17.60(L_1)	290.75	0.121	0.422	0.090	0.810
30.70(L_1)	303.85	0.176	0.384	0.135	0.765
39.30(L_1)	312.45	0.226	0.349	0.180	0.720
40.70(L_2)	313.85	0.684	0.029	0.810	0.090
43.90(L_1)	317.05	0.274	0.315	0.226	0.674
45.05(L_2)	318.20	0.662	0.045	0.766	0.134
46.95(L_1)	320.10	0.318	0.285	0.271	0.629
48.45(L_2)	321.60	0.638	0.062	0.720	0.180
50.25(L_1)	323.40	0.398	0.228	0.361	0.539
50.30(L_2)	323.45	0.613	0.079	0.675	0.225
51.00(L_2)	324.15	0.587	0.097	0.630	0.270
51.25(L_1)	324.40	0.468	0.180	0.451	0.449
51.35(L_2)	324.50	0.560	0.116	0.585	0.315
51.40[a]	324.55	0.531	0.136	0.540	0.360
13.05(L_1)	286.20	0.055	0.120	0.090	0.510
28.20(L_1)	301.35	0.073	0.111	0.121	0.479
37.30(L_1)	310.45	0.090	0.103	0.151	0.449
41.90(L_2)	315.05	0.282	0.012	0.541	0.059
42.10(L_1)	315.25	0.106	0.095	0.180	0.420
46.00(L_2)	319.15	0.269	0.018	0.510	0.090
48.75(L_1)	321.90	0.138	0.080	0.240	0.360
49.20(L_2)	322.35	0.256	0.024	0.481	0.119
50.70(L_2)	323.85	0.242	0.031	0.450	0.150
50.90(L_1)	324.05	0.169	0.065	0.300	0.300
51.20(L_2)	324.35	0.228	0.037	0.421	0.179
51.35(L_1)	324.50	0.199	0.051	0.360	0.240
51.50[a]	324.65	0.214	0.044	0.391	0.209
21.5(L_3)	296.7	0.314	0.483	0.193	0.770
37.4(L_3)	310.6	0.308	0.475	0.192	0.768
39.7(L_3)	312.9	0.304	0.470	0.191	0.767
40.5(L_1)	313.7	0.278	0.431	0.188	0.754
40.8(L_1)	314.0	0.295	0.457	0.190	0.763
40.9(L_1)	314.1	0.302	0.467	0.191	0.766
29.6(L_3)	302.8	0.518	0.300	0.384	0.576
33.5(L_3)	306.7	0.508	0.294	0.382	0.574
43.5(L_3)	316.7	0.499	0.288	0.381	0.571
50.2(L_1)	323.4	0.489	0.283	0.379	0.569
25.6(L_3)	298.8	0.647	0.204	0.530	0.434
30.4(L_3)	303.6	0.631	0.199	0.527	0.431
37.7(L_3)	310.9	0.620	0.196	0.525	0.429
47.6(L_3)	320.8	0.610	0.192	0.523	0.427
51.3(L_1)	324.5	0.602	0.190	0.521	0.426
20.7(L_3)	293.9	0.760	0.126	0.679	0.291
31.8(L_3)	305.0	0.746	0.123	0.676	0.289
40.1(L_3)	313.3	0.731	0.121	0.672	0.288
45.2(L_3)	318.4	0.720	0.119	0.669	0.287
48.3(L_3)	321.5	0.715	0.118	0.668	0.286
51.0(L_2)	324.2	0.707	0.117	0.666	0.285
27.1(L_3)	300.3	0.837	0.057	0.824	0.145
36.0(L_3)	309.2	0.825	0.056	0.820	0.145
42.1(L_3)	315.3	0.813	0.055	0.817	0.144
45.0(L_2)	318.2	0.802	0.054	0.814	0.143
45.0(L_2)	318.2	0.788	0.054	0.809	0.143
45.0(L_2)	318.2	0.774	0.053	0.805	0.142

[a]Critical opalescence.

TABLE 2. Solubility temperatures of two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
41.1	314.3	0.305	0.469	0.192	0.765
41.4	314.6	0.308	0.475	0.192	0.768
41.9	315.1	0.314	0.483	0.193	0.770
42.2	315.4	0.302	0.467	0.191	0.766
42.3	315.5	0.317	0.489	0.193	0.772
43.3	316.5	0.326	0.503	0.194	0.776
44.2	317.4	0.336	0.518	0.195	0.780
45.2	318.4	0.346	0.534	0.196	0.784
47.3	320.5	0.369	0.568	0.198	0.792
50.1	323.3	0.297	0.456	0.191	0.762
69.9	343.1	0.278	0.431	0.188	0.754
50.7	323.9	0.499	0.288	0.381	0.571
51.3	324.5	0.508	0.294	0.382	0.574
51.6	324.8	0.489	0.283	0.379	0.569
51.9	325.1	0.518	0.299	0.384	0.576
52.5	325.7	0.528	0.305	0.386	0.578
53.2	326.4	0.541	0.312	0.388	0.581
54.1	327.3	0.555	0.320	0.390	0.584
55.3	328.5	0.577	0.334	0.393	0.589
57.0	330.2	0.601	0.348	0.396	0.594
51.5	324.7	0.608	0.195	0.523	0.434
52.0	325.2	0.620	0.196	0.525	0.429
52.6	325.8	0.631	0.199	0.527	0.431
52.6	325.8	0.602	0.190	0.521	0.426
53.4	326.6	0.647	0.204	0.530	0.434
54.4	327.6	0.664	0.209	0.534	0.436
55.3	328.5	0.682	0.215	0.537	0.439
56.6	329.8	0.706	0.223	0.541	0.443
57.7	330.9	0.726	0.229	0.545	0.445
51.3	324.5	0.715	0.118	0.668	0.286
51.6	324.8	0.720	0.119	0.669	0.287
52.3	325.5	0.732	0.121	0.672	0.288
53.1	326.3	0.746	0.123	0.676	0.289
53.1	326.3	0.707	0.117	0.666	0.285
53.8	327.0	0.760	0.126	0.679	0.291
54.5	327.7	0.773	0.128	0.682	0.292
55.8	329.0	0.797	0.132	0.687	0.295
57.0	330.2	0.824	0.136	0.693	0.297
45.3	318.5	0.813	0.055	0.817	0.144
45.9	319.1	0.825	0.056	0.820	0.145
46.3	319.5	0.802	0.054	0.814	0.143
46.6	319.8	0.837	0.057	0.824	0.145
47.2	320.4	0.848	0.058	0.827	0.146
48.4	321.6	0.873	0.059	0.834	0.147
49.8	323.0	0.903	0.061	0.842	0.148
51.5	323.7	0.788	0.054	0.809	0.143
55.6	328.8	0.775	0.053	0.805	0.142

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and repeatedly distilled in a packed glass column; no impurities detectable by gas chromatography.
(2) Source not specified; pure grade reagent; dried and repeatedly distilled at vacuum; 99.5 mole % purity.
(3) Twice distilled.

Estimated Error:

Temperature: ±0.05 K.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

5.29. +1-Dodecanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Dodecanol; $C_{12}H_{26}O$; [112-53-8]
(3) Water; H_2O; [7732-18-5]

Original Measurements:

I. K. Zhuravleva, E. F. Zhuraylev, and L. N. Salamatin, Zh. Obshch. Khim. **46**, 1210–4 (1976).

Variables:

T/K = 300–336

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of the three liquid phases were determined in ternary mixtures with a constant mass content of (3) as 20.0, 30.0, 40.0, and 50.0 mass %, respectively. These data are presented in graphical form.

Solubility temperatures of three liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
30.9	304.1	0.447	0.042	0.600	0.200
38.2	311.4	0.041	0.278	0.040	0.760
42.2	315.4	0.426	0.060	0.560	0.240
50.1	323.3	0.081	0.274	0.080	0.720
51.6	324.8	0.403	0.071	0.520	0.280
57.0	330.2	0.118	0.218	0.120	0.680
58.1	331.3	0.380	0.083	0.480	0.320
61.5	334.7	0.153	0.200	0.160	0.640
61.8	335.0	0.356	0.096	0.440	0.360
62.8	336.0	0.331	0.168	0.400	0.400
63.0	336.2	0.186	0.183	0.200	0.600
63.0	336.2	0.305	0.122	0.360	0.440
63.0	336.2	0.248	0.151	0.280	0.520
27.2	300.4	0.311	0.044	0.490	0.210
40.8	314.0	0.028	0.172	0.035	0.665
42.3	315.5	0.054	0.160	0.070	0.630
44.6	317.8	0.275	0.060	0.420	0.280
48.8	322.0	0.080	0.148	0.105	0.595
55.4	328.6	0.256	0.069	0.385	0.315
61.2	334.4	0.236	0.077	0.350	0.350
61.8	335.0	0.105	0.137	0.140	0.560
63.0	336.2	0.128	0.126	0.175	0.525
63.0	336.2	0.216	0.087	0.315	0.385
63.0	336.2	0.174	0.106	0.245	0.455
33.8	307.0	0.186	0.050	0.330	0.270
43.1	316.3	0.019	0.119	0.030	0.570
50.1	323.3	0.171	0.056	0.300	0.300
53.8	327.0	0.038	0.111	0.060	0.540
58.4	331.6	0.156	0.062	0.270	0.330
60.5	333.7	0.056	0.104	0.090	0.510
62.2	335.4	0.074	0.096	0.120	0.480
63.0	336.2	0.140	0.069	0.240	0.360
63.0	336.2	0.108	0.082	0.180	0.420
63.0	336.2	0.124	0.076	0.210	0.390
38.6	311.8	0.112	0.045	0.225	0.275
45.4	318.6	0.013	0.083	0.025	0.475
53.4	326.6	0.100	0.049	0.200	0.300
55.8	329.0	0.026	0.078	0.050	0.450
60.6	333.8	0.089	0.054	0.175	0.325
61.8	335.0	0.039	0.073	0.075	0.425
62.5	335.7	0.052	0.068	0.100	0.400
63.0	336.2	0.077	0.058	0.150	0.350
63.0	336.2	0.064	0.063	0.125	0.375

*These data were extracted graphically by the compiler.

5.30. +Alkanes C_7–C_{13}

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Alkanes; C_7H_{16}–$C_{13}H_{28}$
(3) Water; H_2O; [7732-18-5]

Original Measurements:
B. Malesinska and W. Malesinski, Bull. Acad. Pol. Sci., Ser. Sci. Chim. **11**, 475–8 (1963).

Variables:
T/K=372–396

Prepared By:
V. P. Sazonov

Experimental Data

Maximal temperature of transition from the three- to the two-phase system in ternary nitromethane+alkane+water

Alkane	t/°C	T/K (compiler)
Heptane; C_7H_{16}; [142-82-5]	122.50	395.65
Octane; C_8H_{18}; [111-65-9]	116.10	389.25
Decane; $C_{10}H_{22}$; [124-18-5]	108.70	381.85
Undecane; $C_{11}H_{24}$; [1120-21-4]	106.12	379.27
Dodecane; $C_{12}H_{26}$; [112-40-3]	104.75	377.90
Tridecane; $C_{13}H_{28}$; [629-50-5]	98.70	371.85

Auxiliary Information

Method/Apparatus/Procedure:
No experimental details given.

Source and Purity of Materials:
(1) Source not specified; purity not specified.
(2) Source not specified; purity not specified.
(3) Source not specified; purity not specified.

Estimated Error:
Not reported.

Auxiliary Information

Method/Apparatus/Procedure:
The solubility temperatures of the liquid phases were determined by the synthetic method.[1] No experimental details given.

Source and Purity of Materials:
(1) Source not specified; purity not specified; boiling point=101.0 °C; n(20 °C,D)=1.3820, d(20 °C,4 °C)=1.1320.
(2) Source not specified; purity not specified; boiling point=225 °C; melting point=22.6 °C; n(24 °C,D)=1.4420, d(24 °C,4 °C)=0.8310.
(3) Twice distilled; n(20 °C,D)=1.333.

Estimated Error:
Not specified.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6. Ternary System Nitromethane+Two Organic Compounds

6.1. +Tetrachloromethane+1,2-Ethanediol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Tetrachloromethane; CCl_4; [56-23-5]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]

Original Measurements:
L. V. Gudkina, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1975.

Variables:
T/K=314–324

Prepared By:
V. P. Sazonov

Experimentla Values

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (3) as 65.0:35.0.

Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.42	313.57	0.6399	0.0213	0.6165	0.0516
40.87	314.02	0.6262	0.0422	0.5853	0.0995
42.03	315.18	0.6101	0.0668	0.5512	0.1520
44.03	317.18	0.5947	0.0905	0.5203	0.1996
47.07	320.22	0.5764	0.1183	0.4865	0.2515
50.87	324.02	0.5582	0.1463	0.4548	0.3003

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method[1] was used. Mixtures of (1), (2), and (3) of mass 10 g were heated with vigorous stirring to a temperature higher than the homogenization temperature, and then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:
(1) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(2) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(3) Analytical purity; dried and twice distilled at vacuum; 0.03 mass % water by the Karl Fischer analysis.

Estimated Error:
Temperature: ±0.01 K.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova 8, 249 (1876).

6.2. +Tribromethane+1,2-Ethanediol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Tribromomethane; $CHBr_3$; [75-25-2]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]

Original Measurements:
L. V. Gudkina, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1975.

Variables:
T/K=306–317

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (3) as 65.0:35.0.

Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
32.37	305.52	0.5427	0.1700	0.3527	0.4574
32.62	305.77	0.5625	0.1396	0.3897	0.4005
32.62	305.77	0.5240	0.1984	0.3219	0.5047
33.18	306.33	0.5776	0.1165	0.4213	0.3518
33.57	306.72	0.5042	0.2289	0.2926	0.5499
34.07	307.22	0.5914	0.0955	0.4531	0.3029
34.91	308.06	0.6012	0.0805	0.4778	0.2649
36.16	309.31	0.6175	0.0555	0.5234	0.1948
37.33	310.48	0.6266	0.0417	0.5513	0.1519
37.82	310.97	0.4632	0.2915	0.2413	0.6288
38.17	311.32	0.6366	0.0263	0.5850	0.1000
39.02	312.17	0.6450	0.0135	0.6153	0.0534
43.77	316.92	0.4122	0.3694	0.1905	0.7069

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method[1] was used. Mixtures of (1), (2), and (3) of mass 10 g were heated with vigorous stirring to a temperature higher than the homogenization temperature, and then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:
(1) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(2) Source not specified; pure grade reagent; dried and repeatedly distilled under vacuum.
(3) Analytical purity; dried and twice distilled under vacuum; 0.03 mass % water by the Karl Fischer analysis.

Estimated Error:
Temperature: ±0.01 K.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova 8, 249 (1876).

6.3. +Trichloromethane+1,2-Ethanediol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Trichloromethane; $CHCl_3$; [67-66-3]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]

Original Measurements:
L. V. Gudkina, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1975.

Variables:
T/K=306–315

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (3) as 65.0:35.0.

Solubility temperatures of the liquid phases

t/°C	T/K (complier)	x_1 (complier)	x_2 (complier)	w_1	w_2
32.72	305.87	0.4015	0.3859	0.2926	0.5499
33.05	306.20	0.3692	0.4354	0.2601	0.5999
33.17	306.32	0.4313	0.3404	0.3245	0.5008
33.77	306.92	0.4590	0.2979	0.3562	0.4520
33.87	307.02	0.4868	0.2555	0.3899	0.4002
34.82	307.97	0.3335	0.4899	0.2267	0.6512
34.92	308.07	0.5347	0.1821	0.4536	0.3021
35.83	308.98	0.5792	0.1141	0.5198	0.2003
37.87	311.02	0.6184	0.0541	0.5850	0.1000
42.17	315.32	0.2973	0.5454	0.1951	0.6999

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method[1] was used. Mixtures of (1), (2), and (3) of mass 10 g were heated with vigorous stirring to a temperature higher than the homogenization temperature, and then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:
(1) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(2) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(3) Analytical purity; dried and twice distilled under vacuum; 0.03 mass % water by the Karl Fischer analysis.

Estimated Error:
Temperature: ±0.01 K.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.4. Dibromomethane+1,2-Ethanediol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Dibromomethane; CH_2Br_2; [74-95-3]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]

Original Measurements:
L. V. Gudkina, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1975.

Variables:
T/K=311–318

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (3) as 65.0:35.0.

Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
37.82	310.97	0.5849	0.1054	0.4874	0.2502
37.87	311.02	0.5996	0.0829	0.5176	0.2037
38.12	311.27	0.6137	0.0613	0.5486	0.1560
38.17	311.32	0.5669	0.1329	0.4533	0.3026
38.66	311.81	0.6284	0.0387	0.5834	0.1024
38.87	312.02	0.5472	0.1630	0.4190	0.3554
39.27	312.42	0.6418	0.0184	0.6172	0.0505
40.82	313.97	0.5286	0.1916	0.3890	0.4016
44.77	317.92	0.5026	0.2313	0.3510	0.4600

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method[1] was used. Mixtures of (1), (2), and (3) of mass 10 g were heated with vigorous stirring to a temperature higher than the homogenization temperature, and then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:
(1) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(2) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(3) Analytical purity; dried and twice distilled under vacuum; 0.03 mass % water by the Karl Fischer analysis.

Estimated Error:
Temperature: ±0.01 K.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.5. +Dichloromethane+1,2-Ethanediol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Dichloromethane; CH_2Cl_2; [75-09-2]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]

Original Measurements:
L. V. Gudkina, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1975.

Variables:
T/K=312–318

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (3) as 65.0:35.0.

Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
39.29	312.44	0.6043	0.0757	0.5838	0.1018
39.42	312.57	0.5787	0.1149	0.5511	0.1522
39.48	312.63	0.6295	0.0371	0.6171	0.0506
39.52	312.67	0.5537	0.1532	0.5199	0.2002
40.07	313.22	0.5250	0.1970	0.4853	0.2534
40.96	314.11	0.4987	0.2371	0.4545	0.3007
41.97	315.12	0.4598	0.2966	0.4105	0.3684
43.42	316.57	0.4406	0.3260	0.3894	0.4009
44.78	317.93	0.4100	0.3730	0.3566	0.4514

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method[1] was used. Mixtures of (1), (2), and (3) of mass 10 g were heated with vigorous stirring to a temperature higher than the homogenization temperature, and then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:
(1) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(2) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(3) Analytical purity; dried and twice distilled under vacuum; 0.03 mass % water by the Karl Fischer analysis.

Estimated Error:
Temperature: ±0.01 K.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.6 +Diiodomethane+1,2-Ethanediol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Diiodomethane; CH_2I_2; [75-11-6]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]

Original Measurements:
V. P. Sazonov, I. N. Zhilyaeva, and L. V. Gudkina, Zh. Fiz. Khim. **48**, 2891 (1974).
*Deposited Doc., VINITI 2092 (1974).

Variables:
T/K=294–313

Prepared By:
V. P. Sazonov and N. V. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass content of (2), respectively 5.0, 10.0, 20.0, 30.0, 40.0, 50.0, and 70.0 mass %, and also in ternary mixtures with a constant mass relationship of (1) and (3) as 55.0:45.0, 65.0:35.0, and 75.0:25.0, respectively. L_1 nitromethane-rich phase; L_2 diiodomethane-rich phase; L_3 ethanediol-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
23.77(L_2)	296.92	0.382	0.054	0.320	0.200
24.52(L_1)	297.67	0.287	0.055	0.240	0.200
31.27(L_1)	304.42	0.334	0.055	0.280	0.200
29.22(L_1)	302.37	0.322	0.090	0.245	0.300
32.22(L_2)	305.37	0.504	0.090	0.385	0.300
34.67(L_1)	307.82	0.368	0.090	0.280	0.300
37.47(L_1)	310.62	0.413	0.090	0.315	0.300
38.92(L_1)	312.07	0.459	0.090	0.350	0.300
25.87(L_3)	299.02	0.782	0.132	0.540	0.400
28.85(L_1)	302.00	0.307	0.133	0.210	0.400
30.02(L_3)	303.17	0.740	0.132	0.510	0.400
32.67(L_3)	305.82	0.697	0.132	0.480	0.400
34.12(L_1)	307.27	0.350	0.133	0.240	0.400
35.87(L_3)	309.02	0.653	0.133	0.450	0.400
37.47(L_1)	310.62	0.394	0.133	0.270	0.400
38.87(L_1)	312.02	0.437	0.133	0.300	0.400
39.37(L_3)	312.52	0.481	0.133	0.330	0.400
39.37(L_3)	312.52	0.610	0.133	0.420	0.400
39.67(L_3)	312.82	0.567	0.133	0.390	0.400
39.72(L_3)	312.87	0.545	0.133	0.375	0.400
39.82[a]	312.97	0.524	0.133	0.360	0.400
30.42(L_1)	303.57	0.288	0.187	0.175	0.500
32.27(L_3)	305.42	0.694	0.186	0.425	0.500
32.62(L_1)	305.77	0.328	0.187	0.200	0.500
35.77(L_1)	308.92	0.369	0.187	0.225	0.500
36.47(L_3)	309.62	0.653	0.186	0.400	0.500
38.32(L_1)	311.47	0.410	0.187	0.250	0.500
38.67(L_3)	311.82	0.613	0.186	0.375	0.500
39.42(L_3)	312.57	0.572	0.186	0.350	0.500
39.42(L_1)	312.57	0.451	0.187	0.275	0.500
39.72(L_3)	312.87	0.532	0.187	0.325	0.500
39.77[a]	312.92	0.512	0.187	0.312	0.500
39.77[a]	312.92	0.491	0.187	0.300	0.500
26.32(L_1)	299.47	0.263	0.349	0.120	0.700
27.32(L_3)	300.47	0.388	0.348	0.270	0.700
31.72(L_1)	304.87	0.296	0.349	0.135	0.700
34.22(L_3)	307.37	0.556	0.348	0.255	0.700
36.52(L_1)	309.67	0.328	0.349	0.150	0.700
37.67(L_3)	310.82	0.523	0.348	0.240	0.700
38.87(L_1)	312.02	0.361	0.349	0.165	0.700
39.42(L_3)	312.57	0.491	0.348	0.225	0.700
39.52(L_1)	312.67	0.393	0.349	0.180	0.700
39.67(L_3)	312.82	0.459	0.348	0.210	0.700
39.77(L_1)	312.92	0.410	0.349	0.188	0.700
39.82[a]	312.97	0.426	0.348	0.195	0.700
27.32(L_2)	300.47	0.670	0.110	0.487	0.350
38.57(L_3)	311.72	0.634	0.158	0.412	0.450
24.52(L_2)	297.67	0.595	0.090	0.455	0.300
34.52(L_2)	307.67	0.582	0.110	0.422	0.350
21.12(L_2)	294.27	0.515	0.071	0.412	0.251
39.42(L_1)	312.57	0.493	0.110	0.357	0.350

[a]Critical opalescence.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
30.47	303.62	0.350	0.012	0.333	0.050
30.87	304.02	0.891	0.012	0.855	0.050
34.32	307.47	0.399	0.012	0.380	0.050
34.47	307.62	0.850	0.012	0.807	0.050
36.62	309.77	0.449	0.012	0.428	0.050
37.17	310.32	0.793	0.012	0.760	0.050
37.87	311.02	0.498	0.012	0.475	0.050
38.37	311.52	0.744	0.012	0.712	0.050
38.52	311.67	0.548	0.012	0.523	0.050
38.72	311.87	0.597	0.012	0.570	0.050
38.72	311.87	0.695	0.012	0.665	0.050
38.77[a]	311.92	0.646	0.012	0.617	0.050
27.77	300.92	0.879	0.025	0.810	0.100
29.87	303.02	0.345	0.025	0.315	0.100
33.47	306.62	0.394	0.025	0.360	0.100
33.57	306.72	0.832	0.025	0.766	0.100
35.67	308.82	0.443	0.025	0.405	0.100
36.42	309.57	0.783	0.025	0.720	0.100
36.97	310.12	0.492	0.025	0.450	0.100
37.67	310.82	0.540	0.025	0.495	0.100
37.67	310.82	0.734	0.025	0.675	0.100
37.97	311.12	0.589	0.025	0.540	0.100
38.02	311.17	0.686	0.025	0.630	0.100
38.22[a]	311.37	0.638	0.025	0.585	0.100
27.02	300.17	0.853	0.054	0.720	0.200
32.47	305.62	0.806	0.054	0.680	0.200
33.87	307.02	0.382	0.054	0.320	0.200
35.27	308.42	0.430	0.054	0.360	0.200
35.32	308.47	0.759	0.054	0.640	0.200
36.12	309.27	0.477	0.054	0.400	0.200
36.42	309.57	0.712	0.054	0.600	0.200
36.57	309.72	0.524	0.054	0.440	0.200
36.67	309.82	0.571	0.054	0.480	0.200
36.67	309.82	0.666	0.054	0.560	0.200
36.77[a]	309.92	0.619	0.054	0.520	0.200
25.67	298.82	0.821	0.089	0.630	0.300
31.77	304.92	0.776	0.089	0.595	0.300
34.42	307.57	0.731	0.089	0.560	0.300
36.07	309.22	0.686	0.089	0.525	0.300
36.57	309.72	0.641	0.089	0.490	0.300
37.27[a]	310.42	0.595	0.089	0.455	0.300
37.62	310.77	0.550	0.090	0.420	0.300
38.47	311.62	0.504	0.090	0.385	0.300
28.02	301.17	0.782	0.132	0.540	0.400
32.52	305.67	0.740	0.132	0.510	0.400
35.82	308.97	0.697	0.132	0.480	0.400
38.02	311.17	0.653	0.132	0.450	0.400
36.12	309.27	0.700	0.071	0.563	0.250
36.77	309.92	0.670	0.110	0.487	0.350
37.12	310.27	0.724	0.039	0.636	0.152
37.77	310.92	0.735	0.024	0.678	0.096
38.32	311.47	0.743	0.014	0.708	0.057
36.67[a]	309.82	0.607	0.071	0.487	0.250
36.77[a]	309.92	0.616	0.058	0.512	0.212
37.47[b]	310.62	0.630	0.036	0.559	0.140
38.57	311.72	0.643	0.016	0.606	0.067
38.87[b]	312.02	0.582	0.110	0.422	0.350
38.97	312.12	0.647	0.010	0.622	0.043
36.82	309.97	0.521	0.059	0.432	0.214
36.87	310.02	0.515	0.071	0.412	0.251
37.17	310.32	0.535	0.034	0.477	0.132
37.47	310.62	0.538	0.029	0.486	0.116
38.42	311.57	0.546	0.014	0.518	0.058

[a]Critical opalescence.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. Mixtures of (1), (2), and (3) of mass 10 g were heated with vigorous stirring to a temperature higher than the homogenization temperature, and then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(2) Source not specified; analytical purity; dried and twice distilled in presence of zinc dust under vacuum.
(3) Analytical purity; dried and twice distilled under vacuum; 0.03 mass % water by the Karl Fischer analysis.

Estimated Error:

Temperature: ±0.01 K.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.7. +Diiodomethane+Cyclohexane

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Diiodomethane; CH_2I_2; [75-11-6]
(3) Cyclohexane; C_6H_{12}; [110-82-7]

Original Measurements:

V. P. Sazonov, I. N. Zhilyaeva, and L. V. Gudkina, Zh. Prikl. Khim. (Leningrad) **48**, 1953–7 (1975).

Variables:

T/K=283–317

Prepared By:

V. P. Sazonov and N. V Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass content of (1), respectively, 20.0, 30.0, 40.0, and 50.0 mass %, and also in ternary mixtures with a constant mass relationship of (2) and (3) as 67.5:32.5, 72.5:27.5, and 80.0:20.0, respectively. L_1 nitromethane-rich phase; L_2 diiodomethane-rich phase; L_3 cyclohexane-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
9.48(L_3)	282.60	0.452	0.351	0.200	0.680
10.63(L_2)	283.78	0.376	0.215	0.200	0.500
10.78(L_2)	283.90	0.383	0.227	0.200	0.520
10.82(L_3)	283.97	0.442	0.333	0.200	0.660
11.43(L_2)	284.58	0.391	0.240	0.200	0.540
11.52(L_3)	284.77	0.433	0.316	0.200	0.640
11.71(L_2)	284.86	0.399	0.254	0.200	0.560
11.82(L_3)	284.97	0.424	0.299	0.200	0.620
11.92[a]	285.07	0.407	0.269	0.200	0.580
11.97[a]	285.12	0.415	0.284	0.200	0.600
9.77(L_3)	282.92	0.586	0.265	0.300	0.595
10.48(L_2)	283.63	0.524	0.188	0.300	0.472
11.19(L_3)	284.34	0.576	0.253	0.300	0.577
11.21(L_2)	284.36	0.532	0.198	0.300	0.490
11.64(L_2)	284.79	0.540	0.208	0.300	0.508
11.75(L_3)	284.90	0.567	0.241	0.300	0.560
11.84[a]	284.99	0.549	0.219	0.300	0.525
11.90[a]	285.05	0.558	0.230	0.300	0.543
9.43(L_2)	282.58	0.639	0.153	0.400	0.420
10.28(L_3)	283.43	0.688	0.200	0.400	0.510
10.62(L_2)	283.77	0.646	0.160	0.400	0.435
11.43(L_2)	284.58	0.654	0.168	0.400	0.450
11.56(L_3)	284.71	0.679	0.192	0.400	0.495
11.85[a]	285.00	0.662	0.176	0.400	0.465
11.92[a]	285.07	0.671	0.183	0.400	0.480
9.52(L_2)	282.67	0.746	0.132	0.500	0.388
11.02(L_2)	284.17	0.753	0.137	0.500	0.400
11.32(L_3)	284.47	0.768	0.149	0.500	0.425
11.88[a]	285.03	0.760	0.143	0.500	0.412
11.52(L_2)	284.67	0.1540	0.3341	0.0662	0.6303
11.67(L_2)	284.82	0.1811	0.3710	0.0746	0.6709
11.67(L_2)	284.82	0.2113	0.3574	0.0890	0.6605
10.71(L_3)	283.86	0.2966	0.3918	0.1213	0.7030
11.28(L_3)	284.43	0.2248	0.4317	0.0867	0.7306

[a]Critical opalescence.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
20.54	293.69	0.463	0.369	0.200	0.700
21.13	294.28	0.452	0.351	0.200	0.680
21.44	294.59	0.474	0.389	0.200	0.720
22.83	295.98	0.442	0.333	0.200	0.660
24.85	298.00	0.433	0.316	0.200	0.640
27.71	300.86	0.424	0.299	0.200	0.620
29.98	303.13	0.497	0.431	0.200	0.760
30.58	303.73	0.415	0.284	0.200	0.600
33.87	307.02	0.407	0.269	0.200	0.580
36.74	309.89	0.399	0.254	0.200	0.560
39.96	313.11	0.391	0.240	0.200	0.540
42.57	315.72	0.383	0.227	0.200	0.520
43.96	317.11	0.376	0.215	0.200	0.500
21.02	294.17	0.596	0.278	0.300	0.613
21.98	295.13	0.586	0.265	0.300	0.595
22.13	295.28	0.607	0.290	0.300	0.630
25.34	298.49	0.576	0.253	0.300	0.577
29.83	302.98	0.567	0.241	0.300	0.560
31.97	305.12	0.629	0.318	0.300	0.665
33.98	307.13	0.558	0.230	0.300	0.543
38.03	311.18	0.549	0.219	0.300	0.525
19.74	292.89	0.697	0.208	0.400	0.525
21.48	294.63	0.706	0.217	0.400	0.540
21.97	295.12	0.688	0.200	0.400	0.510
25.77	298.92	0.725	0.236	0.400	0.570
27.66	300.81	0.679	0.192	0.400	0.495
33.17	306.32	0.671	0.183	0.400	0.480
37.93	311.08	0.662	0.176	0.400	0.465
15.93	289.08	0.775	0.155	0.500	0.438
17.67	290.82	0.783	0.160	0.500	0.450
20.62	293.77	0.768	0.149	0.500	0.425
26.05	299.20	0.798	0.173	0.500	0.475
27.21	300.36	0.760	0.143	0.500	0.412
33.18	306.33	0.753	0.137	0.500	0.400
38.27	311.42	0.746	0.132	0.500	0.388
11.17	284.32	0.1408	0.3393	0.0600	0.6345
11.31	284.46	0.1493	0.3359	0.0640	0.6318
11.44	284.59	0.1197	0.3476	0.0503	0.6410
12.23	285.38	0.1079	0.3523	0.0450	0.6446
13.45	286.60	0.0902	0.3593	0.0372	0.6499
16.32	289.47	0.0660	0.3688	0.0268	0.6569
20.68	293.83	0.0307	0.3828	0.0122	0.6668
11.48[a]	284.63	0.1474	0.3863	0.0593	0.6820
11.51[a]	284.66	0.1543	0.3832	0.0624	0.6798
11.59[a]	284.74	0.1605	0.3803	0.0652	0.6777
11.78[a]	284.93	0.1388	0.3902	0.0555	0.6848
13.82[a]	286.97	0.1170	0.4001	0.0461	0.6916
14.47[a]	287.62	0.0943	0.4104	0.0366	0.6985
17.32	290.47	0.0674	0.4226	0.0257	0.7064
21.06	294.21	0.0346	0.4373	0.0129	0.7156
24.43	297.58	0.0152	0.4461	0.0056	0.7209
11.16	284.31	0.2072	0.4416	0.0788	0.7370
11.25	284.40	0.2148	0.4372	0.0822	0.7342
11.25	284.40	0.1967	0.4473	0.0742	0.7406
11.28	284.43	0.1822	0.4555	0.0680	0.7456
11.87	285.02	0.1641	0.4655	0.0604	0.7517
12.66	285.81	0.1465	0.4753	0.0532	0.7574
13.02	286.17	0.1377	0.4802	0.0497	0.7602
24.62	297.77	0.0337	0.5382	0.0113	0.7910
26.12	299.27	0.0160	0.5481	0.0053	0.7958

[a]Critical opalescence.

TABLE 3. Mutual solubility nitromethane, diiodomethane, and cyclohexane

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
11.0	284.15	0.038	0.283	0.017	0.561
		0.093	0.291	0.042	0.575
		0.116	0.325	0.050	0.617
		0.137	0.318	0.060	0.611
		0.089	0.650	0.027	0.864
		0.169	0.533	0.058	0.801
		0.196	0.448	0.074	0.741
		0.223	0.432	0.086	0.731
		0.143	0.316	0.063	0.609
		0.164	0.330	0.071	0.627
		0.173	0.350	0.073	0.649
		0.194	0.365	0.081	0.666
		0.230	0.429	0.089	0.729
		0.229	0.284	0.107	0.583
		0.431	0.225	0.228	0.521
		0.539	0.195	0.306	0.486
		0.611	0.176	0.365	0.460
		0.668	0.161	0.415	0.439
		0.714	0.149	0.459	0.419
		0.804	0.125	0.554	0.379
		0.237	0.652	0.073	0.880
		0.253	0.478	0.093	0.771
		0.883	0.100	0.657	0.326
		0.099	0.196	0.051	0.446

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method and titration method were used. The apparatus and procedure were described in Zhilyaeva.[1]

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column; $n(20\ °C,D) = 1.3820$, $d(20\ °C,4\ °C) = 1.1381$.

(2) Source not specified; analytical purity; dried and twice distilled in presence of zinc dust under vacuum; $d(20\ °C,4\ °C) = 3.3214$.

(3) Source not specified; pure grade reagent; dried and twice distilled.

Estimated Error:

Temperature: ±0.01 K.

References:

[1]I. N. Zhilyaeva, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1972.

6.8. +Iodomethane+1,2-Ethanediol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Iodomethane; CH_3I; [74-88-4]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]

Original Measurements:
L. V. Gudkina dissertation, Novosibirsk Institute of Inorganic Chemistry, 1975.

Variables:
T/K=312–316

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (3) as 65.0:35.0.

Solubility temperatures of the liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
38.82	311.97	0.6091	0.0683	0.5558	0.1449
38.98	312.13	0.6232	0.0468	0.5838	0.1019
39.27	312.42	0.5900	0.0977	0.5199	0.2002
39.33	312.48	0.6380	0.0241	0.6148	0.0541
40.01	313.16	0.5705	0.1275	0.4859	0.2525
41.21	314.36	0.5522	0.1553	0.4561	0.2983
42.82	315.97	0.5307	0.1883	0.4231	0.3491

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method[1] was used. Mixtures of (1), (2), and (3) of mass 10 g were heated with vigorous stirring to a temperature higher than the homogenization temperature, and then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:
(1) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(2) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column.
(3) Analytical purity; dried and twice distilled under vacuum; 0.03 mass % water by the Karl Fischer analysis.

Estimated Error:
Temperature: ±0.01 K.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **9**, 208 (1877).

6.9. +Tetrachloroethene+1,2-Ethanediol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Tetrachloroethene; C_2Cl_4; [127-18-4]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, March, 2000.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+tetrachloroethene+1,2-ethanediol is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+tetrachloroethene+1,2-ethanediol

Author(s)	T/K	Type of data[a]
Sazonov and Chernysheva[1]	290–330	Solubility, three liquid phases (79)
	291–355	Solubility, two liquid phases (75)
Sazonov[2]	313	Solubility (3)
	318	Solubility (10)
	323	Solubility (10)
	328	Solubility (7)
	329.8	Solubility (8)
	293, 326, 329	Equilibrium, three phases (3)
	303	Equilibrium (3)
	313	Equilibrium (8)
	318	Equilibrium (6)
	323	Equilibrium (8)
	328	Equilibrium (5)
	329.8	Equilibrium (3)

[a]Number of experimental points in parentheses.

Solubility data

All three binary pairs of components, nitromethane+tetrachloroethene, nitromethane+1,2-ethanediol, and tetrachloroethene+1,2-ethanediol, are partially miscible. The data for first two systems were compiled and critically evaluated.[3] The UCST (upper critical solution temperature) of the binary system nitromethane+tetrachloroethene has been reported in Sazonov and Chemysheva[1] as 314.35 K which agrees with the recommended value in Sazonov *et al.*[3] The recommended data for the system tetrachloroethene+1,2-ethanediol are not yet available.

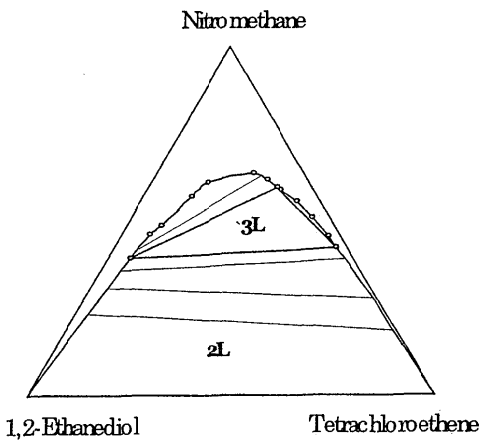

FIG. 20. Phase diagram for the ternary system nitromethane+tetrachloroethene+1,2-ethanediol at 328.2 K (mole fraction).

The solubility temperatures of the three and two phases liquid systems were determined[1] by the synthetic method is ternary mixtures with constant mass content of tetrachloroethene, in ternary mixtures with a constant mass content of 1,2-ethanediol; and in ternary mixtures with a constant mass relationship of (1) and (2) or (1) and (3). The system nitromethane+tetrachloroethene+1,2-ethanediol includes a three-phase region, Fig. 20. Depending on the temperature the system nitromethane+tetrachloroethene+1,2-ethanediol forms a miscibility gaps of Type I–III, Treybal.[4] In the temperature range 273–313.2 K (UCST binary nitromethane+1,2-ethanediol), where three binary systems are partially miscible, the solubility curves correspond to Type III,[4] and a three-phase region occurs. Maximal temperature of the three-phase liquid equilibrium was reported to be 329.8 K.[1] In the temperature range from 313.2 to 314.35 K (UCST binary nitromethane+tetrachloroethene) where two binary systems nitromethane+tetrachloroethene and 1,2-ethanediol +tetrachloroethene are partially miscible, the solubility curves correspond to Type II.[4] Above 314.35 K this ternary system has only one partially miscible binary system.[1] Experimental errors for solubility temperatures were reported to be ±0.01 K.

Liquid–liquid equilibrium data

Compositions of two and three coexisting liquid phases for the ternary system nitromethane+tetrachloroethene+1,2-ethanediol were determined by gas chromatography at 303.15, 313.15, 318.15, 323.2, 328.2, and 329.8 K.[2] Compositions of three coexisting liquid phases were determined at 293.15, 326.2, and 329.2 K. With increasing temperature the area of the three-phase region decreases. Experimental errors were reported in Sazonov[2] as relative error 1% (composition).

All experimental data are considered tentative.

References:

[1]V. P. Sazonov and M. F. Chernysheva, Zh. Obshch. Khim. **55**, 2440 (1985).

[2]V. P. Sazonov, Zh. Prikl. Khim. (Leningrad) **59**, 12 (1986).

[3]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

[4]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Tetrachloroethene; C_2Cl_4; [127-18-4]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]

Original Measurements:

V. P. Sazonov and M. F. Chernysheva, Zh. Obshch. Khim. **55**, 2440–6 (1985).

Variables:

T/K=290–355

Prepared By:

V. P. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass content of (2) as 20.0 mass %; with a constant mass content (3), respectively, 20.0 and 35.0 mass %; and also in ternary mixtures with a constant mass relationship of (1) and (2), respectively, 25.0:75.0, 30.0:70.0, 35.0:65.0, 40.0:60.0, 45.0:55.0, and 50.0:50.0 and with constant mass relationship of (1) and (3), respectively, 40.0:60.0, 50.0:50.0, and 65.0:35.0. L_1 nitromethane-rich phase; L_2 tetrachloroethene-rich phase; L_3 ethanediol-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of the three liquid phases

t/ °C (compiler)	T/K	x_1 (compiler)	x_2 (compiler)	w_1	w_2
19.90	293.05(L_2)	0.5531	0.0848	0.4803	0.2000
20.15	293.25(L_1)	0.2313	0.0853	0.1998	0.2000
24.90	298.05(L_2)	0.5073	0.0849	0.4402	0.2000
32.00	305.15(L_1)	0.2775	0.0852	0.2399	0.2000
36.50	309.65(L_2)	0.4621	0.0849	0.4006	0.2000
51.3	324.5(L_1)	0.3704	0.0850	0.3206	0.2000
54.6	327.8(L_1)	0.3966	0.0850	0.3435	0.2000
18.40	291.55(L_2)	0.6628	0.1045	0.5602	0.2398
26.60	299.75(L_1)	0.2116	0.4415	0.1200	0.6800
37.40	310.55(L_2)	0.6042	0.1483	0.4800	0.3200
46.60	319.75(L_1)	0.3251	0.3567	0.2010	0.5990
51.6	324.8(L_1)	0.3733	0.3207	0.2400	0.5600
52.8	326.0(L_2)	0.5377	0.1979	0.4000	0.4000
55.0	328.2(L_1)	0.4196	0.2861	0.2805	0.5195
56.1	329.3(L_2)	0.5011	0.2252	0.3602	0.4398
56.1	329.3(L_2)	0.5011	0.2252	0.3602	0.4398
56.3	329.5(L_1)[a]	0.4539	0.2605	0.3126	0.4874
56.5	329.7(L_2)[a]	0.4776	0.2428	0.3360	0.4640
28.40	301.55(L_1)	0.2368	0.2615	0.1625	0.4875
34.72	307.87(L_2)	0.4971	0.0983	0.4228	0.2272
36.40	309.55(L_1)	0.2736	0.2385	0.1930	0.4570
48.10	321.25(L_1)	0.3477	0.1920	0.2600	0.3900
48.40	321.55(L_2)	0.4688	0.1160	0.3887	0.2613
52.4	325.6(L_1)	0.3807	0.1713	0.2925	0.3575
55.6	328.8(L_1)	0.4120	0.1517	0.3250	0.3250
56.7	329.9(L_2)[a]	0.4422	0.1327	0.3581	0.2919
22.80	295.95(L_3)	0.4654	0.5140	0.2472	0.7417
50.4	323.6(L_1)	0.4616	0.5098	0.2461	0.7384
53.4	326.6(L_1)	0.4571	0.5049	0.2448	0.7345
54.2	327.4(L_1)	0.4535	0.5008	0.2438	0.7313
54.8	328.0(L_1)	0.4492	0.4961	0.2425	0.7275
16.90	290.05(L_3)	0.5285	0.4540	0.2970	0.6930
33.60	306.75(L_3)	0.5193	0.4460	0.2940	0.6860
39.90	313.05(L_3)	0.5147	0.4421	0.2925	0.6825
51.9	325.1(L_1)	0.3738	0.3209	0.2402	0.5603
54.6	327.8(L_1)	0.5101	0.4382	0.2910	0.6790
54.7	327.9(L_1)	0.4103	0.3524	0.2550	0.5950
55.7	328.9(L_1)	0.5011	0.4304	0.2880	0.6720
55.9	329.1(L_1)	0.4912	0.4219	0.2846	0.6642
55.9	329.1(L_1)	0.4498	0.3864	0.2700	0.6300
26.60	299.75(L_3)	0.5750	0.3932	0.3432	0.6375

.10	312.25(L_3)	0.5650	0.3862	0.3396	0.6306
2.6	325.8(L_2)	0.5602	0.3830	0.3378	0.6274
54.3	327.5(L_2)	0.5524	0.3776	0.3349	0.6219
54.7	327.9(L_2)	0.5510	0.3766	0.3344	0.6209
54.7	327.9(L_1)	0.4104	0.2805	0.2760	0.5126
55.5	328.7(L_2)	0.5368	0.3670	0.3290	0.6110
55.8	329.0(L_2)	0.5185	0.3545	0.3219	0.5979
56.3	329.5(L_2)[a]	0.5006	0.3423	0.3148	0.5847
56.5	329.7(L_1)[a]	0.4593	0.3139	0.2977	0.5528
24.60	297.75(L_3)	0.6240	0.3445	0.3920	0.5879
31.90	305.05(L_3)	0.6142	0.3391	0.3880	0.5820
40.10	313.25(L_3)	0.6408	0.3339	0.3842	0.5762
44.30	317.45(L_3)	0.5997	0.3311	0.3821	0.5731
54.3	327.5(L_2)	0.5930	0.3274	0.3793	0.5689
55.6	328.8(L_2)	0.5761	0.3180	0.3722	0.5582
56.0	329.2(L_2)	0.5483	0.3028	0.3602	0.5403
56.3	329.5(L_2)[a]	0.4615	0.2548	0.3200	0.4800
56.4	329.6(L_2)[a]	0.5014	0.2768	0.3390	0.5085
28.20	301.35(L_3)	0.6592	0.2966	0.4366	0.5336
41.40	314.55(L_3)	0.6412	0.2885	0.4285	0.5237
52.5	325.7(L_2)	0.6253	0.2814	0.4212	0.5149
52.9	326.1(L_2)	0.6196	0.2788	0.4186	0.5116
53.1	326.3(L_2)	0.6136	0.2760	0.4158	0.5081
53.2	326.4(L_2)	0.6096	0.2743	0.4139	0.5059
54.0	327.2(L_2)	0.5908	0.2658	0.4050	0.4950
55.3	328.5(L_2)	0.5450	0.2453	0.3826	0.4677
56.4	329.6(L_2)	0.5005	0.2252	0.3598	0.4397
56.5	329.7(L_2)[a]	0.4594	0.2067	0.3377	0.4127
31.80	304.95(L_3)	0.6894	0.2538	0.4799	0.4799
44.90	318.05(L_3)	0.6701	0.2467	0.4703	0.4703
48.40	321.55(L_2)	0.6505	0.2395	0.4604	0.4604
48.90	322.05(L_2)	0.6397	0.2355	0.4549	0.4549
49.30	322.45(L_2)	0.6312	0.2324	0.4505	0.4505
51.1	324.3(L_2)	0.5841	0.2150	0.4256	0.4256
53.3	326.5(L_2)	0.5373	0.1978	0.3998	0.3998
29.20	302.35(L_2)	0.5807	0.1118	0.4850	0.2538
39.86	313.01(L_2)	0.5646	0.1365	0.4555	0.2993
48.92	322.07(L_3)	0.5447	0.1668	0.4219	0.3510

TABLE 2. Solubility temperatures of the two liquid phases

t/ °C (compiler)	T/K	x_1 (compiler)	x_2 (compiler)	w_1	w_2
18.10	291.25	0.8703	0.0843	0.7597	0.2000
36.90	310.05	0.8094	0.0844	0.7058	0.2000
42.70	315.85	0.7348	0.0845	0.6400	0.2000
46.90	320.05	0.6435	0.0847	0.5596	0.2000
48.10	321.25	0.5986	0.0847	0.5202	0.2000
50.00	323.15[a]	0.5531	0.0848	0.4803	0.2000
53.35	326.50	0.5073	0.0849	0.4402	0.2000
70.9	344.1	0.4621	0.0849	0.4006	0.2000
40.90	314.05	0.7384	0.0480	0.6800	0.1200
44.60	317.75	0.6893	0.0847	0.5998	0.2002
47.50	320.65	0.6628	0.1045	0.5602	0.2398
56.9	330.1	0.6042	0.1483	0.4800	0.3200
78.8	352.0	0.5377	0.1979	0.4000	0.4000
51.9	335.1	0.4971	0.0983	0.4228	0.2272
76.8	350.0	0.4688	0.1160	0.3887	0.2613
44.10	317.25	0.4714	0.5206	0.2489	0.7468
47.55	320.70	0.4654	0.5140	0.2472	0.7417
55.3	328.5	0.4616	0.5098	0.2461	0.7384
62.0	335.2	0.4571	0.5049	0.2448	0.7345
69.1	342.3	0.4535	0.5008	0.2438	0.7312
75.5	348.7	0.4492	0.4961	0.2425	0.7275
45.30	318.45[a]	0.5285	0.4540	0.2970	0.6930
50.2	323.4[a]	0.5193	0.4460	0.2940	0.6860
52.6	325.8[a]	0.5147	0.4421	0.2925	0.6825
59.5	332.7	0.5101	0.4382	0.2910	0.6790
69.8	343.0	0.5011	0.4304	0.2880	0.6720
79.1	352.3	0.4912	0.4219	0.2846	0.6642
44.20	317.35	0.5836	0.3990	0.3403	0.6432
47.35	320.50	0.5750	0.3932	0.3432	0.6375
51.1	324.3	0.5650	0.3862	0.3396	0.6306
58.1	331.3	0.5602	0.3830	0.3378	0.6274
61.8	335.0	0.5524	0.3776	0.3349	0.6219
64.1	337.3	0.5510	0.3766	0.3344	0.6209
66.3	339.5	0.5450	0.3726	0.3321	0.6168
72.1	345.3	0.5368	0.3670	0.3290	0.6110
82.1	355.3	0.5185	0.3545	0.3219	0.5979
42.90	316.05	0.6341	0.3500	0.3960	0.5939
45.90	319.05	0.6240	0.3445	0.3920	0.5879
48.30	321.45	0.6142	0.3391	0.3880	0.5820
51.2	324.4	0.6048	0.3339	0.3842	0.5762
52.7	325.9	0.5997	0.3311	0.3821	0.5731
55.3	328.5	0.5930	0.3274	0.3793	0.5689
63.6	336.8	0.5761	0.3180	0.3722	0.5582
75.1	348.3	0.5483	0.3028	0.3602	0.5403
41.95	315.10	0.6745	0.3035	0.4434	0.5419
45.50	318.65	0.6592	0.2966	0.4366	0.5336
49.50	322.65	0.6412	0.2885	0.4285	0.5237
53.0	326.2	0.6253	0.2814	0.4212	0.5149
55.2	328.4	0.6196	0.2788	0.4186	0.5116
57.7	330.9	0.6136	0.2760	0.4158	0.5081
59.2	332.4	0.6096	0.2743	0.4139	0.5059
64.8	338.0	0.5908	0.2658	0.4050	0.4950
77.7	350.9	0.5450	0.2453	0.3826	0.4677
40.05	313.20	0.7103	0.2615	0.4950	0.4950
43.75	316.90	0.6894	0.2538	0.4799	0.4799
47.10	320.25	0.6701	0.2467	0.4703	0.4703
52.4	325.6	0.6505	0.2395	0.4604	0.4604
55.2	328.4	0.6397	0.2355	0.4549	0.4549
57.0	330.2	0.6312	0.2324	0.4505	0.4505
65.9	339.1	0.5841	0.2150	0.4256	0.4256
78.5	351.7	0.5373	0.1978	0.3998	0.3998
36.88	310.03	0.3977	0.0158	0.3835	0.0413
40.68	313.83	0.3907	0.0330	0.3664	0.0840
54.10	327.25	0.3825	0.0532	0.3475	0.1313
40.31	313.46	0.4948	0.0186	0.4758	0.0485
43.49	316.64	0.4833	0.0414	0.4479	0.1043
48.85	322.00	0.4733	0.0613	0.4252	0.1496
50.00	323.15	0.4717	0.0645	0.4217	0.1566
40.67	313.82	0.6415	0.0189	0.6179	0.0494
42.01	315.16	0.6280	0.0395	0.5850	0.1000
44.30	317.45	0.6138	0.0612	0.5527	0.1497
48.05	321.20	0.5978	0.0856	0.5188	0.2018
53.3	326.5	0.5807	0.1118	0.4850	0.2538
59.6	332.8[a]	0.5646	0.1365	0.4555	0.2993
71.5	344.7	0.5447	0.1668	0.4219	0.3510

[a]Critical opalescence.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column of 20 theoretical plates; 99.9 mass % purity by GLC.
(2) Source not specified; analytical purity; dried and repeatedly distilled in a laboratory packed column.
(3) Analytical purity; dried and twice distilled under vacuum; 0.03 mass % water by the Karl Fischer analysis.

Estimated Error:

Temperature: ±0.01 K.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Tetrachloroethene; C_2Cl_4; [127-18-4]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]

Original Measurements:

V. P. Sazonov, Zh. Prikl. Khim. (Leningrad) **59**, 12–8 (1986).

Variables:

T/K=293–330

Prepared By:

N. V. Sazonov and V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, tetrachloroethene, and 1,2-ethanediol

t/°C (compiler)	T/K	x_1 (compilers)	x_2 (compilers)	w_1	w_2
40.00	313.15	0.6829	0.3073	0.4470	0.5465
		0.7101	0.2614	0.4900	0.4900
		0.4969	0.0145	0.4810	0.0380
45.00	318.15	0.4696	0.5183	0.2485	0.7450
		0.5297	0.4545	0.2975	0.6935
		0.5812	0.3973	0.3455	0.6415
		0.6269	0.3464	0.3930	0.5900
		0.6603	0.2973	0.4370	0.5345
		0.6818	0.2513	0.4760	0.4765
		0.6894	0.0846	0.6000	0.2000
		0.6106	0.0663	0.5455	0.1610
		0.4795	0.0489	0.4390	0.1220
		0.3866	0.0426	0.3570	0.1070
50.0	323.2	0.5195	0.4466	0.2940	0.6865
		0.5676	0.3881	0.3405	0.6325
		0.6093	0.3364	0.3860	0.5790
		0.6387	0.2871	0.4275	0.5220
		0.6576	0.2421	0.4640	0.4640
		0.6430	0.1192	0.5320	0.2680
		0.5908	0.0966	0.5045	0.2240
		0.5528	0.0848	0.4800	0.2000
		0.4716	0.0647	0.4215	0.1570
		0.3839	0.0500	0.3505	0.1240
55.0	328.2	0.6215	0.2795	0.4195	0.5125
		0.6409	0.2359	0.4555	0.4555
		0.6142	0.1408	0.4930	0.3070
		0.5765	0.1178	0.4775	0.2650
		0.4934	0.0849	0.4280	0.2000
		0.4674	0.0730	0.4125	0.1750
		0.3825	0.0531	0.3475	0.1310
56.6	329.8	0.4609	0.5087	0.2460	0.7375
		0.3130	0.4404	0.2920	0.6810
		0.5598	0.3831	0.3375	0.6275
		0.5936	0.3279	0.3795	0.5695
		0.6171	0.2775	0.4175	0.5100
		0.6332	0.2331	0.4515	0.4515
		0.6053	0.1474	0.4815	0.3185
		0.5726	0.1242	0.4700	0.2770

TABLE 2. Compositions of equilibrium two and three liquid phases

t/°C (compiler)	T/K	Nitromethane-rich phase w_1'	Nitromethane-rich phase w_2'	Tetrachloroethene-rich phase w_1''	Tetrachloroethene-rich phase w_2''	1,2-ethanediol-rich phase w_1'''	1,2-ethanediol-rich phase w_2'''
20.00	293.15	0.6540	0.3100	0.0529	0.9470	0.2265	0.0650
30.00	303.15	0.5900	0.3615	0.0745	0.9250	0.2465	0.0740
		0.6605	0.2760	—	—	0.2615	0.0700
		0.6980	0.2205	—	—	0.2750	0.0610
40.00	313.15	0.5280	0.4140	0.1070	0.8905	0.2805	0.0945
		0.4975	0.4760	0.1210	0.8770	—	—
		0.5790	0.3355	—	—	0.3025	0.0930
		0.6285	0.2550	—	—	0.3285	0.0860
		0.6695	0.1660	—	—	0.3695	0.0740
		0.6890	0.1155	—	—	0.4175	0.0580
		—	—	0.0750	0.9240	0.2385	0.0805
		—	—	0.0460	0.9535	0.1670	0.0455
45.00	318.15	0.4955	0.4385	0.1330	0.8620	0.3100	0.0980
		0.4315	0.5465	0.1635	0.8320	—	—
		0.4660	0.5000	0.1445	0.8510	—	—
		0.5250	0.3890	—	—	0.3185	0.1010
		0.5715	0.3035	—	—	0.3495	0.1050
		0.5920	0.2100	—	—	0.4070	0.1160
50.0	323.2	0.4520	0.4800	0.1630	0.8290	0.3300	0.1220
		—	—	0.1235	0.8720	0.2900	0.1030
		—	—	0.0790	0.9185	0.2290	0.0835
		—	—	0.0475	0.9515	0.1685	0.0650
		0.4070	0.5510	0.1920	0.7980	—	—
		0.3640	0.6065	0.2170	0.7710	—	—
		0.4740	0.4450	—	—	0.3425	0.1245
		0.5230	0.3490	—	—	0.3740	0.1340
53.0	326.2	0.4180	0.5210	0.1910	0.7970	0.3485	0.1350
55.0	328.2	0.3880	0.5570	0.2215	0.7645	0.3600	0.1400
		—	—	0.1975	0.7920	0.3320	0.1210
		—	—	0.1260	0.8695	0.2900	0.1050
		—	—	0.0785	0.9180	0.2205	0.0840
		0.4400	0.4840	—	—	0.3790	0.1475
56.0	329.2	0.3600	0.5940	0.2530	0.7285	0.3630	0.1420
56.6	329.8	—	—	0.1245	0.8710	0.2890	0.1080
		—	—	0.1990	0.7895	0.3190	0.1200
		—	—	0.3195	0.6500	0.3700	0.1475

The same data are presented below in mole fractions

t/°C (compiler)	T/K	Nitromethane-rich phase (compilers) x_1'	Nitromethane-rich phase (compilers) x_2'	Tetrachloroethene-rich phase (compilers) x_1''	Tetrachloroethene-rich phase (compilers) x_2''	1,2-ethanediol-rich phase (compilers) x_1'''	1,2-ethanediol-rich phase (compilers) x_2'''
20.00	293.15	0.8139	0.1420	0.1317	0.8680	0.2391	0.0253
30.00	303.15	0.7655	0.1726	0.1793	0.8195	0.2617	0.0289
		0.8010	0.1232	—	—	0.2768	0.0273
		0.8123	0.0945	—	—	0.2893	0.0236
40.00	313.15	0.7160	0.2067	0.2447	0.7497	0.3016	0.0374
		0.7120	0.2507	0.2714	0.7202	—	—
		0.7361	0.1570	—	—	0.3248	0.0368
		0.7510	0.1122	—	—	0.3510	0.0338
		0.7502	0.0685	—	—	0.3914	0.0289
		0.7459	0.0460	—	—	0.4373	0.0224
		—	—	0.1802	0.8174	0.2543	0.0316
		—	—	0.1157	0.8830	0.1743	0.0175
45.00	318.15	0.6865	0.2236	0.2922	0.6970	0.3340	0.0389
		0.6595	0.3074	0.3448	0.6459	—	—
		0.6818	0.2693	0.3126	0.6778	—	—
		0.6974	0.1902	—	—	0.3438	0.0401
		0.7089	0.1386	—	—	0.3780	0.0418
		0.6852	0.0895	—	—	0.4430	0.0465
50.0	323.2	0.6498	0.2540	0.3424	0.6411	0.3611	0.0491
		—	—	0.2751	0.7150	0.3136	0.0410
		—	—	0.1883	0.8058	0.2447	0.0328
		—	—	0.1191	0.8784	0.1781	0.0252
		0.6251	0.3115	0.3874	0.5927	—	—
		0.5907	0.3623	0.4233	0.5537	—	—
		0.6607	0.2283	—	—	0.3753	0.0502
		0.6728	0.1653	—	—	0.4123	0.0544
53.0	326.2	0.6241	0.2863	0.3849	0.5913	0.3846	0.0548
55.0	328.2	0.5996	0.3168	0.4287	0.5447	0.3986	0.0571
		—	—	0.3955	0.5838	0.3631	0.047
		—	—	0.2797	0.7105	0.3140	0.0418
		—	—	0.1870	0.8048	0.2357	0.0331
		0.6350	0.2571	—	—	0.4216	0.0604
56.0	329.2	0.5770	0.3505	0.4691	0.4972	0.4024	0.058
56.6	329.8	—	—	0.2770	0.7132	0.3135	0.0431
		—	—	0.3973	0.5802	0.3487	0.0483
		—	—	0.5427	0.4064	0.4117	0.0604

Auxiliary Information

Method/Apparatus/Procedure:

The analytical method was used. The compositions of equilibrium liquid phases were determined by gas chromatography.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled; purity 99.9 mole %.
(2) Source not specified; pure grade reagent; dried and repeatedly distilled in a laboratory packed column; purity 99.9 mole %.
(3) Analytical purity; dried and twice distilled under vacuum; purity 99.85 mole %.

Estimated Error:

Composition: relative error of 3–5 determinations less than 1%.

6.10. +Tetrachloroethane+1-Hexanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Tetrachloroethene; C_2Cl_4; [127-18-4]
(3) 1-Hexanol; $C_6H_{14}O$; [111-27-3]

Original Measurements:
V. P. Sazonov, Zh. Prikl. Khim. (Leningrad) **55**, 513–7 (1982).

Variables:
T/K = 289–303

Prepared By:
N. V. Sazonov and V. P. Sazonov

Experimental Data
Compositions of two coexisting liquid phases

t/°C	T/K (compilers)	(1)-rich phase (compilers) x_1'	x_2'	(2)-rich phase (compilers) x_1''	x_2''	(1)-rich phase w_1'	w_2'	(2)-rich phase w_1''	w_2''
16.00	289.15	0.8142	0.1733	0.1589	0.8237	0.6235	0.3605	0.0655	0.9225
		0.7920	0.1884	0.1896	0.7759	0.5925	0.3830	0.0805	0.8950
		0.7742	0.2010	0.2178	0.7336	0.5685	0.4010	0.0950	0.8695
		0.7389	0.2245	0.2765	0.6454	0.5240	0.4325	0.1280	0.8115
		0.7121	0.2400	0.3226	0.5737	0.4930	0.4515	0.1570	0.7585
		0.6927	0.2482	0.3604	0.5166	0.4725	0.4600	0.1830	0.7125
		0.6880	0.2492	0.3701	0.5019	0.4680	0.4605	0.1900	0.7000
		0.6846	0.2490	0.3807	0.4849	0.4650	0.4595	0.1980	0.6850
		0.6815	0.2468	0.3883	0.4665	0.4630	0.4555	0.2045	0.6675
		0.6841	0.2432	0.3918	0.4587	0.4665	0.4505	0.2075	0.6600
		0.6859	0.2390	0.3867	0.4538	0.4695	0.4445	0.2050	0.6535
		0.6939	0.2296	0.3844	0.4460	0.4800	0.4315	0.2045	0.6445
		0.6961	0.2281	0.3828	0.4417	0.4825	0.4295	0.2040	0.6395
		0.7028	0.2215	0.3735	0.4451	0.4910	0.4205	0.1980	0.6410
		0.7100	0.2126	0.3675	0.4349	0.5010	0.4075	0.1955	0.6285
		0.7219	0.2005	0.3579	0.4277	0.5170	0.3900	0.1905	0.6185
		0.7389	0.1846	0.3501	0.4162	0.5400	0.3665	0.1870	0.6040
		0.7574	0.1675	0.3344	0.4027	0.5660	0.3400	0.1790	0.5855
		0.7738	0.1526	0.3198	0.3842	0.5900	0.3160	0.1720	0.5615
		0.8004	0.1284	0.2948	0.3524	0.6310	0.2750	0.1600	0.5195
		0.8316	0.1000	0.2632	0.3057	0.6830	0.2230	0.1450	0.4575
		0.8519	0.0816	0.2531	0.2736	0.7190	0.1870	0.1415	0.4155
		0.8739	0.0616	0.2381	0.2215	0.7605	0.1455	0.1365	0.3450
		0.8977	0.0396	0.2265	0.1440	0.8085	0.0970	0.1355	0.2340
		0.9143	0.0251	0.2187	0.0948	0.8435	0.0630	0.1345	0.1585
		0.9334	0.0081	0.2065	0.0341	0.8860	0.0210	0.1315	0.0590
16.85	290.00	0.6367	0.2920	0.4328	0.4557	0.4110	0.5120	0.2330	0.6665
		0.6197	0.3015	0.4564	0.4298	0.3945	0.5215	0.2515	0.6435
		0.6061	0.3081	0.4765	0.4077	0.3820	0.5275	0.2680	0.6230
		0.5928	0.3144	0.4905	0.3918	0.3700	0.5330	0.2800	0.6075
		0.5994	0.3070	0.4871	0.3899	0.3770	0.5245	0.2780	0.6045
		0.6178	0.2882	0.4803	0.3862	0.3965	0.5025	0.2740	0.5985
		0.6424	0.2664	0.4470	0.4016	0.4230	0.4765	0.2495	0.6090
16.90	290.05	0.8113	0.1770	0.1643	0.8184	0.6185	0.3665	0.0680	0.9200
		0.7875	0.1936	0.1949	0.7722	0.5855	0.3910	0.0830	0.8935
		0.7649	0.2096	0.2286	0.7238	0.5555	0.4135	0.1005	0.8645
		0.7431	0.2245	0.2628	0.6736	0.5280	0.4335	0.1195	0.8320
		0.7245	0.2374	0.2951	0.6291	0.5055	0.4500	0.1385	0.8020
		0.7039	0.2516	0.3273	0.5864	0.4815	0.4675	0.1585	0.7715
		0.6882	0.2618	0.3523	0.5533	0.4640	0.4795	0.1750	0.7465
		0.6593	0.2794	0.3982	0.4967	0.4335	0.4990	0.2070	0.7015
		0.6467	0.2876	0.4159	0.4763	0.4205	0.5080	0.2200	0.6845
		0.6349	0.2937	0.4422	0.4477	0.4090	0.5140	0.2400	0.6600
		0.6161	0.3039	0.4760	0.4122	0.3910	0.5240	0.2670	0.6280
		0.5922	0.3185	0.4978	0.3916	0.3685	0.5385	0.2850	0.6090
		0.5920	0.3075	0.4989	0.3727	0.3710	0.5235	0.2890	0.5865
		0.6132	0.2893	0.4809	0.3827	0.3925	0.5030	0.2750	0.5945
		0.6349	0.2706	0.4572	0.3932	0.4155	0.4810	0.2575	0.6015
		0.6471	0.2596	0.4452	0.3972	0.4290	0.4675	0.2490	0.6035
		0.6675	0.2408	0.4272	0.3960	0.4525	0.4435	0.2375	0.5980
		0.6879	0.2221	0.4043	0.3987	0.4770	0.4185	0.2225	0.5960
		0.7067	0.2056	0.3889	0.3929	0.5005	0.3955	0.2135	0.5860
		0.7322	0.1830	0.3627	0.3857	0.5340	0.3625	0.1980	0.5720
		0.7659	0.1527	0.3270	0.3577	0.5815	0.3150	0.1790	0.5320
		0.8231	0.1022	0.2798	0.2954	0.6715	0.2265	0.1560	0.4475
		0.8410	0.0871	0.2660	0.2669	0.7020	0.1975	0.1500	0.4090
		0.8679	0.0625	0.2508	0.2159	0.7520	0.1470	0.1450	0.3390
		0.8950	0.0399	0.2348	0.1434	0.8045	0.0975	0.1410	0.2340
		0.9111	0.0256	0.2259	0.0936	0.8385	0.0640	0.1395	0.1570
		0.9300	0.0082	0.2144	0.0340	0.8810	0.0210	0.1370	0.0590
16.95	290.10	0.6425	0.2911	0.4223	0.4715	0.4160	0.5120	0.2245	0.6810
		0.6241	0.3019	0.4470	0.4439	0.3980	0.5230	0.2435	0.6570
		0.5828	0.3303	0.4884	0.4045	0.3585	0.5520	0.2765	0.6220
		0.5936	0.3025	0.4946	0.3727	0.3735	0.5170	0.2860	0.5855
		0.6272	0.2762	0.4643	0.3880	0.4075	0.4875	0.2630	0.5970
		0.6517	0.2542	0.4419	0.3927	0.4345	0.4605	0.2475	0.5975
		0.6746	0.2341	0.4198	0.3940	0.4610	0.4345	0.2330	0.5940
18.00	291.15	0.8055	0.1827	0.1707	0.8113	0.6095	0.3755	0.0710	0.9165
		0.7799	0.2006	0.2052	0.7628	0.5745	0.4015	0.0880	0.8890
		0.7542	0.2191	0.2421	0.7108	0.5410	0.4270	0.1075	0.8575
		0.7257	0.2404	0.2828	0.6557	0.5055	0.4550	0.1305	0.8220
		0.7010	0.2586	0.3249	0.6023	0.4765	0.4775	0.1560	0.7855
		0.6682	0.2828	0.3697	0.5503	0.4400	0.5060	0.1850	0.7480
		0.6313	0.3105	0.4239	0.4916	0.4015	0.5365	0.2230	0.7025
		0.6309	0.2501	0.4828	0.3370	0.4180	0.4500	0.2840	0.5385
		0.6894	0.2048	0.4204	0.3499	0.4845	0.3910	0.2395	0.5415
		0.7271	0.1742	0.3814	0.3462	0.5325	0.3465	0.2145	0.5290
		0.7443	0.1608	0.3557	0.3475	0.5555	0.3260	0.1980	0.5255
		0.7693	0.1412	0.3341	0.3288	0.5905	0.2945	0.1865	0.4985
		0.8037	0.1120	0.2951	0.2954	0.6435	0.2435	0.1655	0.4500
		0.8353	0.0872	0.2810	0.2655	0.6950	0.1970	0.1595	0.4095
		0.8608	0.0650	0.2600	0.2143	0.7410	0.1520	0.1510	0.3380
		0.8884	0.0412	0.2428	0.1413	0.7945	0.1000	0.1465	0.2315
		0.9071	0.0266	0.2331	0.0927	0.8335	0.0665	0.1445	0.1560
		0.9268	0.0084	0.2230	0.0342	0.8760	0.0215	0.1430	0.0595
20.00	293.15	0.7932	0.1944	0.1856	0.7973	0.5910	0.3935	0.0780	0.9100
		0.7636	0.2161	0.2261	0.7424	0.5515	0.4240	0.0985	0.8785
		0.7301	0.2421	0.2720	0.6826	0.5090	0.4585	0.1235	0.8420
		0.6863	0.2769	0.3327	0.6100	0.4575	0.5015	0.1595	0.7945
		0.6237	0.3277	0.4257	0.5090	0.3910	0.5580	0.2220	0.7210
		0.6704	0.1974	0.4563	0.2986	0.4695	0.3755	0.2720	0.4835
		0.7221	0.1617	0.4039	0.2970	0.5325	0.3240	0.2360	0.4715
		0.7865	0.1167	0.3403	0.2800	0.6215	0.2505	0.1960	0.4380
		0.8177	0.0927	0.3129	0.2549	0.6705	0.2065	0.1810	0.4005
		0.8482	0.0680	0.2869	0.2081	0.7230	0.1575	0.1690	0.3330
		0.8791	0.0429	0.2645	0.1363	0.7805	0.1035	0.1615	0.2260
		0.9000	0.0264	0.2541	0.0915	0.8220	0.0655	0.1590	0.1555
		0.9213	0.0086	0.2419	0.0336	0.8675	0.0220	0.1565	0.0590
25.00	298.15	0.7557	0.2313	0.2284	0.7544	0.5375	0.4470	0.0990	0.8885
		0.7061	0.2722	0.2935	0.6772	0.4765	0.4990	0.1345	0.8430
		0.5626	0.4031	0.4592	0.5036	0.3280	0.6385	0.2430	0.7240
		0.6972	0.1310	0.4869	0.1990	0.5200	0.2655	0.3135	0.3480
		0.7911	0.0822	0.3811	0.1832	0.6450	0.1820	0.2370	0.3095
		0.8448	0.0489	0.3360	0.1245	0.7310	0.1150	0.2130	0.2145
		0.8706	0.0305	0.3065	0.0848	0.7780	0.0740	0.1970	0.1480
		0.8976	0.0093	0.2875	0.0318	0.8320	0.0235	0.1900	0.0570
30.00	303.15	0.6976	0.2889	0.2950	0.6886	0.4635	0.5215	0.1345	0.8530
		0.7474	0.0635	0.4998	0.1012	0.6045	0.1395	0.3465	0.1905
		0.8167	0.0359	0.4155	0.0736	0.7035	0.0840	0.2825	0.1360
		0.8625	0.0106	0.3614	0.0288	0.7815	0.0260	0.2475	0.0535

Auxiliary Information

Method/Apparatus/Procedure:

The analytical method was used. Heterogeneous mixtures were prepared in flat-bottomed glass vessels (15 mL capacity). Total weight of the mixture was 8–11 g. Vessels were put in a 30 L thermostat with clear sides. A sealed magnetic stirrer was present to agitate the mixtures. Equilibrium liquid phases were analyzed in a chromatograph with a thermal-conductivity detector. After prolonged agitating, and settling 3–5 samples from each liquid phase were analyzed

Source and Purity of Materials:

(1) Source not specified, pure grade reagent; dried and twice distilled in a packed column; purity 99.9 mass %.
(2) Source not specified, pure grade reagent; dried and twice distilled in a packed column; no impurities detectable by GLC.
(3) Source not specified; pure grade reagent; dried and repeatedly distilled; purity 99.5 mass %.

Estimated Error:

Temperature: control to ±0.01 K;
Composition: relative error of five determinations not greater than 1%.

6.11. +1,2-Dichloroethane+1,2-Ethanediol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Dichloroethane; $C_2H_4Cl_2$; [107-06-2]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]

Original Measurements:

V. G. Tsvetkov, B. V. Klimin, and I. B. Rabinovich, Tr. Khim. Khim. Tekhnol. (Gor'kii) **41**, 16–7 (1975).

Variables:

$T/K = 313–385$

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant content of 1,2-ethanediol, of 50.0 mole %. The data are presented in graphical form.

Solubility temperatures of the liquid phases*

t/°C	T/K (compiler)	x_1	x_2	w_1 (compiler)	w_2 (compiler)
40.0	313.2	0.500	0.000	0.496	0.000
43.8	317.0	0.450	0.050	0.433	0.078
52.0	325.2	0.350	0.150	0.318	0.221
71.8	345.0	0.200	0.300	0.167	0.407
90.2	363.4	0.100	0.400	0.080	0.515
112.0	385.2	0.000	0.500	0.000	0.614

*This table was prepared by the compiler from the published curve of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method was used. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; dried and distilled.
(2) Source not specified; dried and distilled.
(3) Source not specified; dried and distilled

Estimated Error:

Temperature: ±0.1 K.

6.12. +Nitroethane+Heptane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Nitroethane; $C_2H_5NO_2$; [79-24-3]
(3) Heptane; C_7H_{16}; [142-82-5]

Original Measurements:
E. G. Komarova and V. B. Kogan, Zh. Prikl. Khim. (Leningrad) **37**, 1776–86 (1964).

Variables:
T/K = 293–343

Prepared By:
V. P. Sazonov

Experimental Data

Compositions of two coexisting liquid phases

t/°C	T/K (compiler)	Nitroalkane-rich phase x_1'	x_2'	Heptane-rich phase x_1''	x_2''	Nitroalkane-rich phase (compiler) w_1'	w_2'	Heptane-rich phase (compiler) w_1''	w_2''
20.0	293.2	0.9057	0.0767	0.0341	0.0067	0.8802	0.0917	0.0211	0.0051
		0.8180	0.1626	0.0330	0.0131	0.7792	0.1905	0.0204	0.0100
		0.7255	0.2492	0.0318	0.0218	0.6758	0.2855	0.0197	0.0166
		0.6321	0.3360	0.0303	0.0308	0.5758	0.3765	0.0188	0.0235
		0.5367	0.4238	0.0289	0.0425	0.4780	0.4642	0.0180	0.0326
		0.4318	0.5198	0.0264	0.0560	0.3751	0.5554	0.0165	0.0430
		0.3588	0.5846	0.0246	0.0666	0.3065	0.6141	0.0154	0.0512
		0.2886	0.6459	0.0220	0.0803	0.2424	0.6673	0.0138	0.0619
		0.1992	0.7218	0.0184	0.1029	0.1637	0.7297	0.0116	0.0797
		0.1051	0.7965	0.0118	0.1339	0.0843	0.7860	0.0075	0.1043
40.0	313.2	0.8992	0.0742	0.0594	0.0106	0.8695	0.0882	0.0371	0.0082
		0.8112	0.1530	0.0637	0.0207	0.7666	0.1778	0.0400	0.0160
		0.7196	0.2340	0.0605	0.0373	0.6641	0.2656	0.0381	0.0289
		0.6306	0.3144	0.0617	0.0547	0.5694	0.3491	0.0391	0.0426
		0.5216	0.4130	0.0565	0.0767	0.4588	0.4468	0.0359	0.0599
		0.4160	0.5005	0.0595	0.0835	0.3560	0.5267	0.0381	0.0814
		0.3463	0.5579	0.0591	0.1226	0.2911	0.5767	0.0381	0.0971
		0.2665	0.6151	0.050	0.1441	0.2189	0.6214	0.0369	0.1147
		0.1830	0.6608	0.0530	0.1934	0.1462	0.6491	0.0347	0.1557
		0.0927	0.6998	0.0405	0.3039	0.0716	0.6650	0.0272	0.2506
		0.0593	0.6845	0.0356	0.2562	0.0449	0.6369	0.0242	0.2879
70.0	343.2	0.8766	0.0720	0.1366	0.0186	0.8352	0.0844	0.0883	0.0148
		0.7784	0.1568	0.1422	0.0430	0.7223	0.1790	0.0928	0.0345
		0.6899	0.2255	0.1504	0.0724	0.6237	0.2507	0.0993	0.0588
		0.5786	0.2994	0.1630	0.1140	0.5044	0.3210	0.1094	0.0941
		0.4674	0.3456	0.1892	0.1798	0.3897	0.3544	0.1308	0.1529
		0.3614	0.3573	0.2444	0.2697	0.2852	0.3480	0.1779	0.2415

Auxiliary Information

Method/Apparatus/Procedure:
The analytical method was used. Mixture of (1), (2), and (3) was placed in a thermostated cell and stirred for 1 h. The composition of the phases was determined by gas chromatography.

Source and Purity of Materials:
(1) Source not specified, pure grade reagent; distilled in 1.2 m fractionating column; boiling point = 101.2 °C; n(20 °C,D) = 1.3818, d(20 °C,4 °C) = 1.1380.
(2) Source not specified, pure grade reagent; distilled in 1.2 m fractionating column; boiling point = 114.0 °C; n(20 °C,D) = 1.3920, d(20 °C,4 °C) = 1.0520.
(3) Source not specified; pure grade reagent; distilled in 1.2 m fractionating column; boiling point = 98.4 °C; n(20 °C,D) = 1.3877, d(20 °C,4 °C) = 0.6838.

Estimated Error:
Temperature: control to ±0.1 K.

6.13. +1,2-Ethanediol+2-Methoxy-2-methylpropane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 2-Methoxy-2-methylpropane (methyl t-butyl ether); $C_5H_{12}O_2$; [1634-04-4]

Original Measurements:
V. Kubicek, J. P. Novak, and J. Matous, Collect. Czech. Chem. Commun. **58**, 983–95 (1993).

Variables:
T/K = 293

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, 1,2-ethanediol, and 2-methoxy2-methylpropane

t/°C	T/K (compiler)	x_1	x_2	w_1 (compiler)	w_2 (compiler)
20	293	0.121	0.797	0.115	0.772
		0.291	0.120	0.230	0.097
		0.316	0.518	0.292	0.487
		0.408	0.349	0.366	0.319
		0.413	0.220	0.354	0.192
		0.383	0.536	0.366	0.522
		0.441	0.456	0.419	0.440
		0.523	0.354	0.493	0.339
		0.718	0.171	0.682	0.165

TABLE 2. Compositions of equilibrium liquid phases ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase x_1'	x_2'	Glycol-rich phase x_1''	x_2''	Nitromethane-rich phase (compiler) w_1'	w_2'	Glycol-rich phase (compiler) w_1''	w_2''
20	293	0.189	0.094	0.080	0.841	0.143	0.072	0.076	0.815
		0.322	0.152	0.141	0.763	0.260	0.125	0.134	0.735
		0.412	0.227	0.217	0.666	0.354	0.198	0.204	0.637
		0.429	0.280	0.261	0.606	0.378	0.251	0.244	0.576
		0.625	0.253	0.368	0.554	0.590	0.243	0.352	0.540
		0.773	0.140	0.311	0.647	0.743	0.137	0.302	0.639
		0.877	0.088	0.281	0.704	0.862	0.088	0.276	0.703

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility curve was determined by the titration method. The compositions of equilibrium liquid phases were determined by the analytical method with the apparatus described in Kubicek *et al.*[1]

Source and Purity of Materials:
(1) Xenon (Poland); dried with sodium and distilled on a packed column with 40 theoretical plates; n(20 °C,D) = 1.3820, ρ(20 °C) = 1138.2 g·L^{-1}.
(2) Lachema (Czech); not purified; stored over Dusimo S4 molecular sieve and its water content monitored by the Karl Fischer method during the measurement; n(20 °C,D) = 1.4297, ρ(20 °C) = 1109.5 g·L^{-1}.
(3) Obtained from the Synthetic Rubber Research Institute (Czech); dried with sodium and distilled on a packed column; 0.005 mass % of water by the Karl Fischer analysis; n(20 °C,D) = 1.3688, ρ(20 °C) = 740.3 g·L^{-1}.

Estimated Error:
Composition: ±0.001 mole fraction.

References:
[1] V. Kubicek, J. Matous, and J. P. Novak, Collect. Czech. Chem. Commun. **57**, 2021 (1992).

6.14. +1,2-Ethanediol+Hexanedinitrile

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) Hexanedinitrile; $C_6H_8N_2$; [111-69-3]

Original Measurements:
V. G. Tsvetkov, B. V. Klimin, and I. B. Rabinovich, Tr. Khim. Khim. Tekhnol. (Gor'kii) **41**, 16–7 (1975).

Variables:
T/K=301–313

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of liquid phases were determined in ternary mixtures with a constant content of 1,2-ethanediol, of 50.0 mole %. The data are presented in a graphical form.

Solubility temperatures of the liquid phases*

t/°C	T/K (compiler)	x_1	x_2	w_1 (compiler)	w_2 (compiler)
27.7	300.9	0.075	0.500	0.056	0.380
28.0	301.2	0.158	0.500	0.124	0.400
28.3	301.5	0.243	0.500	0.201	0.421
28.8	302.0	0.000	0.500	0.000	0.365
30.6	303.8	0.300	0.500	0.258	0.437
33.8	307.0	0.407	0.500	0.377	0.471
40.0	313.2	0.500	0.500	0.496	0.504

* This table was prepared by the compiler from the published curve of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method was used. No experimental details given.

Source and Purity of Materials:
(1) Source not specified; dried and distilled.
(2) Source not specified; dried and distilled.
(3) Source not specified; dried and distilled.

Estimated Error:
Temperature: ±0.1 K.

6.15. +1,2-Ethanediol+Cyclohexane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) Cyclohexane; C_6H_{12}; [110-82-7]

Original Measurements:
L. V. Gudkina, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1975.

Variables:
T/K=292–415

Prepared By:
V. P. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass content of (3), respectively, 2.0, 5.0, 10.0, 20.0, 40.0, and 60.0 mass %, and also in ternary mixtures with a constant mass relationship of (1) and (2), respectively 45.0:55.0, 65.0:35.0, and 75.0:25.0. L_1 nitromethane-rich phase; L_2 ethanediol-rich phase; L_3 cyclohexane-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
27.3(L_1)	300.5	0.299	0.686	0.294	0.686
34.6(L_1)	307.8	0.348	0.637	0.343	0.637
27.1(L_1)	300.3	0.292	0.671	0.285	0.665
34.4(L_1)	307.6	0.341	0.622	0.333	0.617
37.7(L_1)	310.9	0.389	0.574	0.380	0.570
39.6(L_1)	312.8	0.437	0.526	0.427	0.523
41.0(L_1)	314.2	0.486	0.477	0.475	0.475
41.6(L_1)	314.8	0.534	0.429	0.523	0.427
41.8(L_2)	315.0	0.677	0.286	0.665	0.285
41.9(L_1)	315.1	0.582	0.381	0.570	0.380
41.9[a]	315.1	0.630	0.333	0.618	0.332
24.4(L_2)	297.6	0.880	0.045	0.855	0.045
26.3(L_1)	299.5	0.281	0.644	0.270	0.630
32.9(L_2)	306.1	0.834	0.091	0.810	0.090
34.2(L_1)	307.4	0.327	0.598	0.315	0.585
37.5(L_2)	310.7	0.788	0.137	0.765	0.135
37.5(L_1)	310.8	0.374	0.551	0.360	0.540
39.5(L_1)	312.7	0.420	0.505	0.405	0.495
40.4(L_2)	313.6	0.743	0.182	0.720	0.180
40.7(L_1)	313.9	0.466	0.459	0.450	0.450
41.4(L_2)	314.6	0.697	0.228	0.675	0.225
41.4(L_1)	314.6	0.513	0.412	0.495	0.405
41.8(L_2)	315.0	0.651	0.274	0.630	0.270
41.9(L_1)	315.1	0.559	0.366	0.540	0.360
42.0[a]	315.2	0.605	0.320	0.585	0.315
24.0(L_2)	297.2	0.805	0.042	0.760	0.040
24.9(L_1)	298.1	0.256	0.589	0.240	0.560
33.0(L_2)	306.2	0.763	0.083	0.720	0.080
33.6(L_1)	306.8	0.299	0.546	0.280	0.520
37.2(L_1)	310.4	0.341	0.504	0.320	0.480
37.8(L_2)	311.0	0.721	0.125	0.680	0.120
39.3(L_1)	312.5	0.384	0.461	0.360	0.440
40.5(L_2)	313.7	0.679	0.167	0.640	0.160
40.5(L_1)	313.7	0.426	0.419	0.400	0.400
41.3(L_1)	314.5	0.469	0.377	0.440	0.360
41.4(L_2)	314.6	0.637	0.209	0.600	0.200
41.8(L_1)	315.0	0.511	0.335	0.480	0.320
41.9(L_2)	315.1	0.595	0.251	0.560	0.240
42.1[a]	315.3	0.553	0.293	0.520	0.280
22.7(L_1)	295.9	0.204	0.468	0.180	0.420
23.3(L_2)	296.5	0.641	0.033	0.570	0.030

32.7(L_1)	305.9	0.238	0.434	0.210	0.390
33.2(L_2)	306.4	0.607	0.067	0.540	0.060
36.8(L_1)	310.0	0.272	0.400	0.240	0.360
38.0(L_2)	311.2	0.574	0.100	0.510	0.090
39.1(L_1)	312.3	0.305	0.367	0.270	0.330
40.4(L_1)	313.6	0.339	0.333	0.300	0.300
40.6(L_2)	313.8	0.540	0.133	0.480	0.120
41.2(L_1)	314.4	0.373	0.300	0.330	0.270
41.5(L_2)	314.7	0.507	0.166	0.450	0.150
41.8(L_1)	315.0	0.406	0.266	0.360	0.240
41.9(L_2)	315.1	0.473	0.200	0.420	0.180
42.0[a]	315.2	0.440	0.233	0.390	0.210
19.2(L_1)	292.4	0.144	0.332	0.120	0.280
22.7(L_2)	295.9	0.455	0.024	0.380	0.020
31.9(L_1)	305.1	0.168	0.308	0.140	0.260
33.2(L_2)	306.4	0.431	0.047	0.360	0.040
36.6(L_1)	309.8	0.192	0.284	0.160	0.240
38.1(L_2)	311.3	0.407	0.071	0.340	0.060
38.9(L_1)	312.1	0.217	0.260	0.180	0.220
40.3(L_1)	313.5	0.240	0.237	0.200	0.200
40.7(L_2)	313.9	0.384	0.094	0.320	0.080
41.2(L_1)	314.4	0.264	0.213	0.220	0.180
41.6(L_2)	314.8	0.360	0.118	0.300	0.100
41.7(L_1)	314.9	0.288	0.189	0.240	0.160
41.9(L_2)	315.1	0.336	0.142	0.280	0.120
42.0[a]	315.2	0.312	0.165	0.260	0.140
39.5(L_1)	312.7	0.445	0.534	0.437	0.534
39.5(L_1)	312.7	0.442	0.532	0.434	0.531
39.5(L_1)	312.7	0.440	0.528	0.431	0.526
39.5(L_1)	312.7	0.438	0.528	0.429	0.525
41.3(L_2)	314.5	0.722	0.237	0.708	0.236
41.3(L_2)	314.5	0.718	0.235	0.703	0.234
41.4(L_2)	314.6	0.715	0.234	0.699	0.233
41.9[a]	315.1	0.630	0.334	0.618	0.333
42.0[a]	315.2	0.627	0.331	0.614	0.330
42.0[a]	315.2	0.617	0.327	0.601	0.324

[a] Critical opalescence.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
23.5	296.7	0.937	0.048	0.931	0.049
32.2	305.4	0.888	0.097	0.882	0.098
36.5	309.7	0.840	0.146	0.833	0.147
36.7	309.9	0.398	0.587	0.392	0.588
38.7	311.7	0.447	0.538	0.441	0.539
38.8	312.0	0.791	0.194	0.784	0.196
39.8	313.0	0.497	0.488	0.490	0.490
39.9	313.1	0.742	0.243	0.735	0.245
40.3	313.5	0.546	0.439	0.539	0.441
40.4	313.6	0.693	0.292	0.686	0.294
40.5	313.7	0.595	0.390	0.588	0.392
40.6[a]	313.8	0.644	0.341	0.637	0.343
24.2	297.4	0.915	0.048	0.902	0.048
32.5	305.7	0.868	0.095	0.858	0.095
37.4	310.6	0.820	0.143	0.807	0.143
39.8	313.0	0.773	0.190	0.760	0.190
41.2	314.4	0.726	0.237	0.713	0.237
42.5	315.7	0.677	0.286	0.665	0.285
47.1	320.3	0.630	0.333	0.618	0.332
53.9	327.1	0.582	0.381	0.570	0.380
60.8	334.0	0.534	0.429	0.523	0.427
67.6	340.8	0.486	0.477	0.475	0.475
75.1	348.3	0.437	0.526	0.427	0.523
82.9	356.1	0.389	0.574	0.380	0.570
92.2	365.4	0.341	0.622	0.333	0.617
102.5	375.7	0.292	0.671	0.285	0.665
59.3	332.5	0.880	0.045	0.855	0.045
63.5	336.7	0.834	0.091	0.810	0.090
67.4	340.6	0.788	0.137	0.765	0.135
70.2	343.4	0.743	0.182	0.720	0.180
74.5	347.7	0.697	0.228	0.675	0.225
79.8	353.0	0.651	0.274	0.630	0.270
86.5	359.7	0.605	0.320	0.585	0.315
94.0	367.2	0.559	0.366	0.540	0.360
101.2	374.4	0.513	0.412	0.495	0.405
111.8	385.0	0.466	0.459	0.450	0.450
121.2	394.4	0.420	0.505	0.405	0.495
132.2	405.4	0.374	0.551	0.360	0.540
141.5	414.7	0.327	0.598	0.315	0.585
81.7	354.9	0.805	0.042	0.760	0.040
88.3	361.5	0.763	0.083	0.720	0.080
94.6	367.8	0.721	0.125	0.680	0.120
100.1	373.3	0.679	0.167	0.640	0.160
105.6	378.8	0.637	0.209	0.600	0.200
114.2	387.4	0.595	0.251	0.560	0.240
122.9	396.1	0.553	0.293	0.520	0.280
136.0	409.2	0.511	0.335	0.480	0.320
99.3	372.5	0.641	0.033	0.570	0.030
104.7	377.9	0.607	0.067	0.540	0.060
112.1	385.3	0.574	0.100	0.510	0.090
120.2	393.4	0.540	0.133	0.480	0.120
129.4	402.6	0.507	0.166	0.450	0.150
141.2	414.4	0.473	0.200	0.420	0.180
38.2	311.4	0.453	0.543	0.448	0.547
38.5	311.7	0.451	0.542	0.446	0.545
39.2	312.4	0.448	0.538	0.441	0.540
39.4	312.6	0.447	0.537	0.440	0.538
39.6	312.8	0.749	0.245	0.744	0.248
39.7	312.9	0.746	0.245	0.741	0.247
39.8	313.0	0.743	0.243	0.736	0.245
40.0	313.2	0.739	0.242	0.730	0.244
40.2	313.4	0.734	0.241	0.724	0.242
40.4	313.6	0.732	0.239	0.721	0.240
40.7	313.9	0.729	0.239	0.717	0.239
41.0	314.2	0.727	0.238	0.714	0.238
40.4	313.6	0.650	0.344	0.645	0.347
40.6	313.8	0.649	0.343	0.643	0.346
40.7	313.9	0.646	0.343	0.640	0.345
40.9	314.1	0.643	0.340	0.635	0.342
41.1	314.3	0.639	0.339	0.630	0.340
41.5	314.7	0.636	0.337	0.626	0.337

[a]Critical opalescence.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. Mixtures of (1), (2), and (3) of mass 10 g were heated with vigorous stirring to a temperature higher than the homogenization temperature, and then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column; $n(20\ °C,D) = 1.3820$, $d(20\ °C,4\ °C) = 1.1381$.
(2) Source not specified; analytical purity; dried and twice distilled under vacuum.
(3) Source not specified; pure grade reagent; dried and fractionated through a laboratory column; $n(20\ °C,D) = 1.4263$, $d(20\ °C,4\ °C) = 0.7785$.

Estimated Error:

Temperature: ±0.1 K.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.16. +1,2-Ethanediol+N,N-Diethylethanamine

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) N,N-Diethylethanamine; $C_6H_{15}N$; [121-44-8]

Original Measurements:

R. I. Burdykina and E. F. Zhuravlev, Zh. Fiz. Khim. **42**, 1925–9 (1968).

Variables:

T/K = 278–343

Prepared By:

V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, 1,2-ethanediol, and N,N-diethylethanamine*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
5.0	278.2	0.620	0.022	0.502	0.018
		0.751	0.015	0.651	0.013
		0.099	0.877	0.096	0.865
		0.194	0.761	0.186	0.742
		0.289	0.656	0.276	0.637
20.0	293.2	0.100	0.883	0.097	0.875
		0.196	0.774	0.190	0.762
		0.294	0.668	0.284	0.656
30.0	303.2	0.101	0.896	0.099	0.895
		0.199	0.782	0.194	0.775
		0.298	0.677	0.290	0.670
70.0	343.2	0.007	0.896	0.005	0.208
		0.024	0.509	0.018	0.393
		0.017	0.686	0.014	0.578

* This table was prepared by the compiler from the published curve of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; freshly distilled.
(2) Source not specified; analytical purity; freshly distilled.
(3) Source not specified; pure grade reagent; freshly distilled.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.17. +1,2-Ethanediol+Heptane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) Heptane; C_7H_{16}; [142-82-5]

Original Measurements:
V. P. Sazonov, I. N. Zhilyaeva, and V. V. Filippov, Zh. Fiz. Khim. **47**, 474 (1973).
*Deposited Doc., VINITI 4960 (1972).

Variables:
T/K=298–315

Prepared By:
V. P. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass content of (3), respectively, 1.0, 3.0, 5.0, 10.0, 20.0, 40.0, and 70.0 mass %, and also in ternary mixtures with a constant mass relationship of (1) and (2), respectively, 45.0:55.0, 65.0:35.0, and 75.0:25.0. L_1 nitromethane-rich phase; L_2 ethanediol-rich phase; L_3 heptane-rich phase. The phase, which is being dissolved, is indicated in the table.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
26.13(L_2)	299.28	0.9091	0.0724	0.8973	0.0727
26.42(L_1)	299.57	0.2978	0.6835	0.2910	0.6790
31.41(L_2)	304.56	0.8848	0.0967	0.8730	0.0970
32.88(L_1)	306.03	0.3473	0.6340	0.3396	0.6304
36.97(L_2)	310.12	0.3965	0.5848	0.3880	0.5820
37.27(L_2)	310.42	0.8363	0.1451	0.8245	0.1455
39.66(L_1)	312.81	0.4457	0.5356	0.4365	0.5335
40.28(L_2)	313.43	0.7878	0.1937	0.7760	0.1940
40.88(L_1)	314.03	0.4948	0.4866	0.4850	0.4850
41.26(L_2)	314.41	0.7391	0.2423	0.7275	0.2425
41.52(L_1)	314.67	0.5438	0.4376	0.5335	0.4365
41.77(L_2)	314.92	0.6904	0.2910	0.6790	0.2910
41.78(L_1)	314.93	0.5928	0.3886	0.5820	0.3880
41.87[a]	315.02	0.6416	0.3398	0.6305	0.3395
26.83(L_1)	299.98	0.2940	0.6746	0.2850	0.6650
26.86(L_2)	300.01	0.8973	0.0716	0.8787	0.0713
31.77(L_2)	304.92	0.8730	0.0958	0.8546	0.0954
32.72(L_1)	305.87	0.3427	0.6259	0.3325	0.6175
36.81(L_1)	309.96	0.3913	0.5773	0.3800	0.5700
37.18(L_2)	310.33	0.8256	0.1433	0.8075	0.1425
39.53(L_1)	312.68	0.4399	0.5288	0.4275	0.5225
40.09(L_2)	313.24	0.7776	0.1912	0.7600	0.1900
40.82(L_1)	313.97	0.4884	0.4803	0.4750	0.4750
41.26(L_2)	314.41	0.7296	0.2392	0.7125	0.2375
41.52(L_1)	314.67	0.5368	0.4319	0.5225	0.4275
41.79(L_1)	314.94	0.5851	0.3836	0.5700	0.3800
41.83(L_2)	314.98	0.6813	0.2875	0.6648	0.2852
41.87[a]	315.02	0.6334	0.3354	0.6175	0.3325
26.53(L_2)	299.68	0.8674	0.0692	0.8325	0.0675
26.77(L_1)	299.92	0.2841	0.6518	0.2700	0.6300
31.18(L_2)	304.33	0.8443	0.0922	0.8100	0.0900
32.88(L_1)	306.03	0.3312	0.6048	0.3150	0.5850
36.86(L_1)	310.01	0.3782	0.5578	0.3600	0.5400
37.06(L_2)	310.21	0.7980	0.1385	0.7650	0.1350
39.61(L_1)	312.76	0.4251	0.5110	0.4050	0.4950
40.17(L_2)	313.32	0.7516	0.1848	0.7200	0.1800
40.88(L_1)	314.03	0.4720	0.4641	0.4500	0.4500
41.43(L_2)	314.58	0.7052	0.2312	0.6750	0.2250
41.77(L_1)	314.92	0.5655	0.3707	0.5400	0.3600
41.78(L_2)	314.93	0.6587	0.2776	0.6300	0.2700
41.87[a]	315.02	0.6121	0.3241	0.5850	0.3150
25.82(L_1)	298.97	0.2630	0.6035	0.2400	0.5600
26.36(L_2)	299.51	0.8036	0.0641	0.7400	0.0600
31.08(L_2)	304.23	0.7822	0.0855	0.7200	0.0800
33.18(L_1)	306.33	0.3066	0.5600	0.2800	0.5200
36.61(L_1)	309.76	0.3502	0.5165	0.3200	0.4800
37.23(L_2)	310.38	0.7383	0.1292	0.6791	0.1209
39.29(L_1)	312.44	0.3936	0.4731	0.3600	0.4400
40.01(L_2)	313.16	0.6963	0.1712	0.6400	0.1600
40.88(L_1)	314.03	0.4771	0.4298	0.4000	0.4000
41.27(L_2)	314.42	0.6532	0.2141	0.6000	0.2000
24.82(L_1)	297.97	0.2151	0.4937	0.1800	0.4200
27.36(L_2)	300.51	0.6584	0.0525	0.5550	0.0450
31.71(L_1)	304.86	0.2508	0.4581	0.2100	0.3900
32.63(L_2)	305.78	0.6408	0.0700	0.5400	0.0600
36.18(L_1)	309.33	0.2865	0.4226	0.2400	0.3600
37.91(L_2)	311.06	0.6056	0.1051	0.5100	0.0900
39.07(L_1)	312.22	0.3221	0.3872	0.2700	0.3300
40.77(L_2)	313.92	0.5703	0.1402	0.4800	0.1200
40.82(L_1)	313.97	0.3577	0.3518	0.3000	0.3000
41.53(L_1)	314.68	0.3932	0.3164	0.3300	0.2700
41.58(L_2)	314.73	0.5350	0.1754	0.4500	0.1500
41.75(L_2)	314.90	0.4996	0.2105	0.4200	0.1800
41.78(L_1)	314.93	0.4287	0.2811	0.3600	0.2400
41.87[a]	315.02	0.4642	0.2458	0.3900	0.2100
27.98(L_1)	301.13	0.1452	0.2652	0.1050	0.1950
30.76(L_2)	303.91	0.3822	0.0305	0.2775	0.0225
33.37(L_1)	306.52	0.1659	0.2447	0.1200	0.1800
34.03(L_2)	307.18	0.3719	0.0407	0.2700	0.0300
37.36(L_1)	310.51	0.1865	0.2242	0.1350	0.1650
39.28(L_2)	312.43	0.3514	0.0610	0.2550	0.0450
39.97(L_1)	313.12	0.2072	0.2038	0.1500	0.1500
41.07(L_2)	314.22	0.3308	0.0813	0.2400	0.0600
41.41(L_1)	314.56	0.2278	0.1833	0.1650	0.1350
41.78(L_1)	314.93	0.2485	0.1629	0.1800	0.1200
41.82(L_2)	314.97	0.3103	0.1017	0.2250	0.0750
41.87(L_1)	315.02	0.2691	0.1425	0.1950	0.1050
41.97[a]	315.12	0.2897	0.1221	0.2100	0.0900
39.62(L_1)	312.77	0.4508	0.5420	0.4447	0.5436
39.62(L_1)	312.77	0.4484	0.5389	0.4408	0.5387
39.62(L_1)	312.77	0.4472	0.5375	0.4389	0.5365
41.87[a]	315.02	0.6450	0.3416	0.6359	0.3424
41.87[a]	315.02	0.6433	0.3407	0.6332	0.3410
41.87[a]	315.02	0.6411	0.3395	0.6297	0.3391
41.17(L_2)	314.32	0.7413	0.2431	0.7310	0.2437
41.17(L_2)	314.32	0.7390	0.2422	0.7272	0.2424

[a]Critical opalescence.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
25.87	299.02	0.9207	0.0731	0.9160	0.0740
26.32	299.47	0.3016	0.6922	0.2970	0.6930
31.86	305.01	0.8960	0.0979	0.8910	0.0990
32.87	306.02	0.3516	0.6422	0.3465	0.6435
36.38	309.53	0.8469	0.1470	0.8415	0.1485
37.17	310.32	0.4015	0.5923	0.3960	0.5940
39.17	312.32	0.7977	0.1962	0.7920	0.1980
39.31	312.46	0.4513	0.5425	0.4455	0.5445
40.28	313.43	0.7485	0.2454	0.7425	0.2475
40.32	313.47	0.5011	0.4927	0.4950	0.4950
40.79	313.94	0.6992	0.2947	0.6930	0.2970
40.83	313.98	0.5507	0.4431	0.5445	0.4455
40.88	314.03	0.6003	0.3935	0.5940	0.3960
41.02[a]	314.17	0.6503	0.3436	0.6440	0.3460
39.72	312.87	0.7516	0.2464	0.7476	0.2492
40.03	313.18	0.7498	0.2458	0.7446	0.2482
40.21	313.36	0.7488	0.2455	0.7430	0.2477
40.37	313.52	0.7474	0.2450	0.7407	0.2469
40.72	313.87	0.7455	0.2444	0.7377	0.2459
40.86	314.01	0.7446	0.2441	0.7362	0.2454
41.02	314.17	0.7430	0.2436	0.7337	0.2446
40.22	313.37	0.6525	0.3455	0.6479	0.3489
41.02	314.17	0.6436	0.3439	0.6432	0.3463
41.33	314.48	0.6485	0.3434	0.6414	0.3454
41.72	314.87	0.6471	0.3427	0.6392	0.3442
38.32	311.47	0.4534	0.5449	0.4488	0.5485
38.67	311.82	0.4524	0.5439	0.4473	0.5468
39.07	312.22	0.4518	0.5430	0.4462	0.5453

[a] Critical opalescence.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. Mixtures of (1), (2), and (3) of mass 10 g were heated with vigorous stirring to a temperature higher than the homogenization temperature, and then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled in a glass packed column; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1381.
(2) Source not specified; analytical purity; dried and repeatedly distilled under vacuum; n(20 °C,D) = 1.4320.
(3) Source not specified; pure grade reagent; dried and fractionated through a laboratory column.

Estimated Error:

Temperature: ±0.01 K.

References:

[1] V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova 8, 249 (1876).

6.18. +1,2-Ethanediol+1-Heptanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Heptanol; $C_7H_{16}O$; [111-70-6]

Original Measurements:

I. K. Zhuravleva, Zh. Obshch. Khim. 55, 1685–9 (1985).

Variables:

T/K = 275–307

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of liquid phases were determined in ternary mixtures with a constant mass relationship of (2) and (3), respectively, 15.0:85.0, 30.0:70.0, 45.0:55.0, 60.0:40.0, 75.0:25.0, and 90.0:10.0.

Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
2.0	275.2	0.119	0.219	0.074	0.139
5.0	278.2	0.940	0.015	0.903	0.015
7.0	280.2	0.936	0.016	0.897	0.016
11.0	284.2	0.215	0.195	0.140	0.129
14.0	287.2	0.911	0.022	0.859	0.021
18.0	291.2	0.288	0.177	0.194	0.121
20.0	293.2	0.888	0.028	0.825	0.026
23.0	296.2	0.880	0.030	0.813	0.028
25.0	298.2	0.869	0.032	0.798	0.030
25.0	298.2	0.382	0.154	0.269	0.110
28.5	301.7	0.425	0.142	0.305	0.104
29.0	302.2	0.846	0.038	0.765	0.035
31.5	304.7	0.810	0.047	0.717	0.042
31.5	304.7	0.520	0.119	0.391	0.091
32.0	305.2	0.549	0.112	0.420	0.087
33.0	306.2	0.642	0.089	0.516	0.073
33.0	306.2	0.765	0.058	0.659	0.051
33.0	306.2	0.676	0.080	0.553	0.067
3.5	276.7	0.144	0.381	0.100	0.270
8.5	281.7	0.213	0.350	0.152	0.254
9.0	282.2	0.908	0.041	0.867	0.040
11.5	284.7	0.263	0.328	0.191	0.243
14.0	287.2	0.881	0.053	0.831	0.051
15.0	288.2	0.322	0.301	0.239	0.228
17.0	290.2	0.869	0.058	0.815	0.055
20.5	293.7	0.431	0.254	0.334	0.200
22.0	295.2	0.846	0.069	0.784	0.065
23.0	296.2	0.481	0.231	0.381	0.186
24.0	297.2	0.525	0.211	0.423	0.173
25.0	298.2	0.775	0.100	0.695	0.092
25.5	298.7	0.724	0.123	0.635	0.110
25.5	298.7	0.595	0.180	0.493	0.152
25.5	298.7	0.659	0.152	0.562	0.131
10.0	283.2	0.886	0.069	0.850	0.068
12.0	285.2	0.877	0.074	0.839	0.072
12.0	285.2	0.367	0.383	0.298	0.316
16.5	289.7	0.443	0.337	0.368	0.284
18.0	291.2	0.843	0.095	0.797	0.091
19.0	292.2	0.827	0.105	0.778	0.100
19.0	292.2	0.502	0.301	0.424	0.259
20.0	293.2	0.534	0.282	0.456	0.245
20.0	293.2	0.799	0.121	0.744	0.115
21.0	294.2	0.762	0.144	0.701	0.134
21.0	294.2	0.575	0.257	0.497	0.226
21.0	294.2	0.626	0.226	0.550	0.202
21.0	294.2	0.717	0.171	0.649	0.158

6.5	279.7	0.876	0.091	0.850	0.090
10.0	283.2	0.349	0.480	0.300	0.420
11.0	284.2	0.866	0.099	0.838	0.097
13.0	286.2	0.855	0.107	0.825	0.105
13.0	286.2	0.410	0.435	0.357	0.386
15.0	288.2	0.825	0.129	0.790	0.126
16.0	289.2	0.530	0.347	0.474	0.316
17.0	290.2	0.557	0.327	0.502	0.299
17.0	290.2	0.798	0.149	0.760	0.144
17.5	290.7	0.586	0.305	0.531	0.281
18.0	291.2	0.657	0.253	0.605	0.237
18.0	291.2	0.767	0.172	0.725	0.165
18.0	291.2	0.729	0.200	0.683	0.190
4.0	277.2	0.965	0.030	0.960	0.030
6.0	279.2	0.277	0.614	0.250	0.563
8.0	281.2	0.330	0.569	0.300	0.525
13.0	286.2	0.388	0.520	0.355	0.484
16.0	289.2	0.452	0.465	0.417	0.437
17.0	290.2	0.510	0.416	0.475	0.394
17.0	290.2	0.939	0.052	0.930	0.053
19.0	292.2	0.934	0.056	0.925	0.056
20.0	293.2	0.581	0.355	0.547	0.340
21.0	294.2	0.616	0.326	0.582	0.313
22.0	295.2	0.916	0.071	0.905	0.071
23.0	296.2	0.684	0.268	0.653	0.260
25.0	298.2	0.764	0.200	0.738	0.196
25.0	298.2	0.886	0.097	0.871	0.097
26.5	299.7	0.814	0.158	0.792	0.156
27.0	300.2	0.873	0.108	0.856	0.108
27.0	300.2	0.834	0.141	0.813	0.140
28.0	301.2	0.851	0.127	0.832	0.126
2.0	275.2	0.224	0.732	0.213	0.708
9.0	282.2	0.953	0.044	0.950	0.045
11.5	284.7	0.309	0.652	0.295	0.634
15.0	288.2	0.945	0.052	0.941	0.053
17.0	290.2	0.363	0.602	0.348	0.587
21.5	294.7	0.420	0.548	0.404	0.536
24.0	297.2	0.916	0.079	0.911	0.080
26.5	299.7	0.558	0.417	0.542	0.412
27.0	300.2	0.904	0.091	0.898	0.092
28.0	301.2	0.613	0.365	0.598	0.362
30.0	303.2	0.681	0.301	0.667	0.300
30.5	303.7	0.729	0.256	0.716	0.256
31.5	304.7	0.768	0.219	0.756	0.219
33.0	306.2	0.810	0.179	0.800	0.180
34.0	307.2	0.880	0.113	0.873	0.114

The compositions of two coexistent liquid phases at 19 °C are also presented in graphical form.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of liquid phases were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; $n(20\ °C,D) = 1.3820$, $d(20\ °C,4\ °C) = 1.1320$.
(2) Source not specified; purity not specified; $n(20\ °C,D) = 1.4315$, $d(20\ °C,4\ °C) = 1.1155$.
(3) Source not specified; purity not specified; $n(20\ °C,D) = 1.4240$; $d(20\ °C,4\ °C) = 0.8220$.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

6.19. +1,2-Ethanediol+1-Octanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Octanol; $C_8H_{18}O$; [111-87-5]

Original Measurements:

I. K. Zhuravleva, Zh. Obshch. Khim. **55**, 1685–9 (1985).

Variables:

T/K = 276–313

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of liquid phases were determined in ternary mixtures with a constant mass relationship of (2) and (3), respectively, 15.0:85.0, 30.0:70.0, 45.0:55.0, 60.0:40.0, 75.0:25.0, and 90.0:10.0.

Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
11.0	284.2	0.230	0.208	0.140	0.129
14.5	287.7	0.966	0.009	0.940	0.009
18.5	291.7	0.298	0.190	0.188	0.122
20.0	293.2	0.949	0.014	0.910	0.014
25.0	298.2	0.942	0.015	0.898	0.015
25.5	298.7	0.367	0.171	0.240	0.114
30.0	303.2	0.412	0.159	0.277	0.109
33.0	306.2	0.479	0.141	0.334	0.100
33.0	306.2	0.910	0.024	0.846	0.023
34.5	307.7	0.541	0.124	0.392	0.091
35.0	308.2	0.891	0.030	0.817	0.028
37.5	310.7	0.863	0.037	0.774	0.034
38.0	311.2	0.610	0.106	0.461	0.081
40.0	313.2	0.694	0.083	0.553	0.067
40.0	313.2	0.812	0.051	0.702	0.045
40.0	313.2	0.784	0.058	0.665	0.050
40.0	313.2	0.738	0.071	0.606	0.059
2.5	275.7	0.210	0.374	0.142	0.257
6.0	279.2	0.968	0.015	0.950	0.015
13.0	286.2	0.958	0.020	0.935	0.019
13.0	286.2	0.261	0.350	0.180	0.246
17.5	290.7	0.294	0.334	0.206	0.238
18.0	291.2	0.942	0.027	0.910	0.027
20.0	293.2	0.932	0.032	0.895	0.031
21.5	294.7	0.335	0.315	0.239	0.228
26.0	299.2	0.408	0.280	0.300	0.210
29.0	302.2	0.883	0.055	0.825	0.052
30.0	303.2	0.488	0.242	0.373	0.188
31.5	304.7	0.584	0.197	0.467	0.160
32.0	305.2	0.843	0.074	0.770	0.069
32.0	305.2	0.644	0.169	0.530	0.141
33.0	306.2	0.708	0.138	0.602	0.119
33.5	306.7	0.789	0.100	0.700	0.090
3.0	276.2	0.264	0.466	0.200	0.360
7.0	280.2	0.954	0.029	0.935	0.029
11.0	284.2	0.304	0.440	0.234	0.345
16.0	289.2	0.346	0.410	0.270	0.328
19.5	292.7	0.397	0.381	0.316	0.308
21.5	294.7	0.875	0.079	0.830	0.076
22.5	295.7	0.479	0.329	0.392	0.274
23.5	296.7	0.844	0.098	0.791	0.094
24.5	297.7	0.479	0.329	0.392	0.274
25.0	298.2	0.588	0.260	0.500	0.225
25.0	298.2	0.802	0.125	0.739	0.117
25.5	298.7	0.744	0.162	0.670	0.149
25.5	298.7	0.650	0.222	0.565	0.196
25.5	298.7	0.717	0.179	0.640	0.162
26.0	299.2	0.677	0.204	0.595	0.182

5.5	278.7	0.265	0.558	0.219	0.489
11.5	284.7	0.953	0.036	0.940	0.036
14.5	287.7	0.360	0.486	0.304	0.418
15.0	288.7	0.925	0.057	0.905	0.057
17.5	290.7	0.879	0.092	0.850	0.090
17.5	290.7	0.409	0.448	0.350	0.390
18.0	291.2	0.854	0.111	0.820	0.108
19.5	292.7	0.463	0.408	0.401	0.359
20.0	293.2	0.806	0.147	0.763	0.142
20.5	293.7	0.508	0.374	0.445	0.333
21.0	294.2	0.582	0.317	0.520	0.288
21.0	294.2	0.746	0.193	0.695	0.183
21.5	294.7	0.705	0.224	0.650	0.210
21.5	294.7	0.665	0.254	0.607	0.236
5.0	278.2	0.281	0.621	0.250	0.563
10.0	283.2	0.317	0.589	0.284	0.537
16.5	289.7	0.387	0.529	0.351	0.487
18.5	291.7	0.940	0.052	0.930	0.053
19.0	292.2	0.453	0.472	0.414	0.439
19.5	292.7	0.495	0.436	0.456	0.408
20.4	293.6	0.934	0.057	0.924	0.057
20.5	293.7	0.579	0.364	0.540	0.345
22.5	295.7	0.623	0.325	0.585	0.311
23.1	296.3	0.914	0.074	0.901	0.074
23.5	296.7	0.673	0.282	0.638	0.271
24.0	297.2	0.710	0.250	0.677	0.242
26.0	299.2	0.778	0.192	0.750	0.188
26.5	299.7	0.883	0.101	0.865	0.101
27.0	300.2	0.830	0.148	0.805	0.146
4.0	277.2	0.235	0.726	0.223	0.699
9.5	282.7	0.288	0.675	0.274	0.651
14.0	287.2	0.322	0.644	0.307	0.624
18.5	291.7	0.930	0.067	0.925	0.068
19.0	292.2	0.392	0.578	0.375	0.563
22.0	295.2	0.447	0.525	0.430	0.513
22.5	295.7	0.920	0.076	0.915	0.077
24.0	297.2	0.504	0.471	0.486	0.462
24.5	297.7	0.906	0.089	0.900	0.090
26.0	299.2	0.591	0.388	0.574	0.383
27.0	300.2	0.874	0.120	0.866	0.121
27.5	300.7	0.656	0.327	0.640	0.324
28.0	301.2	0.849	0.143	0.840	0.144
28.5	301.7	0.719	0.267	0.705	0.266
29.0	302.2	0.821	0.170	0.810	0.171
29.5	302.7	0.792	0.198	0.780	0.198

The compositions of two coexistent liquid phases at 22 °C are also presented in graphical form.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of liquid phases were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified; purity not specified; n(20 °C,D) = 1.4315, d(20 °C,4 °C) = 1.1155.
(3) Source not specified; purity not specified; n(20 °C,D) = 1.4290; d(20 °C,4 °C) = 0.8246.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

6.20. +1,2-Ethanediol+1-Nonanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Nonanol; $C_9H_{20}O$; [143-08-8]

Original Measurements:

I. K. Zhuravleva, and L. M. Zhukova, Zh. Obshch. Khim. **47**, 1942–5 (1977).

Variables:

T/K = 258–317

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of liquid and solid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2), respectively, 60.0:40.0, 70.0:30.0, and 80.0:20.0, and also in ternary mixtures with a constant mass relationship of (2) and (3), respectively, 15.0:85.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, and 80.0:20.0. These data are also presented in graphical form.

Solubility temperatures of the liquid or solid phases*

t/ °C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.9	294.1	0.553	0.383	0.505	0.356
22.2	295.4	0.579	0.379	0.544	0.362
22.4	295.6	0.552	0.362	0.491	0.328
23.9	297.1	0.538	0.354	0.467	0.312
25.9	299.1	0.587	0.385	0.561	0.374
32.5	305.7	0.597	0.391	0.583	0.389
40.0	313.2	0.604	0.396	0.600	0.400
23.7	296.9	0.663	0.280	0.612	0.263
24.7	297.9	0.679	0.286	0.645	0.276
25.6	298.8	0.648	0.274	0.584	0.251
28.2	301.4	0.632	0.266	0.552	0.236
30.6	303.8	0.617	0.260	0.527	0.226
31.7	304.9	0.694	0.292	0.677	0.290
40.0	313.2	0.704	0.296	0.700	0.300
23.8	297.0	0.779	0.192	0.747	0.187
25.7	298.9	0.762	0.187	0.710	0.177
28.5	301.7	0.750	0.185	0.687	0.172
30.8	304.0	0.794	0.195	0.779	0.195
34.1	307.3	0.735	0.181	0.658	0.165
39.0	312.2	0.803	0.197	0.800	0.200
−15.0	258.2	0.224	0.226	0.128	0.131
−15.0	258.2	0.295	0.205	0.175	0.124
−8.8	264.4	0.323	0.197	0.195	0.121
−6.6	266.6	0.173	0.241	0.096	0.136
−2.9	270.3	0.983	0.005	0.967	0.005
2.4	275.6	0.384	0.179	0.240	0.114
3.9	277.1	0.122	0.255	0.066	0.140
4.7	277.9	0.968	0.009	0.939	0.009
8.3	281.5	0.436	0.164	0.282	0.108
10.6	283.8	0.954	0.013	0.914	0.013
11.2	284.4	0.069	0.271	0.036	0.145
14.3	287.5	0.503	0.144	0.339	0.099
17.3	290.5	0.000	0.291	0.000	0.150
18.1	291.3	0.572	0.124	0.404	0.089
18.9	292.1	0.883	0.034	0.792	0.031
20.6	293.8	0.686	0.091	0.525	0.071
−15.0	258.2	0.179	0.410	0.114	0.266

−15.0	258.2	0.226	0.386	0.147	0.256
−7.8	265.4	0.995	0.003	0.991	0.003
−5.0	268.2	0.125	0.437	0.078	0.277
−3.8	269.4	0.283	0.358	0.189	0.243
0.4	273.6	0.982	0.009	0.969	0.009
1.4	274.6	0.096	0.451	0.059	0.282
1.7	274.9	0.322	0.338	0.219	0.234
7.8	281.0	0.064	0.467	0.039	0.288
9.4	282.6	0.386	0.307	0.271	0.219
13.4	286.6	0.426	0.286	0.305	0.208
14.3	287.5	0.000	0.499	0.000	0.300
15.9	289.1	0.938	0.031	0.900	0.030
18.0	291.2	0.482	0.259	0.355	0.194
18.4	291.6	0.901	0.049	0.844	0.047
20.9	294.1	0.563	0.218	0.432	0.170
22.3	295.5	0.657	0.171	0.531	0.141
22.3	295.5	0.840	0.080	0.756	0.073
22.5	295.7	0.754	0.123	0.644	0.107
−15.0	258.2	0.138	0.523	0.094	0.362
−15.0	258.2	0.209	0.481	0.146	0.342
−3.6	269.6	0.091	0.553	0.061	0.376
−2.2	271.0	0.001	0.006	0.986	0.006
2.6	275.8	0.072	0.564	0.048	0.381
3.8	277.0	0.292	0.431	0.211	0.316
6.2	279.4	0.968	0.019	0.952	0.019
11.2	284.4	0.361	0.388	0.268	0.293
11.4	284.6	0.000	0.608	0.000	0.400
15.9	289.1	0.933	0.041	0.900	0.040
16.7	289.9	0.416	0.355	0.316	0.274
20.3	293.5	0.477	0.318	0.371	0.252
21.0	294.2	0.887	0.069	0.836	0.066
22.2	295.4	0.527	0.287	0.419	0.232
23.6	296.8	0.598	0.245	0.491	0.204
23.8	297.0	0.831	0.103	0.761	0.096
24.4	297.6	0.655	0.210	0.551	0.180
24.5	297.7	0.785	0.131	0.703	0.119
24.9	298.1	0.734	0.162	0.641	0.144
−15.0	258.2	0.121	0.615	0.088	0.456
−15.0	258.2	0.185	0.570	0.138	0.431
−11.3	261.9	0.196	0.562	0.146	0.427
−7.8	265.4	0.080	0.643	0.058	0.471
−1.4	271.8	0.055	0.661	0.039	0.480
−1.0	272.2	0.228	0.540	0.172	0.414
2.2	275.4	0.980	0.014	0.972	0.014
5.1	278.3	0.028	0.680	0.020	0.490
7.7	280.9	0.274	0.507	0.210	0.395
9.1	282.3	0.968	0.022	0.955	0.022
9.2	282.4	0.000	0.699	0.000	0.500
13.6	286.8	0.950	0.035	0.931	0.034
14.0	287.2	0.331	0.468	0.258	0.371
18.8	292.0	0.930	0.049	0.904	0.048
20.5	293.7	0.406	0.415	0.325	0.337
23.3	296.5	0.461	0.377	0.376	0.312
24.9	298.1	0.890	0.077	0.850	0.075
25.3	298.5	0.497	0.352	0.410	0.295
26.2	299.4	0.534	0.326	0.447	0.277
27.9	301.1	0.611	0.271	0.526	0.237
29.4	302.6	0.710	0.203	0.663	0.183
29.4	302.6	0.813	0.131	0.754	0.123
−15.0	258.2	0.149	0.662	0.117	0.530
−8.3	264.9	0.168	0.646	0.133	0.520
−3.8	269.4	0.179	0.638	0.142	0.515
2.5	275.7	0.202	0.620	0.161	0.503
12.1	285.3	0.256	0.578	0.207	0.476
17.7	290.9	0.945	0.043	0.929	0.043
19.1	292.3	0.309	0.537	0.253	0.448
27.1	300.3	0.403	0.464	0.339	0.397
30.0	303.2	0.481	0.403	0.413	0.352
31.0	304.2	0.872	0.099	0.838	0.097
32.1	305.3	0.546	0.353	0.477	0.314
33.8	307.0	0.606	0.306	0.539	0.277
34.4	307.6	0.688	0.242	0.626	0.224
34.9	308.1	0.797	0.158	0.749	0.151
−15.0	258.2	0.047	0.805	0.039	0.673
−15.0	258.2	0.087	0.771	0.072	0.650
−7.6	265.8	0.027	0.822	0.022	0.685
−1.0	272.2	0.000	0.844	0.000	0.700
0.2	273.4	0.990	0.008	0.988	0.008
5.9	279.1	0.148	0.719	0.124	0.613
6.4	279.6	0.977	0.020	0.972	0.020
11.6	284.8	0.966	0.029	0.959	0.029
16.2	289.4	0.195	0.680	0.165	0.585
23.2	296.4	0.933	0.057	0.919	0.057
25.0	298.2	0.263	0.622	0.225	0.542
28.2	301.4	0.905	0.080	0.886	0.080
31.2	304.4	0.338	0.559	0.294	0.494
34.1	307.3	0.860	0.118	0.834	0.116
35.0	308.2	0.427	0.483	0.378	0.435
36.9	310.1	0.495	0.426	0.444	0.389
37.8	311.0	0.815	0.157	0.782	0.153
38.9	312.1	0.602	0.337	0.552	0.314
39.6	312.8	0.756	0.206	0.716	0.199
39.7	312.9	0.672	0.277	0.625	0.262
−15.0	258.2	0.030	0.876	0.026	0.779
−15.0	258.2	0.059	0.849	0.052	0.758
−11.0	262.2	0.018	0.886	0.016	0.787
−5.2	268.0	0.000	0.903	0.000	0.800
3.0	276.2	0.993	0.007	0.992	0.007
4.4	277.6	0.109	0.805	0.096	0.723
7.1	280.3	0.989	0.010	0.988	0.010
13.3	286.5	0.973	0.025	0.969	0.025
14.4	287.6	0.150	0.768	0.133	0.694
21.8	295.0	0.952	0.044	0.945	0.044
24.2	297.4	0.206	0.717	0.184	0.653
32.8	306.0	0.292	0.638	0.264	0.587
33.5	306.7	0.889	0.100	0.875	0.100
40.2	313.4	0.841	0.143	0.822	0.142
41.4	314.6	0.473	0.476	0.439	0.449
43.2	316.4	0.576	0.383	0.542	0.366
43.7	316.9	0.670	0.298	0.639	0.289
43.8	317.0	0.743	0.232	0.716	0.227

* This table was prepared by the compiler from the published curve of ternary system solubility.

The compositions of two coexistent liquid phases at 23 °C are also presented in graphical form.

6.21. +1,2-Ethanediol+1-Decanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Decanol; $C_{10}H_{22}O$; [112-30-1]

Original Measurements:
A. W. Francis, J. Phys. Chem. **60**, 20-7 (1956).

Variables:
$T/K = 272-299$

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, 1,2-ethanediol, and 1-decanol

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
−1.0[a,c]	272.2	0.226	0.618	0.180	0.500
0.0	273.2	0.143	0.592	0.100	0.420
		0.161	0.802	0.150	0.760
		0.209	0.549	0.150	0.400
		0.201	0.643	0.160[c]	0.520
		0.210	0.711	0.185	0.635
		0.251	0.698	0.230	0.650
10.0	283.2	0.131	0.588	0.090	0.410
		0.117	0.855	0.110	0.820
		0.151	0.693	0.120[c]	0.560
		0.146	0.785	0.130	0.71
		0.245	0.482	0.170	0.340
		0.292	0.675	0.275	0.645
		0.943	0.045	0.925	0.645
20.0	293.2	0.102	0.617	0.070	0.430
		0.085	0.887	0.080	0.850
		0.126	0.719	0.100[c]	0.580
		0.197	0.194	0.100	0.100
		0.132	0.813	0.120	0.750
		0.296	0.407	0.200	0.280
		0.387	0.563	0.355	0.525
		0.848	0.132	0.820	0.130
23.4	296.6	0.070	0.679	0.050	0.490
		0.075	0.892	0.070	0.850
		0.107	0.741	0.085[c]	0.600
		0.117	0.818	0.105	0.745
		0.349	0.371	0.240	0.260
		0.367	0.609	0.350	0.590
		0.460	0.452	0.400	0.400
		0.483	0.475	0.450	0.450
		0.657	0.297	0.610[a]	0.280
		0.786	0.186	0.750	0.180
		0.822	0.145	0.780	0.140
26.0	299.2	0.060	0.697	0.043	0.507
		0.063	0.912	0.060	0.880
		0.094	0.757	0.075[c]	0.615
		0.104	0.807	0.090	0.710
		0.104	0.845	0.095	0.785
		0.364	0.314	0.240	0.210
		0.444	0.413	0.360	0.340
		0.417	0.563	0.400	0.550
		0.523	0.453	0.500	0.440
		0.651	0.287	0.590[c]	0.265
		0.639	0.335	0.610[c]	0.325
		0.776	0.204	0.750	0.200
		0.807	0.156	0.760	0.150

[a]Subcol temperature. A subcol is a point in a ternary system where a third binodal curve meets by its plait point with an isotherm of a ridge.
[b]Quadruple point temperature. The equilibrium of three liquid phases and crystals of alcohol.
[c]Plait point of binodal curve.
[d]Col. A col is a point in a ternary system where two separate binodal curves meet at their respective plait points.

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility temperatures of liquid phases were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:
(1) Source not specified; purified; boiling point = 101.3 °C; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified; purified; boiling point = 95.0 °C/0.8 kPa; n(20 °C,D) = 1.4315, d(20 °C,4 °C) = 1.1550.
(3) Source not specified; purified; boiling point = 213 °C; n(20 °C,D) = 1.4310; d(20 °C,4 °C) = 0.8280.

Estimated Error:
Not specified.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

TABLE 2. Compositions of three coexisting phases

t/°C	T/K (compiler)	Nitromethane-rich phase w_1'	Nitromethane-rich phase w_2'	Ethanediol-rich phase w_1''	Ethanediol-rich phase w_2''	Solid phase w_1'''	Solid phase w_2'''
0.0	273.2	0.960	0.020	0.065	0.115	0.000	0.000
		0.010	0.280	0.010	0.940	0.000	0.000

The same data are presented below in mole fractions

t/°C	T/K	x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
0.0	273.2	0.972	0.020	0.143	0.248	0.000	0.000
		0.018	0.492	0.011	0.969	0.000	0.000

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method was used. Observations were made after vigorous shaking in glass stoppered tubes (15 mL capacity) immersed in water baths in large Dewar flasks. Temperature was adjusted by adding small amounts of cooler or warmer water. Filling started with 5 mL of one reagent followed by small additions of the other two, usually alternately, to maintain a trace of lower or upper layer, until the composition of a plait point was reached or the tube was full.

Source and Purity of Materials:
(1) Eastman Kodak Co.; distilled with 30 cm column with reflux; boiling point = 101.25 °C; melting point = −30.5 °C, n(20 °C,D) = 1.3820, ρ(25 °C) = 1129.8 g·L^{-1}.
(2) Source not specified; purified by crystallization; melting point = −13.3 °C; n(20 °C,D) = 1.4315, ρ(25 °C) = 1110.1 g·L^{-1}.
(3) Source not specified; purified by crystallization; melting point = 6.8 °C; n(20 °C,D) = 1.4372; ρ(20 °C) = 831.8 g·L^{-1}.

Estimated Error:
Not specified.

6.22. +1,2-Ethanediol+1-Dodecanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Dodecanol; $C_{12}H_{26}O$; [112-53-8]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, March, 2000.

Critical Evaluation

A survey of solubilities and liquid-liquid equilibrium data for the system nitromethane + 1,2-ethanediol + 1-dodecanol is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane + 1,2-ethanediol + 1-dodecanol

Author(s)	T/K	Type of data[a]
Francis[1]	295, 301, and 302	Solubility (20)
	289, 295 301, and 302	Equilibrium, two and three liquid phases (4)
Markuzin and Nikanorova[2]	301	Solubility (27), equilibrium (8)
	313	Solubility (25)
Zhuravleva *et al.*[3]	290–373	Solubility liquid phases (156)
	301	Equilibrium, two and three liquid phases (14)
	303	Equilibrium, two liquid phases (14)
	308	Equilibrium, two liquid phases (11)
Sazonov *et al.*[4]	290–302	Solubility three liquid phases (62)
	296–326	Solubility two liquid phases (102)

[a] Number of experimental points in parentheses.

Solubility data

The system nitromethane + 1,2-ethanediol + 1-dodecanol includes a three-phase region. All three binary pairs of components, nitromethane + 1,2-ethanediol, nitromethane + 1-dodecanol and 1,2-ethanediol + 1-dodeca-nol are partially miscible, Fig. 21. The data for the binary systems (1) + (2) and (1) + (3) were compiled and critically evaluated in Sazonov *et al.*[5] Recommended data for the system 1,2-ethanediol + 1-dodecanol are not yet available. The values of UCST (upper critical solution temperature) of the binary systems are reported in Francis,[1] Zhuravleva *et al.*,[3] and Sazonov *et al.*,[4] and presented in Table 2.

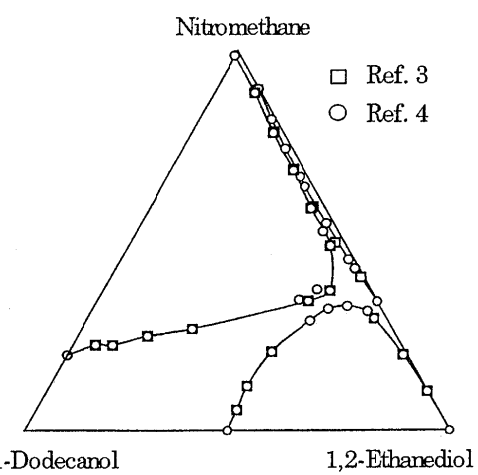

FIG. 21. Solubility curves of the ternary system nitromethane + 1,2-ethanediol + 1-dodecanol at 303.2 K (mole fraction).

TABLE 2. UCST (T/K) binary systems

Binary system	Ref. 1	Ref. 3	Ref. 4	Recommended (Ref. 5)
Nitromethane+1,2-ethanediol	312.9	314.2	313.17	313.7
Nitromethane+1-dodecanol	336.2	340.1	341.33	341.3

Solubility data were obtained by the synthetic method for the ternary system (Francis,[1] Zhuravleva *et al.*,[3] and Sazonov *et al.*[4]) and by titration method (Markuzin and Nikanorova[2]). Maximal temperature of three-phase liquid equilibrium is reported to occur at 301.7 K,[1] 302.32 K,[4] and 304 K.[3] Thus, the tentative value is: $T_c=(302.7\pm1)$ K. Experimental errors are specified only in Markuzin and Nikanorova.[2]

Liquid–liquid equilibrium data

Compositions of coexisting two and three liquid phase regions of the ternary system nitromethane+1,2-ethanediol+1-dodecanol were reported in two references. Composition of each phase at 301.2 K, Markuzin and Nikanorova,[2] was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of the saturation curve measurements. Compositions of three liquid phases in equilibrium were measured at 289.2, 295.2 and 301.2 K.[1] At 301.2 K the compositions of the glycol-rich and alcohol-rich phases[1,2] agree well, while compositions of the nitromethane-rich phase differ appreciably. Experimental errors were not reported in the papers.

All experimental data are considered tentative.

References:

[1]A. W. Francis, J. Phys. Chem. **60**, 20 (1956).
[2]N. P. Markuzin and L. A. Nikanorova, Zh. Obshch. Khim. **32**, 3469 (1962).
[3]I. K. Zhuravleva, E. F. Zhuravlev, and N. M. Cherkasova, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **14**, 1010 (1971).
[4]V. P. Sazonov, I. N. Zhilyaeva, and V. V. Filippov, Zh. Fiz. Khim. **47**, 474 (1973); Deposited Doc., VINITI 4960 (1972).
[5]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Dodecanol; $C_{12}H_{26}O$; [112-53-8]

Original Measurements:
A. W. Francis, J. Phys. Chem. **60**, 20–7 (1956).

Variables:
T/K=289–302

Prepared By:
V. P. Sazonov

Experimental Data:

TABLE 1. Mutual solubility of nitromethane, 1,2-ethanediol, and 1-dodecanol

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
22.0	295.2	0.258	0.732	0.250	0.720
28.0	301.2	0.342	0.544	0.275[a]	0.445
		0.207	0.783	0.200	0.770
		0.327	0.605	0.285	0.535
		0.243	0.508	0.160	0.340
		0.281	0.295	0.150	0.160
29.0	302.2	0.830	0.153	0.800	0.150
		0.773	0.213	0.750	0.210
		0.639	0.340	0.610[b]	0.330
		0.638	0.334	0.600	0.320
		0.536	0.432	0.500	0.410
		0.439	0.544	0.420	0.530
		0.445	0.504	0.400	0.460
		0.391	0.495	0.315[b]	0.405
		0.320	0.624	0.285	0.565
		0.327	0.564	0.265[b]	0.465
		0.262	0.721	0.250	0.700
		0.319	0.393	0.200	0.250
		0.207	0.783	0.200	0.770
		0.235	0.516	0.155	0.345

TABLE 2. Compositions of equilibrium two and three liquid phases

t/°C	T/K (compiler)	Nitromethane-rich phase		Ethanediol-rich phase		Alcohol-rich phase	
		w_1'	w_1'	w_1''	w_2''	w_1'''	w_2'''
16.0[c]	289.2	0.925	0.050	0.280	0.690	0.120	0.240
22.0	295.2	0.870	0.090	0.330	0.610	0.150	0.280
28.0	301.2	0.710	0.220	0.420	0.460	0.250	0.350
28.5[d]	301.7	0.600	0.330	—	—	0.250	0.350

The same data are presented below in mole fractions (compiler).

t/°C	T/K	x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
16.0[c]	289.2	0.942	0.050	0.289	0.701	0.212	0.417
22.0	295.2	0.895	0.091	0.348	0.632	0.245	0.45
28.0	301.2	0.748	0.228	0.461	0.496	0.345	0.475
28.5[d]	301.7	0.633	0.343	—	—	0.345	0.475

[a]Col. A col is a point in a ternary system where two separate binodal curves meet at their respective plait points.
[b]Plait point of binodal curve.
[c]Quadruple point temperature. The equilibrium of three liquid phases and crystals of alcohol.
[d]Subcol tie line. A subcol is a point in a ternary system where a third binodal curve meets by its plait point with an isotherm of a ridge.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method was used. Observations were made after vigorous shaking in glass stoppered tubes (15 mL capacity) immersed in water baths in large Dewar flasks. Temperature was adjusted by adding small amounts of cooler or warmer water. Filling started with 5 mL of one reagent followed by small additions of the other two, usually alternately, to maintain a trace of lower or upper layer, until the composition of a plait point was reached or the tube was full.

Source and Purity of Materials:

(1) Eastman Kodak Co.; distilled with 30 cm column with reflux; boiling point = 101.25 °C; melting point = −30.5 °C, n(20 °C,D) = 1.3820, ρ(25 °C) = 1129.8 g·L^{-1}.
(2) Source not specified; purified by crystallization; melting point = −13.3 °C; n(20 °C,D) = 1.4315, ρ(25 °C) = 1110.1 g·L^{-1}.
(3) Source not specified; purified by crystallization; melting point = 22.7 °C; n(20 °C,D) = 1.4372; ρ(20 °C) = 831.8 g·L^{-1}.

Estimated Error:

Not specified.

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Dodecanol; $C_{12}H_{26}O$; [112-53-8]

Original Measurements:

N. P. Markuzin and L. A. Nikanorova, Zh. Obshch. Khim. **32**, 3469 (1962).

Variables:

T/K = 301 and 313

Prepared By:

V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, 1,2-ethanediol, and 1-dodecanol

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
28.0	301.2	0.207	0.199	0.093	0.091
		0.249	0.323	0.132	0.174
		0.270	0.379	0.156	0.223
		0.282	0.406	0.171	0.251
		0.292	0.422	0.183	0.269
		0.307	0.462	0.207	0.317
		0.944	0.046	0.924	0.046
		0.897	0.092	0.875	0.091
		0.869	0.118	0.845	0.117
		0.393	0.596	0.381	0.587
		0.402	0.586	0.388	0.575
		0.451	0.529	0.430	0.512
		0.464	0.514	0.440	0.496
		0.904	0.092	0.896	0.093
		0.891	0.103	0.878	0.103
		0.874	0.117	0.856	0.117
		0.872	0.119	0.854	0.118
		0.101	0.895	0.099	0.890
		0.202	0.790	0.196	0.781
		0.279	0.708	0.269	0.693
		0.405	0.574	0.384	0.554
		0.447	0.526	0.420	0.502
		0.461	0.511	0.433	0.488
		0.141	0.459	0.077	0.255
		0.227	0.476	0.140	0.299
		0.263	0.479	0.171	0.317
		0.294	0.485	0.201	0.337
40.0	313.2	0.329	0.671	0.325	0.675
		0.168	0.825	0.163	0.816
		0.217	0.769	0.208	0.751
		0.242	0.731	0.227	0.697
		0.267	0.675	0.236	0.608
		0.261	0.612	0.205	0.490
		0.258	0.610	0.202	0.485
		0.260	0.589	0.197	0.454
		0.241	0.532	0.163	0.367
		0.181	0.500	0.109	0.306
		0.128	0.473	0.070	0.263
		0.023	0.443	0.011	0.214
		0.337	0.240	0.180	0.130
		0.374	0.285	0.219	0.170
		0.402	0.324	0.256	0.210
		0.431	0.348	0.295	0.242
		0.464	0.356	0.337	0.263
		0.504	0.348	0.385	0.270
		0.548	0.345	0.447	0.286
		0.575	0.339	0.486	0.291
		0.585	0.341	0.506	0.300
		0.610	0.323	0.534	0.287
		0.677	0.280	0.619	0.260
		0.779	0.191	0.733	0.183
		0.879	0.100	0.842	0.097

TABLE 2. Compositions of two and three coexisting liquid phases

t/°C	T/K (compiler)	Nitromethane-rich phase w_1'	Nitromethane-rich phase w_2'	Ethanediol-rich phase w_1''	Ethanediol-rich phase w_2''	Alcohol-rich phase w_1'''	Alcohol-rich phase w_2'''
28.0	301.2	0.876	0.105	0.390	0.571	—	—
		0.865	0.112	0.408	0.544	—	—
		0.825	0.135	0.460	0.459	0.235	0.365
		—	—	0.227	0.744	0.175	0.315
		—	—	0.135	0.850	0.092	0.268
		—	—	0.106	0.883	0.040	0.235
		0.950	0.020	—	—	0.092	0.078
		0.875	0.094	—	—	0.204	0.318

The same data are presented below in mole fractions

t/°C	T/K (compiler)	x_1' (compiler)	x_2' (compiler)	x_1'' (compiler)	x_2'' (compiler)	x_1''' (compiler)	x_2''' (compiler)
28.0	301.2	0.889	0.105	0.404	0.582	—	—
		0.880	0.112	0.426	0.558	—	—
		0.850	0.137	0.490	0.481	0.324	0.495
		—	—	0.234	0.756	0.268	0.475
		—	—	0.138	0.857	0.163	0.466
		—	—	0.108	0.888	0.079	0.454
		0.970	0.020	—	—	0.209	0.174
		0.895	0.095	—	—	0.303	0.464

Auxiliary Information

Method/Apparatus/Procedure:

The analytical and titration methods were used. Solubility curves were determined by titration. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and distilled over a column of 20 theoretical plates; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1379.
(2) Source not specified; purified by vacuum distillation; n(20 °C,D) = 1.4318, d(20 °C,4 °C) = 1.1134.
(3) Source not specified; purified by vacuum distillation; melting point = 22.2 °C.

Estimated Error:

Temperature: control to ±0.03 K,
Solubility: 1%.

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Dodecanol; $C_{12}H_{26}O$; [112-53-8]

Original Measurements:

I. K. Zhuravleva, E. F. Zhuravlev, and N. M. Cherkasova, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **14**, 1010–3 (1971).

Variables:

T/K = 290–373

Prepared By:

V. P. Sazonov

Experimental Data:

The solubility temperatures of liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2), respectively 10.2:89.8, 19.9:80.1, 29.9:70.1, 40.1:59.9, 50.0:50.0, 60.0:40.0, 70.0:30.0, 79.9:20.1, and 90.0:10.0. These data are also presented in graphical form. The compositions of coexistent two and three liquid phases at 28, 30, and 35 °C are also presented in graphical form.

TABLE 1. Solubility temperatures of the liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
18.3	291.5	0.052	0.449	0.025	0.225
28.0	301.2	0.104	0.896	0.102	0.898
42.8	316.0	0.059	0.504	0.031	0.269
62.5	335.7	0.064	0.554	0.036	0.314
66.6	339.8	0.102	0.881	0.097	0.853
78.4	351.6	0.069	0.598	0.041	0.359
86.8	360.0	0.100	0.864	0.092	0.808
91.7	364.9	0.074	0.637	0.046	0.404
92.9	366.1	0.098	0.846	0.087	0.763
96.1	369.3	0.096	0.827	0.082	0.718
97.4	370.6	0.078	0.673	0.051	0.449
98.3	371.5	0.093	0.807	0.076	0.674
98.9	372.1	0.081	0.705	0.056	0.494
99.0	372.2	0.085	0.734	0.061	0.539
99.1	372.3	0.090	0.785	0.071	0.629
99.3	372.5	0.087	0.761	0.066	0.584
24.2	297.4	0.114	0.449	0.060	0.240
30.0	303.2	0.200	0.792	0.194	0.781
38.4	311.6	0.125	0.493	0.070	0.280
45.9	319.1	0.198	0.785	0.189	0.761
50.7	323.9	0.135	0.532	0.080	0.320
57.0	330.2	0.194	0.770	0.179	0.721
60.0	333.2	0.143	0.569	0.089	0.361
62.1	335.3	0.190	0.754	0.169	0.681
64.7	337.9	0.186	0.737	0.159	0.641
65.6	338.8	0.151	0.600	0.099	0.401
66.8	340.0	0.181	0.719	0.149	0.601
68.4	341.6	0.176	0.699	0.139	0.561
69.5	342.7	0.158	0.628	0.109	0.441
69.8	343.0	0.171	0.678	0.129	0.521
70.5	343.7	0.165	0.654	0.119	0.481
17.0	290.2	0.188	0.431	0.105	0.245
18.2	291.4	0.297	0.686	0.284	0.666
22.1	295.3	0.301	0.691	0.292	0.683
24.5	297.7	0.303	0.697	0.299	0.701
26.9	300.1	0.203	0.465	0.120	0.280
32.4	305.6	0.292	0.673	0.269	0.631
34.1	307.3	0.216	0.496	0.135	0.315
36.7	309.9	0.286	0.65	0.254	0.596
38.2	311.4	0.228	0.523	0.150	0.350
38.5	311.7	0.279	0.644	0.239	0.561

40.2	313.4	0.272	0.628	0.224	0.526
40.5	313.7	0.237	0.549	0.164	0.386
41.3	314.5	0.265	0.611	0.209	0.491
41.8	315.0	0.256	0.592	0.194	0.456
42.1	315.3	0.247	0.572	0.179	0.421
18.0	291.2	0.228	0.336	0.120	0.180
21.4	294.6	0.250	0.369	0.140	0.210
24.0	297.2	0.270	0.398	0.160	0.240
25.4	298.6	0.288	0.424	0.180	0.270
26.5	299.7	0.304	0.447	0.201	0.299
26.5	299.7	0.398	0.585	0.381	0.569
27.4	300.6	0.391	0.574	0.361	0.539
27.8	301.0	0.319	0.468	0.221	0.329
28.2	301.4	0.383	0.562	0.341	0.509
29.0	302.2	0.374	0.549	0.321	0.479
29.1	302.3	0.402	0.590	0.391	0.584
29.5	302.5	0.332	0.487	0.241	0.359
30.2	303.4	0.344	0.505	0.261	0.389
30.2	303.4	0.365	0.536	0.301	0.449
30.3	303.5	0.355	0.521	0.281	0.419
34.3	307.5	0.405	0.595	0.401	0.599
17.0	290.2	0.175	0.173	0.075	0.075
24.0	297.9	0.217	0.214	0.100	0.100
28.4	301.6	0.253	0.249	0.125	0.125
28.6	301.8	0.491	0.483	0.462	0.462
30.0	303.2	0.486	0.48	0.450	0.450
30.8	304.0	0.496	0.487	0.475	0.475
31.4	304.6	0.476	0.469	0.425	0.425
32.2	305.4	0.285	0.280	0.150	0.150
32.8	306.0	0.466	0.458	0.400	0.400
33.6	306.8	0.454	0.447	0.375	0.375
34.2	307.4	0.500	0.492	0.487	0.487
34.4	307.6	0.313	0.307	0.175	0.175
34.8	308.0	0.442	0.434	0.350	0.350
35.4	308.6	0.428	0.421	0.325	0.325
36.7	309.9	0.337	0.332	0.200	0.200
36.8	310.0	0.413	0.406	0.300	0.300
37.2	310.4	0.359	0.353	0.225	0.225
37.5	310.7	0.397	0.390	0.275	0.275
37.8	311.0	0.379	0.373	0.250	0.250
38.7	311.9	0.504	0.496	0.500	0.500
18.7	291.9	0.152	0.100	0.060	0.040
24.5	297.7	0.211	0.138	0.090	0.060
29.1	302.3	0.588	0.386	0.555	0.370
31.1	304.3	0.583	0.382	0.540	0.360
31.2	304.4	0.260	0.171	0.120	0.080
31.5	304.7	0.594	0.389	0.570	0.380
33.6	306.8	0.571	0.374	0.510	0.340
35.0	308.2	0.599	0.393	0.585	0.390
35.0	308.2	0.304	0.199	0.150	0.100
36.8	310.0	0.558	0.366	0.480	0.320
38.4	311.6	0.341	0.224	0.180	0.120
38.8	312.0	0.544	0.357	0.450	0.300
39.5	312.7	0.604	0.396	0.600	0.400
40.0	313.2	0.529	0.347	0.420	0.280
40.3	313.5	0.375	0.245	0.210	0.140
41.3	314.5	0.513	0.336	0.390	0.260
41.6	314.8	0.404	0.265	0.240	0.160
42.1	315.3	0.495	0.325	0.360	0.240
42.2	315.4	0.431	0.282	0.270	0.180
42.4	315.6	0.454	0.298	0.300	0.200
42.6	315.8	0.476	0.312	0.330	0.220
25.0	298.2	0.177	0.075	0.070	0.030
31.2	304.4	0.685	0.289	0.647	0.278
32.3	305.5	0.245	0.104	0.105	0.045
33.0	306.2	0.692	0.291	0.665	0.285
35.1	308.3	0.679	0.286	0.630	0.270
37.0	310.2	0.698	0.294	0.682	0.293
38.5	311.7	0.304	0.128	0.140	0.060
39.4	312.6	0.665	0.280	0.595	0.255
40.0	313.2	0.704	0.296	0.700	0.300
42.5	315.7	0.650	0.274	0.560	0.240
43.0	316.2	0.354	0.149	0.175	0.075
44.6	317.8	0.634	0.267	0.525	0.225
46.0	319.2	0.398	0.168	0.210	0.090
46.6	319.8	0.616	0.260	0.490	0.210
48.1	321.3	0.437	0.184	0.245	0.105
49.2	322.4	0.577	0.243	0.420	0.180
49.5	322.7	0.471	0.198	0.280	0.120
50.6	323.8	0.529	0.223	0.350	0.150
27.3	300.5	0.203	0.050	0.080	0.020
32.5	305.7	0.788	0.195	0.759	0.191
33.8	307.0	0.781	0.193	0.739	0.186
36.1	309.3	0.795	0.197	0.779	0.196
36.4	309.6	0.280	0.069	0.120	0.030
39.5	312.7	0.802	0.198	0.799	0.201
40.0	313.2	0.773	0.192	0.719	0.181
44.0	317.2	0.347	0.085	0.160	0.040
46.5	319.7	0.757	0.188	0.679	0.171
49.0	322.2	0.404	0.099	0.200	0.050
50.2	323.4	0.741	0.183	0.639	0.161
52.5	325.7	0.454	0.112	0.240	0.060
52.7	325.9	0.722	0.179	0.599	0.151
54.2	327.4	0.702	0.174	0.559	0.141
54.4	327.6	0.498	0.123	0.280	0.070
55.3	328.5	0.657	0.163	0.479	0.121
55.5	328.7	0.538	0.132	0.320	0.080
56.0	329.2	0.604	0.149	0.400	0.100
27.5	300.7	0.894	0.098	0.877	0.098
32.5	305.7	0.886	0.097	0.855	0.095
35.0	308.2	0.901	0.099	0.900	0.100
35.7	308.9	0.228	0.025	0.090	0.025
40.0	313.2	0.878	0.096	0.832	0.093
44.0	317.2	0.315	0.034	0.135	0.015
45.3	318.5	0.870	0.095	0.810	0.090
49.5	322.7	0.390	0.043	0.180	0.020
51.5	324.7	0.852	0.093	0.765	0.085
54.2	327.4	0.454	0.050	0.225	0.025
55.3	328.5	0.833	0.091	0.720	0.080
57.3	330.5	0.510	0.056	0.270	0.030
58.1	331.3	0.813	0.089	0.675	0.075
60.0	333.2	0.790	0.087	0.630	0.070
60.0	333.2	0.560	0.061	0.315	0.035
61.2	334.4	0.604	0.066	0.360	0.040
62.0	335.2	0.740	0.081	0.540	0.060
62.2	335.4	0.679	0.074	0.450	0.050

*This table was prepared by the compiler from the published curve of ternary system solubility.

TABLE 2. Composition of three coexistent liquid phases system nitromethane+1,2-ethanediol+1-dodecanol*

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Glycol-rich phase (compiler)		Alcohol-rich phase (compiler)	
		x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
28	301	0.885	0.103	0.530	0.444	0.302	0.380

The same data are presented below in mass fractions

t/°C	T/K	w_1'	w_2'	w_1''	w_2''	w_1'''	w_2'''
28	301	0.862	0.102	0.500	0.426	0.182	0.233

* This table was prepared by the compiler from the published curve of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of liquid phases were determined by synthetic method.[1] The analytical method described in Mertslin and Nikurashina[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; purified; boiling point=101.3 °C; n(24 °C,D)=1.3800.
(2) Source not specified; pure grade reagent; purified by vacuum distillation; boiling point=198.0 °C; n(24 °C,D)=1.4300.
(3) Source not specified; pure grade reagent; purified by vacuum distillation; melting point=24 °C.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]R. V. Mertslin, N. I. Nikurashina, and V. A. Petrov, Zh. Fiz. Khim. **35**, 2770 (1961).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Dodecanol; $C_{12}H_{26}O$; [112-53-8]

Original Measurements:

V. P. Sazonov, I. N. Zhilyaeva, and V. V. Filippov, Zh. Fiz. Khim. **47**, 474 (1973).
*Deposited Doc., VINITI 4960 (1972).

Variables:

T/K=290–327

Prepared By:

V. P. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass content of (3), respectively 3.0, 5.0, 10.0, 20.0, 30.0, and 40.0 mass %, and also in ternary mixtures with a constant mass relationship of (1) and (2), respectively, 45.0:55.0, 65.0:35.0, and 75.0:25.0. L_1 nitromethane-rich phase; L_2 ethanediol-rich phase; L_3 alcohol-rich phase. The phase which is being dissolved is indicated in Table 1.

TABLE 1. Solubility temperature of the three liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.62(L_2)	293.77	0.8862	0.0968	0.8550	0.0950
26.47(L_2)	299.62	0.8376	0.1454	0.8075	0.1425
17.32(L_2)	290.47	0.8698	0.0950	0.8100	0.0900
21.92(L_1)	295.07	0.3413	0.6233	0.3150	0.5850
24.17(L_2)	297.32	0.8221	0.1427	0.7650	0.1350
24.92(L_1)	298.07	0.3897	0.5748	0.3600	0.5400
27.32(L_2)	300.47	0.7744	0.1904	0.7200	0.1800
27.32(L_1)	300.47	0.4381	0.5265	0.4050	0.4950
28.37(L_1)	301.52	0.4863	0.4783	0.4500	0.4500
28.62(L_2)	301.77	0.7266	0.2382	0.6750	0.2250
28.72(L_1)	301.87	0.5345	0.4301	0.4950	0.4050
29.02(L_2)	302.17	0.6787	0.2860	0.6300	0.2700
29.07(L_1)	302.22	0.5827	0.3820	0.5400	0.3600
29.17[a]	302.32	0.6307	0.3340	0.5850	0.3150
17.02(L_2)	290.17	0.7875	0.1367	0.6800	0.1200
21.87(L_1)	295.02	0.3268	0.5968	0.2800	0.5200
23.32(L_2)	296.47	0.7417	0.1824	0.6400	0.1600
25.17(L_1)	298.32	0.3732	0.5504	0.3200	0.4800
26.37(L_2)	299.52	0.6959	0.2281	0.6000	0.2000
27.32(L_1)	300.47	0.4195	0.5042	0.3600	0.4400
28.27(L_2)	301.42	0.6500	0.2740	0.5600	0.2400
28.62(L_1)	301.77	0.4657	0.4580	0.4000	0.4000
29.07(L_1)	302.22	0.5119	0.4119	0.4400	0.3600
29.07(L_2)	302.22	0.6040	0.3199	0.5200	0.2800
29.17[a]	302.32	0.5580	0.3658	0.4800	0.3200
19.71(L_2)	292.86	0.6165	0.2598	0.4900	0.2100
21.90(L_1)	295.05	0.3098	0.5659	0.2450	0.4550
25.71(L_1)	298.86	0.3538	0.5220	0.2800	0.4200
26.72(L_2)	299.87	0.5729	0.3034	0.4550	0.2450
27.82(L_1)	300.97	0.3978	0.4781	0.3150	0.3850
28.93(L_2)	302.08	0.5292	0.3470	0.4200	0.2800
28.97(L_1)	302.12	0.4417	0.4343	0.3500	0.3500
29.12(L_2)	302.27	0.4855	0.3906	0.3850	0.3150
29.17[a]	302.22	0.4636	0.4125	0.3675	0.3325
20.92(L_2)	294.07	0.5360	0.2839	0.3900	0.2100
21.62(L_1)	294.77	0.2898	0.5293	0.2100	0.3900
23.52(L_2)	296.67	0.4952	0.3246	0.3600	0.2400

26.02(L_2)	299.17	0.4542	0.3655	0.3300	0.2700
26.07(L_1)	299.22	0.3310	0.4883	0.2400	0.3600
28.77(L_2)	301.92	0.4132	0.4063	0.3000	0.3000
29.17[a]	302.22	0.3721	0.4473	0.2700	0.3300
25.36(L_3)	298.51	0.7423	0.2433	0.7180	0.2393
26.22(L_3)	299.37	0.7413	0.2430	0.7152	0.2384
28.67(L_2)	301.82	0.7270	0.2383	0.6762	0.2254
28.72(L_3)	301.87	0.7395	0.2424	0.7103	0.2368
28.97(L_2)	302.12	0.7375	0.2418	0.7047	0.2349
29.02(L_2)	302.17	0.7387	0.2422	0.7080	0.2360
26.67(L_3)	299.82	0.6443	0.3412	0.6221	0.3350
27.82(L_3)	300.97	0.6432	0.3406	0.6191	0.3333
28.81(L_3)	301.96	0.6424	0.3401	0.6167	0.3320
29.17[a]	302.32	0.6407	0.3393	0.6122	0.3297
29.17[a]	302.32	0.6395	0.3386	0.6086	0.3277
29.17[a]	302.32	0.6374	0.3375	0.6028	0.3246
29.17[a]	302.32	0.6362	0.3369	0.5998	0.3230
29.17[a]	302.32	0.6323	0.3348	0.5892	0.3173
24.25(L_3)	297.40	0.4482	0.5388	0.4327	0.5289
26.35(L_3)	299.50	0.4462	0.5362	0.4270	0.5218
27.22(L_3)	300.37	0.4455	0.5355	0.4250	0.5195
27.37(L_1)	300.52	0.4448	0.5346	0.4232	0.5172
27.37(L_1)	300.52	0.4429	0.5324	0.4180	0.5109
27.37(L_1)	300.52	0.4407	0.5298	0.4121	0.5037
27.37(L_1)	300.52	0.4369	0.5252	0.4021	0.4915

[a] Critical opalescence.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
22.92	296.07	0.8924	0.0975	0.8730	0.0970
24.57	297.72	0.3502	0.6396	0.3395	0.6305
28.67	301.82	0.8435	0.1464	0.8245	0.1455
28.67	301.82	0.3999	0.5899	0.3880	0.5820
31.17	304.32	0.4495	0.5403	0.4365	0.5335
31.62	304.77	0.7946	0.1954	0.7760	0.1940
32.57	305.72	0.4991	0.4908	0.4850	0.4850
33.22	306.37	0.5485	0.4414	0.5335	0.4365
33.25	306.40	0.7455	0.2444	0.7275	0.2425
33.61	306.76	0.6964	0.2935	0.6790	0.2910
33.62	306.77	0.5979	0.3920	0.5820	0.3880
33.63[a]	306.78	0.6472	0.3427	0.6305	0.3395
22.42	296.57	0.3478	0.6351	0.3325	0.6175
25.87	299.02	0.3971	0.5858	0.3800	0.5700
28.12	301.27	0.4464	0.5365	0.4275	0.5225
28.47	301.62	0.7890	0.1940	0.7600	0.1900
29.32	302.47	0.7403	0.2427	0.7125	0.2375
29.47	302.62	0.4956	0.4873	0.4750	0.4750
29.87	303.02	0.6915	0.2914	0.6650	0.2850
30.02	303.17	0.5447	0.4382	0.5225	0.4275
30.05	303.20	0.5937	0.3892	0.5700	0.3800
30.07[a]	303.22	0.6427	0.3403	0.6175	0.3325
31.52	304.67	0.8376	0.1454	0.8075	0.1425
34.97	308.12	0.8862	0.0968	0.8550	0.0950
27.47	300.62	0.3897	0.5748	0.3600	0.5400
27.92	301.07	0.4381	0.5265	0.4050	0.4950
28.37	301.52	0.3413	0.6233	0.3150	0.5850
28.82	301.97	0.4863	0.4783	0.4500	0.4500
30.52	303.67	0.5345	0.4301	0.4950	0.4050
31.22	304.37	0.2927	0.6717	0.2700	0.6300
32.17	305.32	0.5827	0.3820	0.5400	0.3600
33.87	307.02	0.6307	0.3340	0.5850	0.3150
36.22	309.37	0.6787	0.2860	0.6300	0.2700
38.82	311.97	0.7266	0.2382	0.6750	0.2250
41.47	314.62	0.7744	0.1904	0.7200	0.1800
45.07	318.22	0.8221	0.1427	0.7650	0.1350
49.12	322.27	0.8698	0.0950	0.8100	0.900
29.37	302.52	0.3732	0.5504	0.3200	0.4800
30.02	303.17	0.3268	0.5968	0.2800	0.5200
30.53	303.68	0.4195	0.5042	0.3600	0.4400
32.67	305.82	0.4657	0.4580	0.4000	0.4000
35.07	308.22	0.2803	0.6432	0.2400	0.5600
35.12	308.27	0.5119	0.4119	0.4400	0.3600
37.98	311.13	0.5580	0.3658	0.4800	0.3200
41.02	314.17	0.6040	0.3199	0.5200	0.2800
44.17	317.32	0.6500	0.2740	0.5600	0.2400
47.27	320.42	0.6959	0.2281	0.6000	0.2000
51.86	325.01	0.7417	0.1824	0.6400	0.1600
53.45	326.60	0.7875	0.1367	0.6800	0.1200
29.22	302.37	0.3538	0.5220	0.2800	0.4200
30.32	303.47	0.3098	0.5659	0.2450	0.4550
31.37	304.52	0.3978	0.4781	0.3150	0.3850
34.87	308.02	0.4417	0.4343	0.3500	0.3500
36.12	309.27	0.2658	0.6099	0.2100	0.4900
36.67	309.82	0.4636	0.4125	0.3675	0.3325
38.32	311.47	0.4855	0.3906	0.3850	0.3150
41.27	314.42	0.5292	0.3470	0.4200	0.2800
44.42	317.57	0.5729	0.3034	0.4550	0.2450
47.97	321.12	0.6165	0.2598	0.4900	0.2100
50.77	323.92	0.6601	0.2164	0.5250	0.1750
28.77	301.92	0.3310	0.4883	0.2400	0.3600
29.87	303.02	0.2898	0.5293	0.2100	0.3900
32.72	305.87	0.3721	0.4473	0.2700	0.3300
37.16	310.31	0.4132	0.4063	0.3000	0.3000
37.17	310.32	0.2486	0.5704	0.1800	0.4200
41.02	314.17	0.4542	0.3655	0.3300	0.2700
44.57	317.72	0.4952	0.3246	0.3600	0.2400
47.72	320.87	0.5360	0.2839	0.3900	0.2100
29.12	302.27	0.7395	0.2424	0.7103	0.2368
29.87	303.02	0.7413	0.2430	0.7152	0.2384
30.57	303.72	0.7423	0.2433	0.7180	0.2393
31.02	304.17	0.7387	0.2422	0.7080	0.2360
31.87	305.02	0.7442	0.2439	0.7236	0.2412
33.22	306.37	0.7375	0.2418	0.7047	0.2349
33.25	306.40	0.7460	0.2445	0.7287	0.2429
34.62	307.77	0.7475	0.2450	0.7322	0.2444
34.65	307.80	0.7361	0.2413	0.7007	0.2336
36.22	309.37	0.7495	0.2456	0.7390	0.2463
39.02	312.17	0.7270	0.2383	0.6762	0.2254
29.95	303.10	0.6424	0.3401	0.6167	0.3320
30.22	303.37	0.6407	0.3393	0.6122	0.3297
30.57	303.72	0.6432	0.3406	0.6191	0.3333

31.22	304.37	0.6443	0.3412	0.6221	0.3350
31.32	304.47	0.6395	0.3386	0.6086	0.3277
32.02	305.17	0.6454	0.3418	0.6253	0.3367
32.80	305.95	0.6374	0.3375	0.6028	0.3246
33.27	306.42	0.6362	0.3369	0.5998	0.3230
33.47	306.62	0.6471	0.3426	0.6302	0.3393
34.62	307.77	0.6484	0.3433	0.6339	0.3414
34.82	307.97	0.6323	0.3348	0.5892	0.3173
35.87	309.02	0.6498	0.3441	0.6382	0.3436
36.92	310.07	0.6508	0.3447	0.6412	0.3453
38.37	311.52	0.6523	0.3454	0.6454	0.3475
27.62	300.77	0.4455	0.5355	0.4250	0.5195
27.92	301.07	0.4462	0.5362	0.4270	0.5218
28.82	301.97	0.4448	0.5346	0.4232	0.5172
28.92	302.07	0.4429	0.5324	0.4180	0.5109
29.07	302.22	0.4407	0.5298	0.4121	0.5037
29.22	302.37	0.4369	0.5252	0.4021	0.4915
29.57	302.72	0.4482	0.5388	0.4327	0.5289
31.72	304.87	0.4501	0.5410	0.4381	0.5355
34.62	307.77	0.4521	0.5435	0.4440	0.5427

[a] Critical opalescence.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method was used. Mixtures of (1), (2), and (3) of mass 10 g were heated with vigorous stirring to a temperature higher than homogenization temperature, and then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled in glass packed column; $n(20\ °C,D) = 1.3820$, $d(20\ °C,4\ °C) = 1.1381$.
(2) Source not specified; analytical purity; dried and repeatedly distilled at vacuum; $n(20\ °C,D) = 1.4320$.
(3) Source not specified; pure grade reagent; dried, and distilled at vacuum.

Estimated Error:

Temperature: ±0.01 K.

6.23. +1,2-Ethanediol+1-Tridecanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Tridecanol; $C_{13}H_{28}O$; [112-70-9]

Original Measurements:

I. K. Zhuravleva and N. M. Jamshanova, Termicheskij analiz in phazovye ravnovesiya, Perm', 109–15 (1985).

Variables:

T/K ≈ 296–375

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2), respectively, 10.0:90.0, 20.0:80.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, and also in ternary mixtures with a constant mass content of (3) as 20.0, 30.0, 40.0, and 45.0 mass %, respectively. These data are also presented in graphical form.

TABLE 1. Solubility temperatures of the third liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
24.8	298.0	0.815	0.114	0.700	0.100
27.0	300.2	0.173	0.755	0.147	0.653
30.4	303.6	0.235	0.693	0.200	0.600
30.6	303.8	0.757	0.172	0.650	0.150
31.7	304.9	0.257	0.671	0.219	0.581
32.7	305.9	0.292	0.636	0.249	0.551
33.7	306.9	0.700	0.229	0.600	0.200
34.5	307.7	0.352	0.577	0.300	0.500
35.7	308.9	0.410	0.519	0.350	0.450
35.9	309.1	0.604	0.325	0.517	0.283
36.0	309.2	0.468	0.461	0.400	0.400
36.5	309.7	0.584	0.345	0.500	0.300
36.8	310.0	0.526	0.403	0.450	0.350
26.0	299.2	0.189	0.694	0.148	0.552
28.5	301.7	0.698	0.186	0.551	0.149
30.2	303.4	0.255	0.628	0.200	0.500
33.1	306.3	0.319	0.564	0.250	0.450
33.1	306.3	0.638	0.246	0.503	0.197
35.4	308.6	0.382	0.501	0.300	0.400
35.5	308.7	0.572	0.312	0.450	0.250
36.8	310.0	0.446	0.438	0.350	0.350
36.8	310.0	0.509	0.375	0.400	0.300
24.4	297.6	0.210	0.619	0.150	0.450
26.2	299.4	0.626	0.205	0.450	0.150
27.6	300.8	0.245	0.585	0.175	0.425
29.9	303.1	0.280	0.550	0.200	0.400
31.4	304.6	0.557	0.274	0.400	0.200
33.5	306.7	0.349	0.481	0.250	0.350
35.8	309.0	0.488	0.342	0.350	0.250
36.3	309.5	0.418	0.412	0.300	0.300
25.5	298.7	0.548	0.252	0.375	0.175
26.4	299.6	0.257	0.542	0.175	0.375
29.8	302.0	0.294	0.505	0.200	0.350
30.5	303.7	0.512	0.288	0.350	0.200
33.3	306.5	0.473	0.327	0.323	0.227
34.2	307.4	0.366	0.433	0.250	0.300
35.2	308.4	0.439	0.360	0.300	0.250
36.1	309.3	0.400	0.399	0.273	0.277

*This table was prepared by the compiler from the published curve of ternary system solubility.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
32.0	305.2	0.054	0.477	0.026	0.233
35.0	308.2	0.057	0.495	0.028	0.248
42.5	315.7	0.102	0.894	0.099	0.888
69.5	342.7	0.101	0.895	0.098	0.884
73.0	346.2	0.060	0.533	0.031	0.280
98.7	371.9	0.069	0.602	0.039	0.348
101.6	374.8	0.099	0.878	0.093	0.836
24.7	297.9	0.108	0.426	0.052	0.209
35.0	308.2	0.202	0.794	0.198	0.790
36.1	309.3	0.116	0.453	0.058	0.231
40.0	313.2	0.118	0.463	0.060	0.240
52.9	326.1	0.125	0.488	0.066	0.262
59.8	333.0	0.128	0.500	0.069	0.274
61.1	334.3	0.201	0.791	0.195	0.779
68.4	341.6	0.199	0.782	0.188	0.753
27.6	300.8	0.179	0.409	0.092	0.214
29.1	302.3	0.303	0.694	0.297	0.692
31.1	304.3	0.193	0.442	0.105	0.244
35.3	308.5	0.300	0.689	0.289	0.675
38.3	311.5	0.203	0.465	0.115	0.268
45.6	318.8	0.295	0.678	0.275	0.642
51.4	324.6	0.291	0.666	0.262	0.610
53.3	326.5	0.221	0.508	0.136	0.318
57.7	330.9	0.283	0.649	0.243	0.566
61.6	334.8	0.238	0.547	0.159	0.371
63.0	336.2	0.272	0.622	0.217	0.505
64.0	337.2	0.253	0.583	0.183	0.428
22.4	295.6	0.235	0.347	0.120	0.180
28.3	301.5	0.401	0.592	0.391	0.586
29.1	302.3	0.276	0.408	0.160	0.240
30.9	304.1	0.399	0.589	0.385	0.578
35.0	308.2	0.398	0.587	0.381	0.571
39.8	313.0	0.309	0.456	0.200	0.300
40.0	313.2	0.390	0.575	0.358	0.536
41.1	314.3	0.384	0.566	0.341	0.512
42.4	315.6	0.375	0.553	0.320	0.480
43.3	316.5	0.366	0.540	0.299	0.448
43.4	316.6	0.334	0.493	0.238	0.357
43.9	317.1	0.351	0.517	0.268	0.401
23.9	297.1	0.343	0.338	0.198	0.198
24.8	298.0	0.503	0.495	0.497	0.497
27.2	300.4	0.360	0.354	0.217	0.217
31.7	304.9	0.375	0.39	0.236	0.236
33.3	306.5	0.500	0.492	0.488	0.488
35.1	308.3	0.386	0.379	0.250	0.250
35.3	308.5	0.499	0.491	0.484	0.484
37.4	310.6	0.496	0.488	0.475	0.475
38.6	311.8	0.386	0.403	0.286	0.286
39.5	312.7	0.494	0.485	0.467	0.467
40.0	313.2	0.489	0.480	0.453	0.453
40.0	313.2	0.433	0.425	0.325	0.325
40.6	313.8	0.481	0.473	0.433	0.433
41.3	314.5	0.470	0.462	0.404	0.404
41.9	315.1	0.454	0.446	0.367	0.367
25.8	299.0	0.205	0.136	0.082	0.055
28.1	301.3	0.598	0.392	0.580	0.387
29.4	302.6	0.224	0.148	0.092	0.062
33.1	306.3	0.255	0.167	0.110	0.073
35.6	308.8	0.592	0.389	0.563	0.376
40.9	314.1	0.309	0.204	0.146	0.098
42.2	315.4	0.580	0.380	0.528	0.352
45.3	318.5	0.357	0.236	0.185	0.124
46.7	319.9	0.559	0.366	0.475	0.316
47.6	320.8	0.539	0.353	0.430	0.286
48.1	321.3	0.423	0.279	0.251	0.168
48.5	321.7	0.520	0.340	0.392	0.261
48.7	321.9	0.450	0.296	0.284	0.190
49.4	322.6	0.479	0.315	0.325	0.217
26.1	299.3	0.698	0.294	0.683	0.293
27.0	300.2	0.219	0.094	0.085	0.037
30.6	303.8	0.233	0.097	0.092	0.039
31.9	305.1	0.693	0.293	0.669	0.287
32.4	305.6	0.248	0.105	0.100	0.043
41.6	314.8	0.680	0.287	0.631	0.271
43.1	316.3	0.325	0.13	0.146	0.063
45.0	318.2	0.672	0.283	0.607	0.260
46.8	320.0	0.367	0.154	0.175	0.075
47.6	320.8	0.664	0.280	0.586	0.251
50.9	324.1	0.644	0.271	0.537	0.230
52.2	325.4	0.426	0.180	0.224	0.096
53.1	326.3	0.618	0.260	0.481	0.206
55.6	328.8	0.482	0.203	0.280	0.120
55.7	328.9	0.575	0.242	0.405	0.173
56.7	329.9	0.534	0.226	0.344	0.148
28.0	301.2	0.200	0.051	0.074	0.019
30.2	303.4	0.214	0.053	0.080	0.020
30.7	303.9	0.795	0.196	0.775	0.194
33.9	307.1	0.792	0.195	0.766	0.192
33.9	307.1	0.242	0.054	0.093	0.021
42.2	315.4	0.297	0.074	0.122	0.031
45.6	318.8	0.778	0.191	0.725	0.181
48.3	321.5	0.358	0.087	0.158	0.039
52.2	325.4	0.397	0.097	0.184	0.046
55.0	328.2	0.744	0.184	0.638	0.160
56.4	329.6	0.469	0.115	0.240	0.240
57.8	331.0	0.728	0.179	0.59	0.599
59.4	332.6	0.512	0.126	0.280	0.280
60.0	333.2	0.537	0.133	0.306	0.077
60.0	333.2	0.700	0.172	0.540	0.135
61.3	334.5	0.669	0.165	0.484	0.121
61.4	334.6	0.618	0.152	0.405	0.101
28.9	302.1	0.164	0.017	0.057	0.006
32.6	305.8	0.200	0.022	0.072	0.008
33.1	306.3	0.223	0.024	0.082	0.009
33.8	307.0	0.892	0.098	0.870	0.097
37.3	310.5	0.241	0.026	0.090	0.010
40.8	314.0	0.886	0.097	0.851	0.094
42.0	315.2	0.287	0.030	0.112	0.012
47.2	320.4	0.879	0.096	0.831	0.092
51.8	325.0	0.872	0.095	0.810	0.090
52.2	325.4	0.395	0.043	0.173	0.019
56.9	330.1	0.861	0.094	0.780	0.087
57.8	331.0	0.457	0.050	0.215	0.024
62.1	335.3	0.839	0.092	0.725	0.081
63.7	336.9	0.558	0.061	0.298	0.033
64.7	337.9	0.812	0.088	0.660	0.073
65.3	338.5	0.618	0.068	0.360	0.040
65.8	339.0	0.792	0.087	0.620	0.069
66.3	339.5	0.774	0.085	0.584	0.065
66.8	340.0	0.745	0.081	0.533	0.059
66.8	340.0	0.665	0.072	0.415	0.046
66.9	340.1	0.712	0.077	0.480	0.053

*This table was prepared by the compiler from the published curve of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:

The solubility temperatures of liquid phases were determined by synthetic method.[1] No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; $n(20\ °C,D) = 1.3820$, $d(20\ °C,4\ °C) = 1.1320$.
(2) Source not specified; purity not specified; $n(20\ °C,D) = 1.4315$, $d(20\ °C,4\ °C) = 1.1155$.
(3) Source not specified; purity not specified; $n(40\ °C,D) = 1.4373$, $d(40\ °C,4\ °C) = 0.8223$.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova 8, 249 (1876).

6.24. +1,2-Ethanediol+1-Pentadecanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Pentadecanol; $C_{15}H_{32}O$; [629-76-5]

Original Measurements:

I. K. Zhuravleva, E. F. Zhuravlev, and R. R. Faizulova, Zh. Obshch. Khim. **45**, 1929–33 (1975).

Variables:

T/K=313–338

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2), respectively, 30.0:70.0, 40.0:60.0, 45.0:55.0, 50.0:50.0, 55.0:45.0, 60.0:40.0, 70.0: 30.0, 80.0:20.0, and 90.0:10.0, and also in ternary mixtures with a constant mass content of (3) as 20.0, 30.0, and 40.0 mass %, respectively. These data are also presented in graphical form as isothermal curves of ternary system solubility.

TABLE 1. Solubility of nitromethane, 1,2-ethanediol, and 1-pentadecanol*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40	313	0.164	0.374	0.072	0.167
		0.238	0.352	0.112	0.168
		0.247	0.104	0.089	0.038
		0.249	0.062	0.086	0.022
		0.255	0.026	0.086	0.009
		0.269	0.214	0.111	0.090
		0.273	0.178	0.109	0.072
		0.282	0.340	0.138	0.169
		0.283	0.278	0.128	0.128
		0.303	0.695	0.298	0.695
		0.403	0.594	0.395	0.592
		0.502	0.493	0.490	0.490
		0.601	0.393	0.587	0.391
		0.699	0.295	0.684	0.293
		0.797	0.197	0.782	0.196
		0.897	0.098	0.882	0.098
58	331	0.263	0.377	0.132	0.192
		0.324	0.387	0.180	0.219
		0.396	0.390	0.249	0.249
		0.401	0.045	0.159	0.018
		0.408	0.102	0.174	0.044
		0.423	0.179	0.202	0.087
		0.453	0.364	0.300	0.245
		0.477	0.312	0.301	0.200
		0.498	0.489	0.477	0.477
		0.544	0.437	0.513	0.419
		0.590	0.388	0.554	0.370
		0.690	0.291	0.651	0.279
		0.788	0.194	0.748	0.187
		0.888	0.097	0.853	0.095
60	333	0.330	0.396	0.188	0.229
		0.408	0.401	0.266	0.266
		0.428	0.046	0.175	0.019
		0.430	0.105	0.189	0.047
		0.470	0.199	0.246	0.106
		0.489	0.394	0.369	0.302
		0.489	0.481	0.449	0.449
		0.525	0.423	0.457	0.374
		0.541	0.355	0.419	0.280
		0.565	0.370	0.477	0.318
		0.682	0.288	0.627	0.269
		0.784	0.193	0.736	0.184
		0.887	0.097	0.848	0.094
65	338	0.269	0.397	0.140	0.210
		0.353	0.425	0.219	0.268
		0.392	0.578	0.359	0.539
		0.487	0.053	0.215	0.024
		0.492	0.122	0.239	0.060
		0.555	0.234	0.350	0.150
		0.609	0.257	0.444	0.191
		0.644	0.253	0.501	0.200
		0.704	0.232	0.597	0.200
		0.770	0.189	0.690	0.172
		0.878	0.096	0.818	0.091

* This table was prepared by the compiler from the published curve of ternary system solubility.

The compositions of coexistent two and three liquid phases at 34 and 36 °C are also presented in graphical form.

TABLE 2. Composition of three coexistent liquid phases system nitromethane + 1,2-ethanediol + 1-pentadecanol*

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler) x_1'	x_2'	Glycol-rich phase (compiler) x_1''	x_2''	Alcohol-rich phase (compiler) x_1'''	x_2'''
34	307	0.722	0.212	0.462	0.537	0.247	0.287

The same data are presented below in mass fractions

t/°C	T/K	w_1'	w_2'	w_1''	w_2''	w_1'''	w_2'''
34	307	0.768	0.212	0.455	0.538	0.108	0.128

* This table was prepared by the compiler from the published curve of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of liquid phases were determined by synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purified; boilingpoint = 101.3 °C; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified; purified; boiling point = 95.0 °C/0.8 kPa; n(20 °C,D) = 1.4315, d(20 °C,4 °C) = 1.1155.
(3) Source not specified; purified; boiling point = 174.0 °C/0.8 kPa; melting point = 43.0 °C; n(50 °C,D) = 1.4390.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova 8, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

6.25. +1,2-Ethanediol+1-Hexadecanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1, 2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 1-Hexadecanol; $C_{16}H_{34}O$; [36653-82-4]

Original Measurements:
I. K. Zhuravleva, E. F. Zhuravlev, and R. R. Faizulova, Zh. Obshch. Khim. **45**, 1929–33 (1975).

Variables:
T/K = 318–353

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (3), respectively, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, and also in ternary mixtures with a constant mass relationship of (1) and (2) as 10.0:90.0, 20.0:80.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0 mass %, respectively. These data are also presented in graphical form as isothermal curves of ternary system solubility.

*Solubility of nitromethane, 1, 2-ethanediol and 1-hexadecanol**

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
45	318	0.075	0.290	0.026	0.102
		0.126	0.293	0.046	0.109
		0.203	0.795	0.199	0.794
		0.208	0.306	0.085	0.127
		0.298	0.293	0.134	0.134
		0.303	0.695	0.298	0.694
		0.319	0.077	0.114	0.028
		0.325	0.037	0.112	0.013
		0.328	0.216	0.139	0.093
		0.345	0.146	0.137	0.059
		0.403	0.595	0.396	0.595
		0.503	0.494	0.494	0.494
		0.602	0.395	0.592	0.395
		0.701	0.295	0.689	0.295
		0.799	0.197	0.787	0.197
		0.898	0.099	0.887	0.099
65	338	0.090	0.357	0.034	0.137
		0.149	0.340	0.059	0.137
		0.227	0.334	0.098	0.147
		0.334	0.328	0.166	0.166
		0.485	0.318	0.305	0.203
		0.489	0.119	0.226	0.056
		0.494	0.055	0.211	0.024
		0.598	0.392	0.577	0.385
		0.695	0.293	0.668	0.286
		0.793	0.196	0.766	0.192
		0.893	0.097	0.865	0.096
68	341	0.467	0.357	0.305	0.237
		0.507	0.195	0.268	0.105
		0.517	0.353	0.371	0.258
		0.529	0.271	0.331	0.172
		0.550	0.312	0.388	0.224
70	343	0.155	0.357	0.063	0.148
		0.236	0.348	0.105	0.158
		0.346	0.336	0.177	0.175
		0.400	0.365	0.235	0.218
		0.502	0.493	0.491	0.491
		0.507	0.365	0.366	0.268
		0.532	0.379	0.418	0.303
		0.537	0.149	0.277	0.078
		0.538	0.237	0.322	0.144
		0.570	0.394	0.512	0.360
		0.571	0.367	0.480	0.314
		0.592	0.259	0.409	0.182
		0.600	0.300	0.460	0.234
		0.627	0.305	0.520	0.257
		0.672	0.286	0.594	0.257
		0.768	0.211	0.719	0.201
75	348	0.384	0.390	0.229	0.236
		0.428	0.411	0.288	0.281
		0.465	0.457	0.375	0.375
		0.478	0.470	0.412	0.412
		0.492	0.477	0.447	0.441
		0.492	0.384	0.358	0.284
		0.499	0.491	0.482	0.482
		0.612	0.029	0.296	0.014
		0.625	0.139	0.367	0.083
		0.665	0.168	0.443	0.114
		0.700	0.182	0.518	0.137
		0.750	0.169	0.603	0.138
		0.810	0.139	0.702	0.123
		0.874	0.101	0.814	0.096
80	353	0.405	0.588	0.393	0.580
		0.413	0.431	0.281	0.298
		0.429	0.463	0.323	0.354
		0.435	0.492	0.355	0.408
		0.439	0.513	0.382	0.454
		0.445	0.543	0.425	0.528
		0.448	0.524	0.410	0.488
		0.703	0.032	0.393	0.018
		0.733	0.082	0.473	0.054
		0.780	0.089	0.561	0.065
		0.820	0.092	0.648	0.074
		0.882	0.063	0.756	0.055

*This table was prepared by the compiler from the published curve of ternary system solubility.

The compositions of coexistent two liquid phases at 45 °C are also determined, but the data are not given in the original publication.

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility temperatures of liquid phases were determined by synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:
(1) Source not specified; purified; boiling point = 101.3 °C; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified; purified; boiling point = 95.0 °C/0.8 kPa; n(20 °C,D) = 1.4315, d(20 °C,4 °C) = 1.1155.
(3) Source not specified; purified; boiling point = 206.0 °C/1.6 kPa; melting point = 49.5 °C; n(50 °C,D) = 1.4400.

Estimated Error:
Not specified.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

6.26. +1-Propanol+1-Nonanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Propanol; C_3H_8O; [71-23-8]
(3) 1-Nonanol; $C_9H_{20}O$; [143-08-8]

Original Measurements:
V. P. Sazonov and A. G. Gromakovskaya, Zh. Obshch. Khim. 47, 1209–12 (1977).

Variables:
T/K=291–320

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of liquid phases were determined in ternary mixtures with a constant mass content of 1-propanol as 10.0, 20.0, and 30.0 mass %, respectively.

TABLE 1. Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
27.5	300.7	0.168	0.190	0.090	0.100
30.4	303.6	0.853	0.107	0.810	0.100
35.7	308.9	0.307	0.173	0.180	0.100
37.9	311.1	0.802	0.113	0.720	0.100
41.7	314.9	0.423	0.159	0.270	0.100
43.2	316.4	0.745	0.120	0.630	0.100
45.5	318.7	0.522	0.147	0.360	0.100
46.2	319.4	0.680	0.128	0.540	0.100
47.0	320.2	0.606	0.137	0.450	0.100
19.1	292.3	0.136	0.346	0.080	0.200
23.1	296.3	0.752	0.212	0.720	0.200
28.9	302.1	0.703	0.223	0.640	0.200
29.2	302.3	0.252	0.320	0.160	0.200
33.8	307.0	0.648	0.235	0.560	0.200
35.7	308.9	0.353	0.299	0.240	0.200
37.5	310.7	0.586	0.248	0.480	0.200
38.8	312.0	0.440	0.280	0.320	0.200
39.3	312.5	0.518	0.263	0.400	0.200
17.4	290.6	0.205	0.447	0.140	0.300
19.5	292.7	0.630	0.323	0.595	0.300
21.8	295.0	0.606	0.330	0.560	0.300
25.1	298.3	0.291	0.422	0.210	0.300
25.9	299.1	0.554	0.345	0.490	0.300
29.0	302.2	0.498	0.361	0.420	0.300
29.3	302.5	0.367	0.400	0.280	0.300
30.3	303.5	0.436	0.380	0.350	0.300

TABLE 2. Compositions of equilibrium two liquid phases

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Alcohol-rich phase (compiler)		Nitromethane-rich phase		Alcohol-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.0	293.2	0.436	0.406	0.166	0.396	0.360	0.330	0.104	0.245
		0.689	0.276	0.125	0.212	0.660	0.260	0.66	0.110
		0.795	0.184	0.125	0.082	0.774	0.176	0.50	0.039

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. Solubility temperatures were determined by the synthetic method.[1] Compositions of equilibrium phases were determined by the method in Palatnik *et al.*[2] based on measurement of the masses of the phases. No experimental details were given.

Source and Purity of Materials:
(1) Source not specified; pure grade reagent; dried and twice distilled over a laboratory packed column; purity 99.9 mol %.
(2) Source not specified; CP reagent; dried and repeatedly distilled over a laboratory packed column; purity 99.9 mole %.
(3) Source not specified; pure grade reagent; dried and repeatedly distilled at vacuum; purity 99.5 mole %.

Estimated Error:
Temperature: ±0.02 K,
Composition: relative error 0.2%.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]L. S. Palatnik, G. R. Vinogorov, M. B. Kagan, and V. B. Kuropyatnik, Zh. Fiz. Khim. **33**, 1939 (1959).

6.27. +1,2,3-Propanetriol+1-Pentanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1, 2, 3-Propanetriol; $C_3H_8O_3$; [56-81-5]
(3) 1-Pentanol; $C_5H_{12}O$; [71-41-0]

Original Measurements:
I. K. Mel'nikova and E. F. Zhuravlev, Zh. Fiz. Khim. **39**, 664–71 (1965).

Variables:
T/K = 277–370

Prepared By:
V. P. Sazonov and M. F. Chernysheva

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (2) and (3) as 10.0:90.0, 15.0:85.0, 20.0:80.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 70.0:30.0, and 85.0:15.0, respectively.

TABLE 1. Solubility temperatures of the liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
8.0	281.2	0.239	0.073	0.178	0.082
9.0	282.2	0.969	0.003	0.955	0.005
12.0	285.2	0.276	0.069	0.208	0.079
14.0	287.2	0.890	0.010	0.848	0.015
14.0	287.2	0.959	0.004	0.941	0.006
15.0	288.2	0.927	0.007	0.898	0.010
15.0	288.2	0.941	0.005	0.916	0.008
15.3	288.5	0.316	0.066	0.242	0.076
18.5	291.7	0.372	0.060	0.290	0.071
19.5	292.7	0.833	0.016	0.775	0.023
21.0	294.2	0.439	0.054	0.350	0.065
22.0	295.2	0.767	0.023	0.695	0.031
22.5	295.7	0.514	0.047	0.422	0.058
23.0	296.2	0.625	0.036	0.535	0.047
23.0	296.2	0.699	0.029	0.615	0.039
3.7	277.0	0.030	0.140	0.021	0.147
8.0	281.2	0.014	0.143	0.010	0.149
10.2	283.4	0.254	0.108	0.190	0.122
15.9	289.1	0.317	0.099	0.242	0.114
19.2	292.4	0.373	0.091	0.290	0.107
21.0	294.2	0.840	0.023	0.783	0.033
21.8	295.0	0.448	0.080	0.358	0.096
22.7	295.9	0.779	0.032	0.708	0.044
22.8	296.0	0.500	0.072	0.408	0.089
23.5	296.7	0.592	0.059	0.500	0.075
23.5	296.7	0.695	0.045	0.610	0.059
27.3	300.5	0.869	0.019	0.820	0.027
30.0	303.2	0.889	0.016	0.847	0.023
31.5	304.7	0.903	0.014	0.865	0.020
31.5	304.7	0.938	0.009	0.913	0.013
32.0	305.2	0.925	0.011	0.894	0.016
5.5	278.7	0.225	0.150	0.166	0.167
6.5	279.7	0.085	0.177	0.060	0.188
12.2	285.4	0.060	0.182	0.042	0.192
13.0	286.2	0.284	0.138	0.214	0.157
13.0	286.2	0.976	0.005	0.965	0.007
17.0	290.2	0.036	0.186	0.025	0.195
17.7	290.9	0.353	0.126	0.272	0.146
19.5	292.7	0.025	0.189	0.017	0.197
21.6	294.8	0.447	0.107	0.357	0.129
23.5	296.7	0.578	0.081	0.485	0.103
24.0	297.2	0.683	0.061	0.597	0.081
24.3	297.5	0.731	0.052	0.651	0.070
30.7	303.9	0.786	0.041	0.716	0.057
34.0	307.2	0.799	0.039	0.732	0.054
36.5	309.7	0.956	0.009	0.937	0.013
37.5	310.7	0.823	0.034	0.762	0.048
39.5	312.7	0.946	0.010	0.923	0.015
41.3	314.5	0.848	0.029	0.793	0.041
43.2	316.4	0.927	0.014	0.897	0.021
44.3	317.5	0.911	0.017	0.875	0.025
44.5	317.7	0.880	0.023	0.834	0.033
7.7	280.9	0.228	0.225	0.168	0.250
9.0	282.2	0.197	0.234	0.144	0.257
14.0	287.2	0.276	0.211	0.207	0.238
19.0	292.2	0.130	0.253	0.093	0.272
21.0	294.2	0.375	0.182	0.291	0.213
25.0	298.2	0.500	0.145	0.406	0.178
25.6	298.8	0.095	0.263	0.067	0.280
26.0	299.2	0.542	0.133	0.447	0.166
30.0	303.2	0.592	0.119	0.498	0.151
33.0	306.2	0.981	0.005	0.973	0.008
37.9	311.1	0.040	0.280	0.028	0.292
39.0	312.2	0.639	0.105	0.548	0.136
42.5	315.7	0.972	0.008	0.959	0.012
46.5	319.7	0.686	0.091	0.599	0.120
50.0	323.2	0.957	0.013	0.938	0.019
52.0	325.2	0.727	0.080	0.645	0.107
56.5	329.7	0.765	0.068	0.690	0.093
57.5	330.7	0.937	0.018	0.911	0.027
62.1	335.3	0.913	0.025	0.877	0.037
63.9	337.1	0.883	0.034	0.838	0.049
64.1	337.3	0.858	0.042	0.805	0.059
21.0	294.2	0.255	0.290	0.189	0.324
23.0	296.2	0.202	0.311	0.147	0.341
24.7	297.9	0.338	0.258	0.258	0.297
27.7	300.9	0.156	0.328	0.112	0.355
29.3	302.5	0.391	0.237	0.304	0.278
35.0	308.2	0.442	0.217	0.350	0.260
35.7	308.9	0.109	0.347	0.077	0.369
41.0	314.2	0.488	0.200	0.393	0.243
44.5	317.7	0.068	0.363	0.047	0.381
47.5	320.7	0.531	0.183	0.435	0.226
53.3	326.5	0.031	0.378	0.021	0.392
57.5	330.7	0.595	0.158	0.500	0.200
61.0	334.2	0.947	0.020	0.934	0.030
64.5	337.7	0.642	0.139	0.550	0.180
71.5	344.7	0.699	0.117	0.612	0.155
74.0	347.2	0.915	0.033	0.880	0.048
77.0	350.2	0.889	0.043	0.845	0.062
78.0	351.2	0.774	0.088	0.700	0.120
79.5	352.7	0.855	0.057	0.800	0.080
80.0	353.2	0.817	0.071	0.752	0.099
29.4	302.6	0.199	0.392	0.144	0.428
30.5	303.7	0.036	0.471	0.210	0.395
32.3	305.5	0.164	0.409	0.117	0.442
38.2	311.4	0.126	0.428	0.089	0.456
44.3	317.5	0.392	0.297	0.304	0.348
46.9	320.1	0.083	0.448	0.058	0.471
55.5	328.7	0.048	0.466	0.033	0.484
56.5	329.7	0.469	0.260	0.375	0.313
62.5	335.7	0.019	0.480	0.013	0.494
66.9	340.1	0.534	0.228	0.437	0.282
76.0	349.2	0.595	0.198	0.499	0.250
84.7	357.9	0.665	0.164	0.574	0.213
32.2	305.4	0.167	0.575	0.119	0.617
34.0	307.2	0.203	0.551	0.146	0.598

34.9	308.1	0.135	0.598	0.095	0.634
38.5	311.7	0.231	0.531	0.168	0.582
41.5	314.7	0.099	0.622	0.069	0.652
52.0	325.2	0.061	0.649	0.042	0.671
63.6	336.8	0.342	0.455	0.259	0.519
64.0	337.2	0.019	0.678	0.013	0.691
81.5	354.7	0.436	0.390	0.342	0.461
97.0	370.2	0.551	0.310	0.452	0.384
33.0	306.2	0.134	0.731	0.094	0.770
38.5	311.7	0.175	0.697	0.124	0.745
42.5	315.7	0.092	0.767	0.063	0.796
51.7	324.9	0.209	0.668	0.150	0.723
53.9	327.1	0.053	0.799	0.036	0.819
62.5	335.7	0.242	0.639	0.176	0.700
64.0	337.2	0.022	0.825	0.015	0.837
72.5	345.7	0.277	0.610	0.204	0.677
80.5	353.7	0.309	0.585	0.230	0.656

The compositions of two and three coexistent liquid phases at 10, 20, 26, 28, and 60 °C are also presented in graphical form.

TABLE 2. Composition of three coexistent liquid phases system nitromethane+1,2,3-propanetriol+1-pentanol*

		Nitromethane-rich phase (compilers)		Glycerine-rich phase (compilers)		Alcohol-rich phase (compilers)	
t/°C	T/K (compilers)	x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
10	283	0.913	0.011	0.114	0.816	0.257	0.202
20	293	0.876	0.014	0.116	0.796	0.318	0.226
26	299	0.817	0.030	0.127	0.769	0.411	0.222

The same data are presented below in mass fractions

t/°C	T/K	w_1'	w_2'	w_1''	w_2''	w_1'''	w_2'''
10	283	0.879	0.016	0.079	0.851	0.191	0.227
20	293	0.829	0.020	0.080	0.832	0.241	0.259
26	299	0.754	0.042	0.088	0.807	0.322	0.262

*These data were extracted graphically by the compilers.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phases were determined by the synthetic method.[1] The analytical method described in Mertslin *et al.*[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; freshly distilled.
(2) Source not specified, freshly distilled.
(3) Source not specified, freshly distilled.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]R. V. Mertslin, N. I. Nikurashina, and V. A. Petrov, Zh. Fiz. Khim. **35**, 2770 (1961).

6.28. +1,2,3-Propanetriol+1-Hexanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2,3-Propanetriol; $C_3H_8O_3$; [56-81-5]
(3) 1-Hexanol; $C_6H_{14}O$; [111-27-3]

Original Measurements:

I. K. Zhuravleva, E. F. Zhuravlev, and N. A. Rudakova, Zh. Obshch. Khim. **46**, 2178–86 (1976).

Variables:

T/K=289–393

Prepared By:

V. P. Sazonov and M. F. Chernysheva

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass content of (2), respectively 35.0, 55.0, 65.0, and 75.0 mass % and also in ternary mixtures with constant mass relationship of (1) and (3) as 19.4:80.6, 27.7:72.3, 39.1:60.9, 49.0:51.0, 60.10:39.9, 70.3:29.7, 79.3:20.7, and 90.0:10.0, respectively.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
17.0	290.2	0.220	0.341	0.150	0.350
25.0	298.2	0.653	0.276	0.550	0.350
26.0	299.2	0.285	0.331	0.200	0.350
31.5	304.7	0.609	0.282	0.500	0.350
32.0	305.2	0.561	0.290	0.450	0.350
32.0	305.2	0.347	0.322	0.250	0.350
32.0	305.2	0.460	0.305	0.350	0.350
32.0	305.5	0.405	0.313	0.300	0.350
18.0	291.2	0.148	0.541	0.100	0.550
26.0	299.2	0.483	0.464	0.380	0.550
26.5	299.7	0.216	0.526	0.150	0.550
29.5	302.7	0.452	0.471	0.350	0.550
32.0	305.2	0.398	0.483	0.300	0.550
32.0	305.2	0.280	0.511	0.200	0.550
32.0	305.2	0.341	0.497	0.250	0.550
17.0	290.2	0.105	0.645	0.070	0.650
23.5	296.7	0.147	0.633	0.100	0.650
29.5	302.7	0.372	0.572	0.280	0.650
32.0	305.2	0.338	0.582	0.250	0.650
32.0	305.2	0.214	0.615	0.150	0.650
32.0	305.2	0.278	0.598	0.200	0.650
32.0	305.2	0.253	0.605	0.180	0.650
24.0	297.2	0.104	0.737	0.070	0.750
29.5	302.7	0.275	0.684	0.200	0.750
30.0	303.2	0.139	0.726	0.095	0.750
32.0	305.2	0.212	0.703	0.150	0.750
32.0	305.2	0.173	0.716	0.120	0.750

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
75.0	348.2	0.285	0.331	0.200	0.350
76.5	349.7	0.347	0.322	0.250	0.350
78.0	351.2	0.220	0.341	0.150	0.350
81.5	354.7	0.405	0.313	0.300	0.350
84.5	357.7	0.151	0.351	0.100	0.350
89.0	362.2	0.460	0.305	0.350	0.350
104.0	377.2	0.561	0.290	0.450	0.350
119.5	392.7	0.653	0.276	0.550	0.350
86.5	359.7	0.280	0.511	0.200	0.550
87.0	360.2	0.255	0.516	0.180	0.550
89.5	362.7	0.317	0.502	0.230	0.550
92.5	365.7	0.216	0.526	0.150	0.550
93.0	366.2	0.341	0.497	0.250	0.550
102.0	375.2	0.398	0.483	0.300	0.550
103.5	376.7	0.148	0.541	0.100	0.550
113.5	386.7	0.452	0.471	0.350	0.550
114.0	387.2	0.106	0.551	0.070	0.550
90.0	363.2	0.214	0.615	0.150	0.650
90.5	363.7	0.188	0.622	0.130	0.650
92.5	365.7	0.253	0.605	0.180	0.650
94.5	367.7	0.278	0.598	0.200	0.650
97.5	370.7	0.147	0.633	0.100	0.650
108.5	381.7	0.105	0.645	0.070	0.650
109.0	382.2	0.338	0.582	0.250	0.650
114.0	387.2	0.372	0.572	0.280	0.650
89.0	362.2	0.173	0.716	0.120	0.750
93.5	366.7	0.139	0.726	0.095	0.750
93.5	366.7	0.212	0.703	0.150	0.750
105.0	378.2	0.275	0.684	0.200	0.750
108.0	381.2	0.104	0.737	0.070	0.750
29.0	302.2	0.928	0.010	0.887	0.014
53.0	326.2	0.917	0.022	0.871	0.032
70.0	343.2	0.907	0.033	0.854	0.047
20.0	293.2	0.081	0.906	0.055	0.930
23.0	296.2	0.096	0.890	0.066	0.927
28.5	301.7	0.853	0.014	0.778	0.019
29.0	302.2	0.859	0.007	0.785	0.010
29.0	302.2	0.847	0.021	0.770	0.029
31.0	304.2	0.094	0.892	0.064	0.920
37.5	310.7	0.102	0.882	0.070	0.912
39.5	312.7	0.839	0.031	0.760	0.042
44.0	317.2	0.836	0.034	0.757	0.046
45.0	318.2	0.115	0.867	0.079	0.900
52.0	325.2	0.126	0.855	0.089	0.891
54.0	327.2	0.830	0.041	0.749	0.056
56.5	329.7	0.133	0.846	0.092	0.884
57.5	330.7	0.826	0.046	0.744	0.062
60.0	333.2	0.824	0.048	0.742	0.065
62.5	335.7	0.144	0.834	0.100	0.874
67.5	340.7	0.822	0.050	0.784	0.071
70.0	343.2	0.157	0.818	0.110	0.861
74.0	347.2	0.808	0.066	0.722	0.089
75.0	348.2	0.171	0.802	0.120	0.849
17.0	290.2	0.068	0.915	0.046	0.935
24.0	297.2	0.074	0.908	0.050	0.925
31.5	304.7	0.777	0.027	0.678	0.036
31.5	304.7	0.769	0.037	0.669	0.048
32.0	305.2	0.785	0.017	0.688	0.022
32.0	305.2	0.765	0.042	0.664	0.055
33.0	306.2	0.791	0.010	0.694	0.013
33.0	306.2	0.081	0.899	0.055	0.922
36.0	309.2	0.760	0.048	0.659	0.063
38.0	311.2	0.087	0.891	0.059	0.916
45.5	318.7	0.756	0.054	0.654	0.070
47.5	320.7	0.099	0.875	0.068	0.903
53.5	326.7	0.750	0.061	0.647	0.080
59.5	332.7	0.743	0.069	0.640	0.089
61.0	334.2	0.119	0.851	0.082	0.884
65.0	338.2	0.735	0.079	0.631	0.102
67.0	340.2	0.136	0.830	0.094	0.867
69.5	342.7	0.729	0.087	0.624	0.113
72.0	345.2	0.150	0.812	0.104	0.852
20.0	293.2	0.042	0.942	0.028	0.954
31.0	304.2	0.048	0.933	0.032	0.946
32.0	305.2	0.688	0.038	0.572	0.048
32.0	305.2	0.674	0.059	0.557	0.073
32.0	305.2	0.669	0.065	0.552	0.081
33.0	306.2	0.701	0.021	0.585	0.026
34.0	307.2	0.709	0.009	0.594	0.012
34.0	307.2	0.663	0.073	0.546	0.091
38.0	311.2	0.055	0.924	0.037	0.939
40.5	313.7	0.660	0.078	0.543	0.097
46.0	319.2	0.656	0.084	0.539	0.104
50.0	323.2	0.065	0.909	0.044	0.927
51.0	324.2	0.649	0.093	0.532	0.115
54.5	327.7	0.071	0.901	0.048	0.920
55.0	328.2	0.645	0.099	0.528	0.122
59.0	332.2	0.639	0.107	0.522	0.132
60.5	333.7	0.081	0.887	0.055	0.909
65.5	338.7	0.628	0.123	0.510	0.151
69.0	342.2	0.097	0.866	0.066	0.891
71.0	344.2	0.622	0.132	0.504	0.161
76.0	349.2	0.609	0.149	0.492	0.181
77.0	350.2	0.115	0.839	0.079	0.868
80.0	353.2	0.604	0.156	0.487	0.190
32.0	305.2	0.584	0.054	0.459	0.064
32.0	305.2	0.575	0.067	0.451	0.079
32.0	305.2	0.567	0.079	0.444	0.093
32.0	305.2	0.562	0.088	0.439	0.104
32.5	305.7	0.591	0.041	0.466	0.049
32.5	305.7	0.554	0.101	0.432	0.119
33.0	306.2	0.603	0.023	0.477	0.027
34.0	307.2	0.610	0.011	0.484	0.013
35.0	308.2	0.549	0.109	0.427	0.128
44.0	317.2	0.540	0.125	0.419	0.146
49.0	322.2	0.535	0.133	0.414	0.155
53.5	325.7	0.530	0.141	0.410	0.164
60.0	333.2	0.521	0.155	0.402	0.180
65.5	338.7	0.512	0.169	0.394	0.196
74.5	347.7	0.494	0.199	0.378	0.229
80.5	353.7	0.475	0.230	0.361	0.264
22.5	295.7	0.018	0.965	0.012	0.969
30.0	303.2	0.477	0.079	0.356	0.089
30.0	303.2	0.467	0.097	0.348	0.109

30.0	303.2	0.454	0.124	0.337	0.139
31.0	304.2	0.487	0.059	0.365	0.067
31.0	304.2	0.449	0.133	0.333	0.149
32.0	305.2	0.502	0.032	0.377	0.036
33.0	306.2	0.021	0.960	0.014	0.965
33.5	306.7	0.511	0.013	0.385	0.015
36.0	309.2	0.451	0.144	0.335	0.162
41.0	314.2	0.023	0.956	0.015	0.961
43.0	316.2	0.434	0.162	0.320	0.181
47.0	320.2	0.428	0.174	0.316	0.193
47.0	320.2	0.025	0.951	0.017	0.957
53.0	326.2	0.420	0.189	0.309	0.210
57.0	330.2	0.028	0.945	0.019	0.951
59.0	332.2	0.410	0.209	0.301	0.231
64.0	337.2	0.031	0.939	0.021	0.946
64.5	337.5	0.398	0.232	0.291	0.256
69.5	342.7	0.385	0.256	0.281	0.282
75.0	348.2	0.365	0.293	0.265	0.321
76.0	349.2	0.040	0.921	0.027	0.930
77.5	350.7	0.358	0.309	0.259	0.338
23.5	296.7	0.333	0.145	0.234	0.154
24.0	297.2	0.343	0.123	0.241	0.130
24.5	297.7	0.348	0.109	0.245	0.116
25.0	298.2	0.354	0.096	0.249	0.102
25.5	298.7	0.357	0.085	0.252	0.090
26.0	299.2	0.364	0.068	0.257	0.072
26.5	299.7	0.367	0.062	0.259	0.066
27.0	300.2	0.371	0.050	0.262	0.053
28.0	301.2	0.376	0.038	0.266	0.041
28.5	301.7	0.379	0.029	0.268	0.031
29.0	302.2	0.383	0.021	0.271	0.022
30.0	303.2	0.387	0.010	0.274	0.011
30.0	303.2	0.328	0.159	0.230	0.168
35.0	308.2	0.323	0.173	0.226	0.183
42.5	315.7	0.316	0.190	0.221	0.201
49.0	322.2	0.309	0.211	0.216	0.222
55.5	328.7	0.300	0.232	0.209	0.244
65.0	338.2	0.286	0.268	0.199	0.281
70.0	343.2	0.276	0.292	0.192	0.306
76.5	349.7	0.264	0.325	0.183	0.340
16.0	289.2	0.251	0.129	0.169	0.131
16.0	289.2	0.246	0.144	0.166	0.146
16.5	289.7	0.254	0.115	0.171	0.117
17.0	290.2	0.258	0.100	0.174	0.102
18.0	291.2	0.270	0.086	0.183	0.088
18.5	291.7	0.267	0.072	0.180	0.073
19.0	292.2	0.268	0.064	0.181	0.065
20.0	293.2	0.274	0.048	0.185	0.049
21.5	294.7	0.277	0.033	0.187	0.034
22.5	295.7	0.242	0.156	0.163	0.159
23.0	296.2	0.283	0.017	0.191	0.017
33.0	306.2	0.236	0.179	0.159	0.182
37.5	310.7	0.233	0.190	0.157	0.193
45.5	318.7	0.226	0.211	0.152	0.214
56.0	329.2	0.219	0.240	0.147	0.244
67.0	340.2	0.208	0.276	0.140	0.280
77.0	350.2	0.197	0.315	0.132	0.319

The compositions of two and three coexistent liquid phases at 30 and 32 °C are also presented in graphical form.

TABLE 3. Composition of three coexistent liquid phases system nitromethane + 1,2,3-propanetriol + 1-hexanol*

		Nitromethane-rich phase (compilers)		Glycerine-rich phase (compilers)		Alcohol-rich phase (compilers)	
t/°C	T/K (compilers)	x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
30	303	0.815	0.020	0.087	0.896	0.399	0.139
32	305	0.799	0.035	0.087	0.886	0.439	0.137

The same data are presented below in mass fractions

t/°C	T/K	w_1'	w_2'	w_1''	w_2''	w_1'''	w_2'''
30	303	0.763	0.028	0.059	0.921	0.289	0.152
32	305	0.707	0.047	0.059	0.910	0.324	0.153

*These data were extracted graphically by the compilers.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phases were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified, purity not specified; n(20 °C,D) = 1.4740, d(20 °C,4 °C= 1.2640).
(3) Source not specified, purity not specified; n(20 °C,D) = 1.4135, d(20 °C,4 °C) = 0.8186.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

6.29. +1,2,3-Propanetriol+N,N-Diethylethanamine

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2,3-Propanetriol; $C_3H_8O_3$; [56-81-5]
(3) N,N-Diethylethanamine; $C_6H_{15}N$; [121-44-8]

Original Measurements:
I. K. Mel'nikova and E. F. Zhuravlev, Zh. Obshch. Khim. **38**, 2147–50 (1968).

Variables:
T/K=283–313

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (3), respectively, 10.0:90.0, 20.0:80.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0. These data are also presented in graphical form as isothermal curves of ternary system solubility.

Solubility of nitromethane, 1,2,3-propanetriol and N,N-diethylethanamine*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
10	283	0.021	0.862	0.014	0.858
		0.127	0.189	0.082	0.734
		0.133	0.859	0.092	0.898
		0.136	0.844	0.094	0.883
		0.147	0.815	0.102	0.854
		0.157	0.781	0.109	0.819
		0.185	0.704	0.129	0.742
		0.395	0.367	0.294	0.412
		0.522	0.007	0.397	0.008
		0.563	0.211	0.448	0.253
		0.614	0.015	0.491	0.018
		0.709	0.005	0.596	0.006
		0.713	0.103	0.608	0.132
		0.829	0.046	0.750	0.063
		0.918	0.020	0.874	0.029
15	288	0.020	0.872	0.013	0.868
		0.081	0.726	0.054	0.732
		0.116	0.876	0.080	0.911
		0.130	0.851	0.090	0.888
		0.132	0.834	0.091	0.870
		0.133	0.146	0.086	0.142
		0.134	0.678	0.091	0.697
		0.137	0.808	0.095	0.842
		0.146	0.766	0.101	0.798
		0.173	0.671	0.120	0.701
		0.181	0.384	0.122	0.391
		0.223	0.461	0.155	0.482
		0.287	0.453	0.205	0.488
		0.437	0.299	0.330	0.340
		0.582	0.183	0.467	0.221
		0.713	0.103	0.608	0.132
		0.831	0.044	0.752	0.060
		0.919	0.020	0.875	0.028
40	313	0.009	0.941	0.006	0.939
		0.026	0.914	0.017	0.917
		0.043	0.896	0.029	0.904
		0.062	0.882	0.042	0.896
		0.077	0.877	0.052	0.896
		0.091	0.873	0.062	0.897
		0.104	0.870	0.071	0.899
		0.113	0.870	0.078	0.903
		0.123	0.869	0.085	0.906
		0.148	0.051	0.095	0.050
		0.257	0.120	0.175	0.123
		0.352	0.153	0.251	0.164
		0.444	0.153	0.331	0.172
		0.536	0.141	0.417	0.166
		0.635	0.110	0.519	0.135
		0.747	0.061	0.645	0.079
		0.841	0.032	0.765	0.044
		0.926	0.012	0.884	0.018

*This table was prepared by the compiler from the published curve of ternary system solubility.

The compositions of two coexistent liquid phases at 20 °C are also presented in graphical form.

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility temperatures of the liquid phases were determined by the synthetic method.[1] The analytical method described in Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:
(1) Source not specified; freshly distilled.
(2) Source not specified; freshly distilled.
(3) Source not specified; freshly distilled.

Estimated Error:
Not specified.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]R. V. Mertslin, Izv. Perm. Biol. Inst. **11**, 1 (1937).

6.30. +1,2,3-Propanetriol+1-Heptanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2,3-Propanetriol; $C_3H_8O_3$; [56-81-5]
(3) 1-Heptanol; $C_7H_{16}O$; [111-70-6]

Original Measurements:
V. P. Sazonov and I. N. Zhilyaeva, Zh. Fiz. Khim. **45**, 733–4 (1971).
*Deposited Doc., VINITI 2410 (1970).

Variables:
T/K=288–316

Prepared By:
N. V. Sazonov and V. P. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass content of (2), respectively, 2.5, 5.0, 7.5, 10.0, 20.0, 40.0, and 70.0 mass % and also in ternary mixtures with constant mass relationship of (1) and (3) as 40.0:60.0, 55.0:45.0, and 70.0:30.0, respectively. L_1 nitromethane-rich phase; L_2 propanetriol-rich phase; L_3 alcohol-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
24.70(L_3)	297.85	0.929	0.017	0.878	0.025
32.20(L_3)	305.35	0.899	0.018	0.829	0.025
24.65(L_3)	297.80	0.912	0.035	0.855	0.050
32.25(L_3)	305.40	0.882	0.036	0.807	0.050
36.05(L_3)	309.20	0.851	0.037	0.760	0.050
38.47(L_3)	311.62	0.819	0.038	0.713	0.050
39.36(L_3)	312.51	0.784	0.039	0.665	0.050
24.55(L_3)	297.70	0.895	0.053	0.833	0.075
32.23(L_3)	305.38	0.865	0.055	0.786	0.075
36.07(L_3)	309.22	0.834	0.056	0.740	0.075
38.45(L_3)	311.60	0.802	0.058	0.694	0.075
39.32(L_1)	312.47	0.567	0.068	0.416	0.075
39.37(L_3)	312.52	0.768	0.059	0.647	0.075
39.66(L_1)	312.81	0.612	0.066	0.462	0.075
39.77(L_1)[a]	312.92	0.655	0.064	0.509	0.075
39.78(L_3)	312.93	0.732	0.061	0.601	0.075
39.82[a]	312.97	0.695	0.062	0.555	0.075
24.45(L_3)	297.60	0.877	0.072	0.810	0.100
32.25(L_3)	305.40	0.848	0.073	0.765	0.100
34.81(L_1)	307.96	0.405	0.099	0.270	0.100
36.04(L_3)	309.19	0.818	0.075	0.720	0.100
36.87(L_1)	310.02	0.458	0.096	0.315	0.100
38.24(L_1)	311.39	0.507	0.093	0.360	0.100
38.46(L_3)	311.61	0.785	0.077	0.675	0.100
39.35(L_3)	312.50	0.752	0.079	0.630	0.100
39.35(L_1)	312.50	0.554	0.091	0.405	0.100
39.56(L_1)	312.71	0.598	0.088	0.450	0.100
39.72(L_3)	312.87	0.716	0.081	0.585	0.100
39.77(L_1)	312.92	0.639	0.086	0.495	0.100
39.82[a]	312.97	0.679	0.083	0.540	0.100
17.60(L_1)	290.75	0.197	0.217	0.120	0.200
24.25(L_3)	287.40	0.805	0.148	0.720	0.200
25.25(L_1)	298.40	0.254	0.211	0.160	0.200
30.62(L_1)	303.77	0.309	0.205	0.200	0.200
32.27(L_3)	305.42	0.777	0.151	0.680	0.200
33.94(L_1)	307.09	0.360	0.199	0.240	0.200
36.00(L_3)	309.15	0.747	0.155	0.640	0.200
36.45(L_1)	309.60	0.408	0.193	0.280	0.200
37.96(L_1)	311.11	0.454	0.188	0.320	0.200
38.14(L_1)	311.29	0.498	0.183	0.360	0.200
38.44(L_3)	311.59	0.716	0.158	0.600	0.200
39.40(L_3)	312.55	0.684	0.162	0.560	0.200
39.52(L_1)	312.67	0.539	0.178	0.400	0.200
39.75(L_3)	312.90	0.650	0.166	0.520	0.200
39.77(L_1)	312.92	0.578	0.174	0.440	0.200
39.80(L_1)	312.95	0.615	0.170	0.480	0.200
39.82[a]	312.97	0.633	0.168	0.500	0.200
14.40(L_1)	287.55	0.145	0.425	0.090	0.400
22.20(L_1)	295.35	0.188	0.416	0.120	0.400
23.95(L_3)	297.10	0.645	0.317	0.540	0.400
28.25(L_1)	301.40	0.230	0.407	0.150	0.400
32.01(L_3)	305.16	0.620	0.322	0.510	0.400
32.71(L_1)	305.86	0.270	0.398	0.180	0.400
35.75(L_1)	308.90	0.309	0.390	0.210	0.400
35.80(L_3)	308.95	0.594	0.328	0.480	0.400
37.65(L_1)	310.80	0.346	0.382	0.240	0.400
38.39(L_3)	311.54	0.567	0.334	0.450	0.400
38.84(L_1)	311.99	0.381	0.374	0.270	0.400
39.34(L_3)	312.49	0.539	0.340	0.420	0.400
39.52(L_1)	312.67	0.415	0.367	0.300	0.400
39.72(L_1)	312.87	0.448	0.360	0.330	0.400
39.77(L_3)	312.92	0.510	0.346	0.390	0.400
39.78(L_1)	312.93	0.479	0.353	0.360	0.400
39.82[a]	312.97	0.494	0.350	0.375	0.400
21.60(L_3)	294.75	0.360	0.619	0.270	0.700
24.31(L_1)	297.46	0.114	0.706	0.075	0.700
30.37(L_1)	303.52	0.136	0.698	0.090	0.700
31.30(L_3)	304.45	0.343	0.625	0.255	0.700
34.55(L_1)	307.70	0.156	0.691	0.105	0.700
35.55(L_3)	308.70	0.326	0.631	0.240	0.700
36.47(L_1)	309.62	0.177	0.684	0.120	0.700
37.93(L_1)	311.08	0.197	0.677	0.135	0.700
38.32(L_3)	311.47	0.309	0.637	0.225	0.700
39.27(L_3)	312.42	0.291	0.643	0.210	0.700
39.64(L_1)	312.79	0.236	0.663	0.165	0.700
39.75(L_1)	312.90	0.255	0.656	0.180	0.700
39.78(L_3)	312.93	0.282	0.647	0.202	0.700
39.82[a]	312.97	0.273	0.650	0.195	0.700
39.35(L_3)	312.50	0.771	0.055	0.651	0.070
39.35(L_3)	312.50	0.778	0.047	0.658	0.060
39.35(L_3)	312.50	0.784	0.039	0.665	0.050
39.77(L_1)	312.92	0.655	0.064	0.509	0.075
39.77(L_1)	312.92	0.661	0.055	0.514	0.065
39.77(L_1)	312.92	0.667	0.047	0.520	0.055
38.30(L_1)	311.45	0.512	0.084	0.364	0.090
38.35(L_1)	311.50	0.515	0.079	0.366	0.085
38.42(L_1)	311.57	0.518	0.075	0.368	0.080

[a]Critical opalescence.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
23.75	296.90	0.244	0.028	0.146	0.025
30.85	304.00	0.314	0.027	0.195	0.025
35.15	308.30	0.379	0.026	0.244	0.025
36.15	309.30	0.868	0.018	0.780	0.025
38.17	311.32	0.438	0.025	0.292	0.025
38.55	311.70	0.835	0.019	0.731	0.025
39.87	313.02	0.494	0.024	0.341	0.025
40.15	313.30	0.801	0.019	0.683	0.025
40.75	313.90	0.546	0.023	0.390	0.025
40.82	313.97	0.764	0.020	0.634	0.025
40.97	314.12	0.725	0.021	0.585	0.025
41.17	314.32	0.596	0.022	0.439	0.025
41.22	314.37	0.641	0.022	0.487	0.025
41.27[a]	314.42	0.685	0.021	0.536	0.025
21.81	294.96	0.238	0.055	0.143	0.050
29.35	302.50	0.305	0.053	0.190	0.050
34.25	307.40	0.368	0.051	0.237	0.050
36.67	309.82	0.427	0.050	0.285	0.050
38.41	311.56	0.481	0.048	0.332	0.050
39.55	312.70	0.533	0.047	0.380	0.050
39.87	313.02	0.748	0.040	0.617	0.050
40.05	313.20	0.581	0.045	0.427	0.050
40.07	313.22	0.710	0.041	0.570	0.050
40.17	313.32	0.627	0.044	0.475	0.050
40.22[a]	313.37	0.669	0.043	0.522	0.050
19.77	292.92	0.231	0.083	0.139	0.075
27.25	300.40	0.297	0.080	0.185	0.075
32.45	305.60	0.358	0.077	0.231	0.075
35.71	308.86	0.415	0.075	0.277	0.075
37.45	310.60	0.470	0.072	0.324	0.075
38.67	311.82	0.520	0.070	0.370	0.075
18.45	291.60	0.224	0.110	0.135	0.100
26.35	299.50	0.288	0.106	0.180	0.100
31.62	304.77	0.348	0.103	0.225	0.100
39.40	312.55	0.788	0.035	0.669	0.045
39.47	312.62	0.791	0.031	0.672	0.040
39.65	312.80	0.794	0.027	0.676	0.035
39.85	313.00	0.797	0.023	0.679	0.030
40.15	313.30	0.801	0.019	0.683	0.025
40.35	313.50	0.804	0.015	0.686	0.020
40.70	313.85	0.807	0.012	0.690	0.015
41.05	314.20	0.810	0.008	0.693	0.010
41.37	314.52	0.813	0.004	0.697	0.005
40.02	313.17	0.670	0.043	0.523	0.050
40.22	313.37	0.673	0.038	0.525	0.045
40.47	313.62	0.676	0.034	0.528	0.040
40.71	313.86	0.679	0.030	0.531	0.035
40.92	314.07	0.682	0.025	0.534	0.030
41.17	314.32	0.684	0.021	0.536	0.025
41.45	314.60	0.688	0.017	0.539	0.020
41.77	314.92	0.691	0.013	0.542	0.015
42.12	315.27	0.694	0.008	0.545	0.010
42.52	315.67	0.696	0.004	0.547	0.005
38.62	311.77	0.520	0.070	0.370	0.075
38.77	311.92	0.523	0.065	0.372	0.070
38.92	312.07	0.526	0.060	0.374	0.065
39.12	312.27	0.528	0.056	0.376	0.060
39.26	312.41	0.531	0.051	0.378	0.055
39.46	312.61	0.533	0.047	0.380	0.050
39.67	312.82	0.536	0.042	0.382	0.045
39.87	313.02	0.539	0.037	0.384	0.040
40.12	313.27	0.541	0.033	0.386	0.035
40.42	313.57	0.544	0.028	0.388	0.030
40.72	313.87	0.546	0.023	0.390	0.025
41.02	314.17	0.549	0.019	0.392	0.020
41.27	314.42	0.551	0.014	0.394	0.015
41.55	314.70	0.554	0.009	0.396	0.010
41.92	315.07	0.557	0.005	0.398	0.005

[a]Critical opalescence.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. Mixtures of (1), (2), and (3) of total mass 10 g were heated with vigorons stirring to a temperature higher than the homogenization temperature, then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled in glass packed column.
(2) Source not specified, analytical purity; twice distilled at vacuum; 0.03 mass % of water by the Karl Fischer analysis.
(3) Source not specified, pure grade reagent; dried and twice distilled at vacuum.

Estimated Error:

Temperature: ±0.02 K.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.31. +1,2,3-Propanetriol+Octanoic Acid

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2,3-Propanetriol; $C_3H_8O_3$; [56-81-5]
(3) Octanoic acid; $C_8H_{16}O_2$; [124-07-2]

Original Measurements:
V. P. Sazonov and I. N. Zhilyaeva, Zh. Fiz. Khim. **45**, 773–4 (1971).
*Deposited Doc., VINITI 2410 (1970).

Variables:
T/K=286–307

Prepared By:
N. V. Sazonov and V. P. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass content of (2), respectively, 2.5, 5.0, 7.5, 10.0, 20.0, 40.0, and 70.0 mass % and also in ternary mixtures with constant mass relationship of (1) and (3) as 45.0:55.0, 57.5:42.5, and 70.0:30.0, respectively. L_1 nitromethane-rich phase; L_2 propanetriol-rich phase; L_3 acid-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
19.15(L_3)	292.30	0.9135	0.0183	0.8288	0.0250
19.15(L_3)	292.30	0.8963	0.0368	0.8075	0.0500
23.00(L_3)	296.15	0.8700	0.0379	0.7600	0.0500
24.52(L_3)	297.67	0.8420	0.0392	0.7125	0.0500
25.17(L_3)	298.32	0.8122	0.0405	0.6650	0.0500
25.27(L_3)	298.42	0.7803	0.0419	0.6175	0.0500
19.18(L_3)	292.33	0.8788	0.0556	0.7863	0.0750
23.02(L_3)	296.17	0.8525	0.0573	0.7400	0.0750
23.44(L_1)	296.59	0.6110	0.0730	0.4163	0.0750
24.52(L_3)	297.67	0.8246	0.0591	0.6938	0.0750
24.52(L_1)	297.67	0.6534	0.0702	0.4626	0.0750
25.06(L_1)	298.21	0.6925	0.0677	0.5088	0.0750
25.17(L_3)	298.32	0.7948	0.0610	0.6475	0.0750
25.27(L_3)	298.42	0.7568	0.0635	0.5926	0.0750
25.29(L_3)	298.44	0.7464	0.0642	0.5782	0.0750
25.30[a]	298.45	0.7290	0.0653	0.5550	0.0750
12.70(L_3)	285.85	0.8860	0.0725	0.8102	0.1000
19.05(L_1)	292.20	0.5008	0.1054	0.3149	0.1000
19.23(L_3)	292.38	0.8610	0.0746	0.7649	0.1000
21.57(L_1)	294.72	0.5497	0.1012	0.3599	0.1000
23.05(L_3)	296.20	0.8348	0.0768	0.7199	0.1000
23.41(L_1)	296.56	0.5949	0.0974	0.4050	0.1000
24.50(L_1)	297.65	0.6366	0.0938	0.4499	0.1000
24.57(L_3)	297.72	0.8069	0.0792	0.6750	0.1000
25.05(L_1)	298.20	0.6755	0.0905	0.4949	0.1000
25.18(L_3)	298.33	0.7772	0.0818	0.6300	0.1000
25.28(L_3)	298.43	0.7457	0.0845	0.5851	0.1000
25.29(L_3)	298.44	0.7291	0.0859	0.5627	0.1000
25.29[a]	298.44	0.7117	0.0874	0.5399	0.1000
18.95(L_1)	292.10	0.4427	0.2095	0.2801	0.2000
19.31(L_3)	292.46	0.7876	0.1535	0.6800	0.2000
21.37(L_1)	294.52	0.4881	0.2022	0.3201	0.2000
23.07(L_3)	296.22	0.7617	0.1578	0.6401	0.2000
23.28(L_1)	296.43	0.5304	0.1953	0.3600	0.2000
24.45(L_1)	297.60	0.5699	0.1889	0.4000	0.2000
24.61(L_3)	297.76	0.7342	0.1622	0.6000	0.2000
25.00(L_1)	298.15	0.6070	0.1828	0.4400	0.2000
25.22(L_3)	298.37	0.7052	0.1669	0.5600	0.2000
25.28(L_3)	298.43	0.6745	0.1719	0.5201	0.2000
25.29[a]	298.44	0.6585	0.1745	0.5002	0.2000
25.30[a]	298.45	0.6417	0.1772	0.4800	0.2000
17.90(L_1)	291.05	0.3280	0.4141	0.2100	0.4000
19.43(L_3)	292.58	0.6269	0.3261	0.5097	0.4000
20.87(L_1)	294.02	0.3650	0.4032	0.2400	0.4000
23.00(L_1)	296.15	0.4000	0.3929	0.2699	0.4000
23.10(L_3)	296.25	0.6032	0.3331	0.4801	0.4000
24.27(L_1)	297.42	0.4336	0.3830	0.3001	0.4000
24.68(L_3)	297.83	0.5779	0.3405	0.4500	0.4000
24.96(L_1)	298.11	0.4653	0.3737	0.3301	0.4000
25.24(L_3)	298.39	0.5518	0.3482	0.4201	0.4000
25.27(L_1)	298.42	0.4954	0.3648	0.3600	0.4000
25.27(L_3)	298.42	0.5379	0.3523	0.4048	0.4000
25.30(L_3)	298.45	0.5242	0.3563	0.3900	0.4000
25.30[a]	298.45	0.5100	0.3605	0.3751	0.4000
19.48(L_1)	292.63	0.1816	0.7029	0.1199	0.7000
19.55(L_3)	292.70	0.3456	0.6286	0.2551	0.7000
21.97(L_1)	295.12	0.2020	0.6937	0.1351	0.7000
23.15(L_3)	296.30	0.3290	0.6361	0.2400	0.7000
23.58(L_1)	296.73	0.2214	0.6849	0.1500	0.7000
24.73(L_1)	297.88	0.2405	0.6762	0.1650	0.7000
24.75(L_3)	297.90	0.3122	0.6438	0.2250	0.7000
25.15(L_1)	298.30	0.2590	0.6679	0.1799	0.7000
25.26(L_3)	298.41	0.2947	0.6517	0.2098	0.7000
25.30[a]	298.45	0.2771	0.6597	0.1949	0.7000

[a]Critical opalescence.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
14.20	287.35	0.4278	0.0291	0.2438	0.0250
19.85	293.00	0.4892	0.0277	0.2925	0.0250
23.16	296.31	0.8873	0.0188	0.7801	0.0250
23.62	296.77	0.5450	0.0265	0.3412	0.0250
25.61	298.76	0.8593	0.0195	0.7313	0.0250
26.09	299.24	0.5962	0.0253	0.3900	0.0250
26.90	300.05	0.8294	0.0201	0.6825	0.0250
27.27	300.42	0.6430	0.0243	0.4387	0.0250
27.71	300.86	0.7974	0.0208	0.6337	0.0250
28.16	301.31	0.6863	0.0233	0.4876	0.0250
28.21	301.36	0.7631	0.0216	0.5850	0.0250
28.32[a]	301.47	0.7449	0.0220	0.5606	0.0250
28.33	301.48	0.7261	0.0224	0.5363	0.0250
16.75	289.90	0.4753	0.0553	0.2850	0.0500
20.37	293.52	0.5302	0.0529	0.3324	0.0500
22.83	295.98	0.5807	0.0506	0.3800	0.0500
24.30	297.45	0.6270	0.0486	0.4275	0.0500
25.03	298.18	0.6698	0.0467	0.4750	0.0500
25.38	298.53	0.7094	0.0450	0.5225	0.0500
25.42[a]	298.57	0.7461	0.0434	0.5700	0.0500
25.50	298.65	0.7281	0.0442	0.5463	0.0500
19.19	292.34	0.5156	0.0792	0.3238	0.0750
21.71	294.86	0.5652	0.0759	0.3700	0.0750
25.31	298.46	0.8217	0.0293	0.6746	0.0363
25.60	298.75	0.8238	0.0267	0.6768	0.0331
26.02	299.17	0.8263	0.0239	0.6793	0.0296

26.57	299.72	0.8285	0.0212	0.6816	0.0263
26.91	300.06	0.8295	0.0201	0.6826	0.0249
27.30	300.45	0.8311	0.0182	0.6842	0.0226
28.25	301.40	0.8336	0.0152	0.6868	0.0189
29.32	302.47	0.8362	0.0121	0.6894	0.0151
30.45	303.60	0.8389	0.0089	0.6922	0.0111
31.58	304.73	0.8414	0.0059	0.6948	0.0074
32.96	306.11	0.8440	0.0029	0.6975	0.0036
25.33	298.48	0.7246	0.0488	0.5433	0.0552
25.39	298.54	0.7257	0.0473	0.5442	0.0535
25.50	298.65	0.7280	0.0443	0.5462	0.0501
25.69	298.84	0.7306	0.0409	0.5484	0.0463
25.91	299.06	0.7329	0.0378	0.5504	0.0428
26.26	299.41	0.7354	0.0345	0.5525	0.0391
26.37	299.52	0.7361	0.0336	0.5531	0.0381
26.73	299.88	0.7382	0.0309	0.5549	0.0350
27.31	300.46	0.7409	0.0273	0.5572	0.0310
27.94	301.09	0.7435	0.0240	0.5594	0.0272
28.56	301.71	0.7460	0.0206	0.5615	0.0234
29.39	302.54	0.7486	0.0172	0.5638	0.0195
30.27	303.42	0.7511	0.0139	0.5659	0.0158
31.34	304.49	0.7540	0.0101	0.5684	0.0115
32.49	305.64	0.7565	0.0069	0.5705	0.0078
33.66	306.81	0.7590	0.0035	0.5727	0.0040
23.55	296.70	0.6172	0.0635	0.4206	0.0653
23.65	296.80	0.6178	0.0626	0.4210	0.0644
23.82	296.97	0.6217	0.0567	0.4238	0.0583
23.93	297.08	0.6226	0.0552	0.4244	0.0568
24.09	297.24	0.6255	0.0509	0.4264	0.0524
24.21	297.36	0.6263	0.0497	0.4270	0.0511
24.77	297.92	0.6315	0.0419	0.4306	0.0431
25.14	298.29	0.6337	0.0384	0.4322	0.0395
25.52	298.67	0.6361	0.0348	0.4339	0.0358
26.60	299.75	0.6407	0.0278	0.4371	0.0286
27.31	300.46	0.6436	0.0235	0.4391	0.0242
28.33	301.48	0.6467	0.0187	0.4413	0.0193
29.41	302.56	0.6497	0.0143	0.4434	0.0147
30.25	303.40	0.6517	0.0113	0.4448	0.0116
31.34	304.49	0.6542	0.0074	0.4466	0.0076
32.42	305.57	0.6566	0.0037	0.4483	0.0038

[a]Critical opalescence.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. Mixtures of (1), (2), and (3) of total mass 10 g were heated with vigorous stirring to a temperature higher than the homogenization temperature, then slowly cooled until turbidity appeared. Heating and cooling cycles were repeated twice. Temperature values obtained for appearing and disappearing turbidity were averaged.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled in glass packed column.
(2) Source not specified, analytical purity; twice distilled at vacuum; 0.03 mass % of water by the Karl Fischer analysis.
(3) Source not specified, pure grade reagent; dried and twice distilled at vacuum.

Estimated Error:

Temperature: ±0.02 K.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.32. +1,2,3-Propanetriol+1-Octanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2,3-Propanetriol; $C_3H_8O_3$; [56-81-5]
(3) 1-Octanol; $C_8H_{18}O$; [111-87-5]

Original Measurements:

I. K. Zhuravleva, E. F. Zhuravlev, and N. A. Rudakova, Zh. Obshch. Khim. **46**, 2178–86 (1976).

Variables:

T/K=287–420

Prepared By:

V. P. Sazonov and M. F. Chernysheva

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass content of (2), respectively, 25.0, 35.0, 45.0, and 55.0 mass % and also in ternary mixtures with constant mass relationship of (1) and (3) as 10.1:89.9, 20.0:80.0, 29.8:70.2, 39.7:60.3, 49.5:50.5, 59.6:40.4, 69.9:30.1, 79.5:20.5, and 89.5:10.5, respectively.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
18.0	291.2	0.754	0.192	0.650	0.250
22.5	295.7	0.092	0.305	0.050	0.250
30.0	303.2	0.718	0.198	0.600	0.250
35.0	308.2	0.175	0.291	0.100	0.250
38.0	311.2	0.679	0.205	0.550	0.250
42.0	315.2	0.251	0.278	0.150	0.250
42.0	315.2	0.639	0.212	0.500	0.250
44.0	317.2	0.595	0.219	0.450	0.250
44.5	317.7	0.321	0.266	0.200	0.250
45.5	318.7	0.548	0.227	0.400	0.250
45.5	318.7	0.385	0.255	0.250	0.250
45.5	318.7	0.498	0.236	0.350	0.250
45.5	318.7	0.443	0.245	0.300	0.250
23.5	296.7	0.664	0.280	0.550	0.350
31.0	304.2	0.089	0.412	0.050	0.350
34.5	307.7	0.623	0.289	0.500	0.350
38.0	311.2	0.170	0.393	0.100	0.350
40.0	313.2	0.580	0.299	0.450	0.350
43.0	316.2	0.243	0.376	0.150	0.350
45.0	318.2	0.484	0.321	0.350	0.350
45.5	318.7	0.311	0.361	0.200	0.350
45.5	318.7	0.431	0.333	0.300	0.350
45.5	318.7	0.373	0.347	0.250	0.350
27.0	300.2	0.566	0.375	0.450	0.450
32.5	305.7	0.086	0.512	0.050	0.450
36.0	309.2	0.520	0.388	0.400	0.450
41.0	314.2	0.164	0.490	0.100	0.450
42.0	315.2	0.472	0.402	0.350	0.450
44.5	317.7	0.236	0.469	0.150	0.450
45.0	318.2	0.419	0.417	0.300	0.450
45.5	318.7	0.302	0.450	0.200	0.450
45.5	318.7	0.363	0.433	0.250	0.450
31.0	304.2	0.460	0.479	0.350	0.550
34.0	307.2	0.083	0.606	0.050	0.550
40.0	313.2	0.408	0.496	0.300	0.550
43.0	316.2	0.159	0.580	0.100	0.550
44.0	317.2	0.353	0.515	0.250	0.550
45.5	318.7	0.229	0.556	0.150	0.550
45.5	318.7	0.293	0.535	0.200	0.550

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
117.5	390.7	0.595	0.219	0.450	0.250
118.0	391.2	0.548	0.227	0.400	0.250
118.5	391.7	0.639	0.212	0.500	0.250
119.5	392.7	0.498	0.236	0.350	0.250
120.0	393.2	0.679	0.205	0.550	0.250
121.5	394.7	0.718	0.198	0.600	0.250
122.0	395.2	0.443	0.245	0.300	0.250
124.0	397.2	0.754	0.192	0.650	0.250
126.5	399.7	0.385	0.255	0.250	0.250
126.5	399.7	0.787	0.186	0.700	0.250
133.0	406.2	0.321	0.266	0.200	0.250
142.0	415.2	0.251	0.278	0.150	0.250
127.0	400.2	0.580	0.299	0.450	0.350
127.0	400.2	0.623	0.289	0.500	0.350
128.0	401.2	0.664	0.280	0.550	0.350
130.5	403.7	0.484	0.321	0.350	0.350
136.0	409.2	0.431	0.333	0.300	0.350
142.0	415.2	0.373	0.347	0.250	0.350
128.5	401.7	0.520	0.388	0.400	0.450
128.5	401.7	0.566	0.375	0.450	0.450
129.5	402.7	0.608	0.363	0.500	0.450
131.0	404.2	0.472	0.402	0.350	0.450
137.0	410.2	0.419	0.417	0.300	0.450
147.0	420.2	0.363	0.433	0.250	0.450
128.0	401.2	0.460	0.479	0.350	0.550
129.5	402.7	0.508	0.463	0.400	0.550
132.5	405.7	0.408	0.496	0.300	0.550
141.5	414.7	0.353	0.515	0.250	0.550
21.0	294.2	0.064	0.933	0.043	0.952
30.0	303.2	0.943	0.005	0.889	0.007
32.0	305.2	0.074	0.922	0.050	0.944
40.0	313.2	0.937	0.011	0.881	0.016
40.5	313.7	0.081	0.914	0.055	0.938
52.0	325.2	0.104	0.891	0.071	0.921
53.5	326.7	0.934	0.014	0.877	0.020
64.0	337.2	0.929	0.021	0.869	0.029
65.0	338.2	0.125	0.869	0.086	0.904
75.0	348.2	0.922	0.027	0.861	0.038
75.0	348.2	0.149	0.842	0.104	0.884
81.5	354.7	0.917	0.033	0.854	0.046
22.0	295.2	0.025	0.971	0.017	0.978
37.5	310.7	0.033	0.963	0.022	0.972
42.0	315.2	0.884	0.010	0.785	0.013
42.0	315.2	0.881	0.013	0.782	0.017
42.5	315.7	0.889	0.004	0.791	0.005
44.0	317.2	0.876	0.018	0.776	0.024
45.0	318.2	0.039	0.956	0.026	0.967
53.5	326.7	0.046	0.948	0.031	0.961
55.0	328.2	0.874	0.021	0.773	0.028
64.0	337.2	0.055	0.939	0.037	0.954
65.0	338.2	0.867	0.029	0.765	0.038
72.0	345.2	0.863	0.032	0.761	0.043
72.0	345.2	0.061	0.932	0.041	0.949
79.0	352.2	0.067	0.925	0.045	0.943
81.5	354.7	0.854	0.042	0.750	0.056
45.0	318.2	0.816	0.020	0.682	0.025
45.0	318.2	0.810	0.026	0.676	0.033
48.5	321.7	0.804	0.034	0.669	0.043
59.0	332.2	0.801	0.038	0.666	0.048
68.5	341.7	0.792	0.048	0.657	0.060
78.5	351.7	0.784	0.058	0.649	0.072
45.5	318.7	0.729	0.040	0.568	0.047
46.0	319.2	0.736	0.031	0.575	0.036
46.0	319.2	0.722	0.047	0.562	0.055
46.5	319.7	0.744	0.020	0.582	0.024
47.0	320.2	0.751	0.009	0.589	0.011
51.0	324.2	0.720	0.051	0.560	0.060
60.0	333.2	0.715	0.058	0.556	0.068
68.0	341.2	0.708	0.067	0.549	0.079
75.0	348.2	0.702	0.075	0.544	0.088
80.5	353.7	0.697	0.082	0.539	0.096
20.0	293.2	0.006	0.990	0.004	0.991
37.0	310.2	0.007	0.988	0.005	0.989
45.0	318.2	0.637	0.058	0.463	0.064
45.5	318.7	0.642	0.051	0.467	0.056
45.5	318.7	0.634	0.063	0.461	0.069
46.0	319.2	0.652	0.036	0.475	0.040
46.5	319.7	0.662	0.022	0.483	0.024
47.0	320.2	0.667	0.014	0.487	0.016
48.0	321.2	0.673	0.005	0.492	0.006
48.0	321.2	0.009	0.986	0.006	0.987
55.0	328.2	0.628	0.072	0.456	0.079
62.0	335.2	0.014	0.980	0.009	0.982
64.0	337.2	0.623	0.079	0.452	0.087
69.0	342.2	0.619	0.084	0.449	0.092
72.0	345.2	0.014	0.979	0.009	0.981
73.0	346.2	0.615	0.091	0.446	0.099
78.5	351.7	0.611	0.097	0.443	0.106
44.0	317.2	0.545	0.065	0.370	0.067
44.0	317.2	0.541	0.073	0.367	0.075
44.5	317.7	0.551	0.056	0.374	0.057
45.0	318.2	0.557	0.046	0.378	0.047
45.5	318.7	0.563	0.037	0.372	0.038
46.0	319.2	0.568	0.027	0.386	0.028
46.6	319.8	0.574	0.017	0.390	0.017
47.0	320.2	0.580	0.078	0.394	0.008
49.0	321.2	0.537	0.081	0.364	0.083
56.0	329.2	0.531	0.091	0.360	0.093
61.5	334.7	0.528	0.097	0.358	0.099
68.0	341.2	0.524	0.105	0.355	0.007
73.0	346.2	0.519	0.111	0.352	0.113
77.0	350.2	0.516	0.116	0.350	0.119
40.0	313.2	0.437	0.080	0.275	0.076
40.5	313.7	0.440	0.074	0.277	0.070
41.0	314.2	0.443	0.068	0.279	0.065
41.0	314.2	0.435	0.086	0.274	0.082
41.5	314.7	0.450	0.052	0.283	0.049
42.5	315.7	0.458	0.035	0.288	0.033
43.0	316.2	0.463	0.025	0.291	0.024
44.0	317.2	0.467	0.018	0.293	0.017
44.5	317.7	0.472	0.007	0.296	0.007
48.5	321.7	0.430	0.095	0.271	0.090
55.5	328.7	0.428	0.100	0.270	0.095
68.0	341.2	0.421	0.114	0.266	0.109
72.0	345.2	0.420	0.118	0.265	0.112
77.0	350.2	0.417	0.123	0.263	0.117
32.5	305.7	0.318	0.088	0.185	0.077
33.0	306.2	0.322	0.075	0.187	0.066
34.0	307.2	0.326	0.065	0.189	0.057
34.5	307.7	0.330	0.052	0.191	0.045
34.5	307.7	0.314	0.098	0.183	0.086

35.5	308.7	0.334	0.039	0.193	0.034
36.5	309.7	0.340	0.025	0.196	0.022
37.5	310.7	0.344	0.012	0.198	0.010
42.0	315.2	0.310	0.107	0.181	0.094
52.0	325.2	0.308	0.116	0.180	0.102
62.0	335.2	0.304	0.126	0.178	0.111
72.5	345.7	0.302	0.140	0.177	0.124
78.5	351.7	0.297	0.146	0.174	0.129
14.0	287.2	0.181	0.069	0.096	0.055
16.0	289.2	0.184	0.051	0.097	0.041
16.0	289.2	0.177	0.085	0.094	0.068
18.0	291.2	0.188	0.031	0.099	0.025
34.0	307.2	0.174	0.102	0.093	0.082
48.5	321.7	0.172	0.116	0.092	0.094
69.0	342.2	0.169	0.126	0.091	0.102
75.0	348.2	0.165	0.147	0.089	0.120

The compositions of two and three coexistent liquid phases at 40, 45.5, and 46 °C are also presented in graphical form.

TABLE 3. Composition of three coexistent liquid phases system nitromethane+1,2,3-propanetriol+1-octanol*

		Nitromethane-rich phase (compilers)		Glycerine-rich phase (compilers)		Alcohol-rich phase (compilers)	
t/°C	T/K (compilers)	x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
40	313	0.903	0.010	0.037	0.958	0.443	0.089
45.5	318.7	0.811	0.030	0.037	0.957	0.600	0.064

The same data are presented below in mass fractions

t/°C	T/K	w_1'	w_2'	w_1''	w_2''	w_1'''	w_2'''
40	313	0.819	0.014	0.025	0.968	0.281	0.085
45.5	318.7	0.679	0.038	0.025	0.967	0.425	0.068

*These data were extracted graphically by the compilers.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phases were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified, purity not specified; n(20 °C,D) = 1.4740, d(20 °C,4 °C) = 1.2640.
(3) Source not specified, purity not specified; n(20 °C,D) = 1.4295, d(20 °C,4 °C) = 0.8246.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

6.33. +1,2,3-Propanetriol+1-Decanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2,3,-Propanetriol; $C_3H_8O_3$; [56-81-5]
(3) 1-Decanol; $C_{10}H_{22}O$; [112-30-1]

Original Measurements:

I. K. Zhuravleva and N. R. Mukhametshin, Zh. Obshch. Khim. **49**, 1217–22 (1979).

Variables:

T/K = 307–409

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass content of (2), respectively, 15.0, 35.0, and 55.0 mass % and also in ternary mixtures with constant mass relationship of (1) and (3) as 15.0:85.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, respectively, and also in ternary mixtures with a constant mass relationship of (1) and (2) as 56.0:44.0, respectively. Additional data were reported in graphical form.

TABLE 1. Solubility temperatures of the three liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.7	313.9	0.266	0.195	0.136	0.150
45.1	318.3	0.784	0.121	0.646	0.150
51.5	324.7	0.380	0.178	0.212	0.150
51.9	325.1	0.748	0.126	0.591	0.150
55.6	328.8	0.535	0.156	0.340	0.150
55.6	328.8	0.655	0.139	0.468	0.150
40.1	313.3	0.174	0.429	0.094	0.350
41.4	314.6	0.543	0.320	0.393	0.350
52.9	326.1	0.280	0.398	0.163	0.350
54.0	327.2	0.473	0.341	0.322	0.350
55.5	328.7	0.366	0.373	0.228	0.350
55.6	328.8	0.405	0.361	0.260	0.350
41.3	314.5	0.280	0.561	0.182	0.550
44.5	317.7	0.083	0.643	0.047	0.550
49.1	322.3	0.088	0.641	0.050	0.550
52.3	325.5	0.121	0.627	0.070	0.550
53.1	326.3	0.249	0.574	0.158	0.550
54.4	327.6	0.155	0.613	0.092	0.550
55.2	328.4	0.215	0.588	0.135	0.550

TABLE 2. Solubility temperatures of the two liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
33.7	306.9	0.297	0.053	0.144	0.039
35.5	308.7	0.302	0.040	0.146	0.029
36.8	310.0	0.291	0.075	0.142	0.055
37.6	310.8	0.306	0.025	0.147	0.018
39.4	312.6	0.314	0.000	0.150	0.000
63.5	336.7	0.283	0.095	0.139	0.070
68.3	338.5	0.280	0.108	0.138	0.080
50.0	323.2	0.494	0.062	0.284	0.054
50.7	323.9	0.504	0.043	0.289	0.037
51.6	324.8	0.512	0.028	0.293	0.024
52.7	325.9	0.519	0.014	0.296	0.012
53.9	327.1	0.526	0.000	0.300	0.000
60.9	334.1	0.488	0.071	0.281	0.062
68.5	341.7	0.484	0.081	0.279	0.070
75.8	349.0	0.478	0.091	0.276	0.079

54.1	327.3	0.602	0.050	0.381	0.048
55.4	328.6	0.614	0.031	0.388	0.030
55.9	329.1	0.625	0.014	0.395	0.013
56.5	329.7	0.633	0.000	0.400	0.000
59.1	332.3	0.594	0.062	0.376	0.059
65.6	338.8	0.592	0.066	0.375	0.063
75.5	348.7	0.584	0.077	0.370	0.074
55.4	328.6	0.688	0.046	0.476	0.048
56.1	329.3	0.700	0.031	0.484	0.032
57.1	330.3	0.712	0.013	0.493	0.014
58.3	331.5	0.722	0.000	0.500	0.000
61.6	334.8	0.681	0.056	0.471	0.058
66.8	340.0	0.677	0.061	0.468	0.064
70.0	343.2	0.675	0.065	0.466	0.068
55.6	328.8	0.765	0.038	0.574	0.043
56.6	329.8	0.776	0.025	0.583	0.028
57.2	330.4	0.786	0.011	0.592	0.013
58.3	331.5	0.796	0.000	0.600	0.000
61.9	335.1	0.760	0.044	0.570	0.050
67.4	340.6	0.759	0.046	0.569	0.052
72.2	345.4	0.754	0.052	0.565	0.059
56.3	329.5	0.833	0.029	0.675	0.035
57.0	330.2	0.847	0.013	0.689	0.016
57.8	331.0	0.858	0.000	0.700	0.000
62.6	335.8	0.828	0.035	0.670	0.043
71.5	344.7	0.823	0.041	0.665	0.050
77.5	350.7	0.816	0.049	0.658	0.060
52.4	325.6	0.897	0.017	0.782	0.022
52.9	326.1	0.889	0.025	0.774	0.033
53.3	326.5	0.902	0.011	0.789	0.014
54.5	327.7	0.912	0.000	0.800	0.000
61.3	334.5	0.886	0.029	0.770	0.038
67.0	340.2	0.882	0.033	0.766	0.043
71.6	344.8	0.877	0.038	0.760	0.050
41.6	314.8	0.948	0.011	0.886	0.015
42.3	315.5	0.959	0.000	0.900	0.000
58.9	332.1	0.938	0.022	0.872	0.031
62.6	335.8	0.934	0.026	0.868	0.036
66.3	339.5	0.931	0.029	0.864	0.040
	406.6	0.656	0.342	0.557	0.437
	407.0	0.655	0.341	0.554	0.436
	407.6	0.653	0.340	0.550	0.433
	407.8	0.651	0.339	0.548	0.431
	408.7	0.649	0.338	0.544	0.428

*These tables were prepared by the compiler from the published curve of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; boiling point = 101.3 °C, n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified, purity not specified; n(20 °C,D) = 1.4740, d(20 °C,4 °C) = 1.2640.
(3) Source not specified, purity not specified; boiling point = 120 °C/0.67 kPa, meeting point = 6.0 °C, n(20 °C,D) = 1.4295, d(20 °C,4 °C) = 0.8246.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.34. +1,2,3-Propanetriol+1-Undecanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2,3-Propanetriol; $C_3H_8O_3$; [56-81-5]
(3) 1-Undecanol; $C_{11}H_{24}O$; [112-42-5]

Original Measurements:

I. K. Zhuravleva and N. R. Mukhametshin, Zh. Obshch. Khim. **49**, 1217–22 (1979).

Variables:

T/K = 314–409

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass content of (2), respectively, 15.0, 35.0, and 55.0 mass % and also in ternary mixtures with constant mass relationship of (1) and (3) as 15.0:85.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, respectively, and also in ternary mixtures with a constant mass relationship of (1) and (2) as 56.0:44.0, respectively. Numerical data were derived by compiler from graphs in the original paper.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
50.9	324.1	0.333	0.195	0.170	0.150
51.3	324.5	0.785	0.122	0.637	0.150
59.5	332.7	0.451	0.176	0.255	0.150
59.9	333.1	0.729	0.131	0.552	0.150
61.6	334.8	0.699	0.136	0.510	0.150
61.7	334.9	0.552	0.160	0.344	0.150
62.3	335.5	0.633	0.147	0.429	0.150
54.7	327.9	0.516	0.335	0.357	0.350
55.3	328.5	0.238	0.425	0.130	0.350
59.3	332.5	0.286	0.409	0.162	0.350
59.6	332.8	0.484	0.345	0.325	0.350
61.0	334.2	0.332	0.394	0.195	0.350
61.3	334.5	0.449	0.356	0.292	0.350
62.2	335.4	0.413	0.368	0.260	0.350
46.4	319.6	0.081	0.659	0.045	0.550
50.0	323.2	0.281	0.569	0.180	0.550
59.2	332.4	0.133	0.636	0.076	0.550
59.4	332.6	0.252	0.583	0.157	0.550
60.9	334.1	0.155	0.626	0.090	0.550
61.6	334.8	0.221	0.596	0.135	0.550
62.0	335.2	0.189	0.611	0.113	0.550

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.9	314.1	0.314	0.056	0.144	0.039
42.8	316.0	0.320	0.035	0.146	0.024
44.3	317.5	0.324	0.019	0.147	0.013
45.2	318.4	0.310	0.070	0.143	0.049
45.7	318.9	0.332	0.000	0.150	0.000
53.0	326.2	0.308	0.073	0.142	0.051
59.6	332.8	0.307	0.077	0.142	0.054
77.2	350.4	0.302	0.091	0.140	0.064
56.3	329.5	0.524	0.043	0.289	0.036
56.5	329.7	0.529	0.034	0.292	0.028
57.8	331.0	0.541	0.013	0.297	0.011
59.1	332.3	0.547	0.000	0.300	0.000
69.1	342.3	0.517	0.055	0.286	0.046

77.1	350.3	0.513	0.062	0.284	0.052
80.3	353.5	0.510	0.069	0.283	0.058
59.4	332.6	0.623	0.046	0.383	0.043
60.0	333.2	0.632	0.031	0.388	0.029
60.9	334.1	0.644	0.014	0.395	0.013
61.9	335.1	0.653	0.000	0.400	0.000
65.6	338.8	0.616	0.057	0.379	0.053
79.6	352.8	0.607	0.070	0.374	0.065
60.4	333.6	0.707	0.043	0.478	0.044
61.3	334.5	0.718	0.027	0.486	0.028
62.3	335.5	0.730	0.012	0.494	0.012
63.0	336.2	0.705	0.045	0.477	0.046
63.2	336.4	0.738	0.000	0.500	0.000
66.1	339.3	0.704	0.047	0.476	0.048
79.6	352.8	0.692	0.063	0.468	0.064
60.4	333.6	0.778	0.038	0.575	0.042
61.2	334.4	0.789	0.025	0.583	0.028
62.3	335.5	0.798	0.013	0.591	0.015
63.0	336.2	0.809	0.000	0.600	0.000
65.9	339.1	0.774	0.043	0.571	0.048
73.6	346.8	0.769	0.049	0.567	0.055
80.0	353.2	0.764	0.055	0.563	0.061
60.4	333.6	0.847	0.025	0.679	0.030
61.4	334.6	0.858	0.012	0.690	0.014
62.4	334.6	0.858	0.012	0.690	0.014
62.4	335.6	0.868	0.000	0.700	0.000
62.9	336.1	0.842	0.031	0.674	0.037
66.5	339.7	0.839	0.033	0.672	0.040
70.6	343.8	0.836	0.037	0.668	0.045
57.1	330.3	0.899	0.021	0.778	0.028
58.1	331.3	0.909	0.011	0.789	0.014
59.1	332.3	0.919	0.000	0.800	0.000
61.7	334.9	0.894	0.027	0.772	0.035
63.0	336.2	0.891	0.030	0.769	0.039
67.4	340.6	0.887	0.035	0.764	0.045
47.8	321.0	0.951	0.011	0.886	0.016
49.0	322.2	0.962	0.000	0.900	0.000
52.2	325.4	0.947	0.016	0.880	0.022
67.0	340.2	0.943	0.020	0.875	0.028
75.5	348.7	0.935	0.028	0.865	0.039
133.4	406.6	0.657	0.342	0.558	0.438
133.6	406.8	0.656	0.341	0.556	0.437
134.0	407.2	0.655	0.341	0.554	0.435
134.6	407.8	0.653	0.340	0.551	0.433
135.0	408.2	0.652	0.340	0.549	0.431
135.6	408.8	0.651	0.339	0.546	0.429

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method[1] was used. No experimental details given.

Source and Purity of Materials:
(1) Source not specified; purity not specified; boiling point = 101.3 °C, n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified, purity not specified; n(20 °C,D) = 1.4740, d(20 °C,4 °C) = 1.2640.
(3) Source not specified, purity not specified; boiling point = 144 °C/2.67 kPa, melting point = 15.1 °C, n(20 °C,D) = 1.4392, d(20 °C,4 °C) = 0.8330.

Estimated Error:
Not specified.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.35. +1,2,3-Propanetriol+1-Dodecanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2,3-Propanetriol; $C_3H_8O_3$; [56-81-5]
(3) 1-Dodecanol; $C_{12}H_{26}O$; [112-53-8]

Original Measurements:
I. K. Zhuravleva and N. R. Mukhametshin, Zh. Obshch. Khim. **49**, 1217–22 (1979).

Variables:
T/K = 317–410

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass content of (2), respectively, 15.0, 35.0, and 55.0 mass % and also in ternary mixtures with constant mass relationship of (1) and (3) as 15.0:85.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, respectively, and also in ternary mixtures with a constant mass relationship of (1) and (2) as 56.0:44.0, respectively. Additional data were reported in graphical form.

TABLE 1. Solubility temperatures of the three liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
43.5	316.7	0.814	0.119	0.680	0.150
61.7	334.9	0.420	0.189	0.221	0.150
65.8	339.0	0.753	0.130	0.577	0.150
67.8	341.0	0.675	0.144	0.467	0.150
49.0	322.2	0.552	0.328	0.390	0.350
53.5	326.7	0.178	0.459	0.090	0.350
65.5	338.7	0.490	0.350	0.325	0.350
65.7	338.9	0.310	0.413	0.174	0.350
67.4	340.6	0.377	0.389	0.225	0.350
50.6	323.8	0.071	0.678	0.038	0.550
55.2	328.4	0.284	0.576	0.180	0.550
63.2	336.4	0.121	0.654	0.067	0.550
66.5	339.7¶	0.157	0.637	0.090	0.550
67.1	340.3	0.224	0.605	0.135	0.550

TABLE 2. Solubility temperatures of the two liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
46.6	319.8	0.335	0.044	0.146	0.029
47.7	320.9	0.343	0.018	0.148	0.012
49.2	322.4	0.350	0.000	0.150	0.000
61.8	335.0	0.326	0.069	0.143	0.046
66.1	339.3	0.322	0.078	0.142	0.052
75.5	348.7	0.318	0.091	0.141	0.061
60.6	333.8	0.538	0.051	0.288	0.041
61.2	334.4	0.548	0.032	0.292	0.026
62.4	335.6	0.558	0.015	0.296	0.012
63.6	336.8	0.567	0.000	0.300	0.000
63.9	337.1	0.532	0.062	0.285	0.050
73.3	346.5	0.527	0.071	0.283	0.058
78.0	348.2	0.523	0.078	0.281	0.063
64.0	337.2	0.641	0.045	0.384	0.041
64.4	337.6	0.652	0.027	0.390	0.024
65.6	338.8	0.661	0.013	0.395	0.012
66.4	339.6	0.671	0.000	0.400	0.000

76.9	350.1	0.627	0.065	0.376	0.059
82.6	355.8	0.621	0.074	0.373	0.067
86.3	359.5	0.615	0.082	0.370	0.074
64.6	337.8	0.725	0.038	0.481	0.038
65.2	338.4	0.735	0.024	0.488	0.024
66.1	339.3	0.746	0.010	0.495	0.010
67.2	340.4	0.753	0.000	0.500	0.000
68.0	341.2	0.717	0.048	0.476	0.048
76.8	350.0	0.710	0.058	0.471	0.058
83.0	356.2	0.705	0.064	0.468	0.064
65.5	338.7	0.794	0.033	0.578	0.036
66.4	339.6	0.808	0.015	0.590	0.017
67.5	340.7	0.821	0.000	0.600	0.000
71.2	344.4	0.785	0.044	0.571	0.048
74.3	347.5	0.779	0.051	0.566	0.056
78.3	351.5	0.776	0.055	0.564	0.060
65.1	338.3	0.855	0.025	0.679	0.030
66.1	339.3	0.867	0.011	0.691	0.013
67.2	340.4	0.877	0.000	0.700	0.000
76.5	349.7	0.840	0.042	0.665	0.050
81.5	354.7	0.837	0.046	0.662	0.055
85.0	358.2	0.831	0.053	0.656	0.063
62.4	335.6	0.906	0.020	0.779	0.026
63.2	336.4	0.914	0.011	0.789	0.014
63.7	336.9	0.924	0.000	0.800	0.000
71.9	345.1	0.898	0.029	0.770	0.037
79.0	352.2	0.891	0.036	0.763	0.046
81.5	354.7	0.888	0.039	0.760	0.050
52.4	325.6	0.952	0.014	0.883	0.019
52.8	326.0	0.960	0.006	0.893	0.008
53.6	326.8	0.965	0.000	0.900	0.000
66.9	340.1	0.938	0.028	0.865	0.039
74.8	348.0	0.934	0.032	0.860	0.045
79.1	352.3	0.931	0.035	0.856	0.049
133.2	406.4	0.657	0.342	0.558	0.438
133.8	407.0	0.655	0.341	0.555	0.436
135.8	409.0	0.654	0.340	0.552	0.433
136.5	409.7	0.651	0.339	0.546	0.429
137.2	410.4	0.650	0.339	0.545	0.428

*These tables were prepared by the compiler from the published curve of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method[1] was used. No experimental details given.

Source and Purity of Materials:
(1) Source not specified; purity not specified; boilingpoint = 101.3 °C, n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified, purity not specified; n(20 °C,D) = 1.4740, d(20 °C,4 °C) = 1.2640.
(3) Source not specified, purity not specified; boiling point = 155 °C/1.33 kPa, melting point = 23.3 °C, n(24 °C,D) = 1.4420, d(24 °C,4 °C) = 0.8310.

Estimated Error:
Not specified.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.36. +1,2,3-Propanetriol+1-Tridecanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2,3-Propanetriol; $C_3H_8O_3$; [56-81-5]
(3) 1-Tridecanol; $C_{13}H_{28}O$;[112-70-9]

Original Measurements:
I. K. Zhuravleva and N. R. Mukhametshin, Zh. Obshch. Khim. **49**, 1217–22 (1979).

Variables:
T/K = 324–412

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass content of (2), respectively, 15.0, 35.0, and 45.0 mass % and also in ternary mixtures with constant mass relationship of (1) and (3) as 15.0:85.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, respectively, and also in ternary mixtures with a constant mass relationship of (1) and (2) as 56.0:44.0, respectively. Additional data were reported in graphical form.

TABLE 1. Solubility temperatures of the three liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
49.1	352.3	0.822	0.119	0.689	0.150
63.8	337.0	0.432	0.194	0.221	0.150
65.9	339.1	0.771	0.129	0.595	0.150
69.6	342.8	0.715	0.139	0.510	0.150
69.7	342.9	0.572	0.167	0.340	0.150
53.1	326.3	0.556	0.331	0.390	0.350
61.7	334.9	0.202	0.464	0.101	0.350
68.6	341.8	0.495	0.354	0.325	0.350
68.8	342.0	0.309	0.424	0.169	0.350
70.3	343.5	0.387	0.394	0.228	0.350
52.2	325.4	0.109	0.592	0.055	0.450
66.7	339.9	0.388	0.468	0.248	0.450
67.8	341.0	0.203	0.550	0.110	0.450
70.2	343.4	0.321	0.497	0.193	0.450

TABLE 2. Solubility temperatures of the two liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
51.1	324.3	0.347	0.057	0.145	0.036
52.5	325.7	0.352	0.038	0.146	0.024
53.9	327.1	0.359	0.021	0.148	0.013
55.4	328.8	0.367	0.000	0.150	0.000
70.6	343.8	0.336	0.082	0.142	0.052
80.3	353.5	0.329	0.101	0.140	0.065
85.9	359.1	0.327	0.109	0.140	0.070
64.6	337.8	0.557	0.046	0.289	0.036
65.0	338.2	0.552	0.056	0.287	0.043
65.7	338.9	0.568	0.028	0.293	0.022
66.3	339.5	0.585	0.000	0.300	0.000
77.0	350.2	0.545	0.067	0.284	0.053
85.6	356.8	0.538	0.080	0.281	0.063
93.3	366.5	0.530	0.094	0.278	0.074
67.2	340.4	0.657	0.042	0.385	0.037
68.1	341.3	0.671	0.022	0.392	0.019
69.1	342.3	0.686	0.000	0.400	0.000

71.5	344.7	0.653	0.049	0.383	0.043
75.9	349.1	0.651	0.052	0.382	0.046
90.0	363.2	0.642	0.065	0.377	0.058
68.7	341.9	0.738	0.037	0.482	0.036
69.1	342.3	0.754	0.016	0.492	0.016
69.6	342.8	0.766	0.000	0.500	0.000
72.6	345.8	0.728	0.051	0.475	0.050
78.3	351.5	0.723	0.057	0.472	0.056
90.0	363.2	0.707	0.077	0.462	0.076
68.4	341.6	0.801	0.037	0.576	0.040
69.1	342.3	0.819	0.015	0.590	0.016
70.0	343.2	0.831	0.000	0.600	0.000
80.3	353.5	0.791	0.048	0.569	0.052
85.7	358.9	0.784	0.056	0.563	0.061
90.0	363.2	0.776	0.066	0.557	0.071
67.4	340.6	0.858	0.030	0.675	0.036
67.8	341.0	0.874	0.013	0.690	0.015
68.3	341.5	0.884	0.000	0.700	0.000
70.6	343.8	0.848	0.041	0.666	0.049
77.7	350.9	0.842	0.048	0.660	0.057
83.7	356.9	0.837	0.053	0.656	0.063
64.9	338.1	0.906	0.026	0.774	0.033
65.7	338.9	0.920	0.010	0.790	0.013
66.1	339.3	0.929	0.000	0.800	0.000
68.7	341.9	0.904	0.027	0.772	0.035
74.7	347.9	0.902	0.029	0.770	0.038
80.9	354.1	0.898	0.034	0.765	0.044
57.0	330.2	0.956	0.011	0.886	0.016
57.8	331.0	0.967	0.000	0.900	0.000
65.8	339.0	0.946	0.022	0.872	0.031
72.2	345.4	0.943	0.025	0.869	0.035
77.4	350.6	0.940	0.028	0.865	0.039
133.8	407.0	0.657	0.342	0.558	0.438
135.0	408.2	0.655	0.341	0.554	0.436
136.4	409.6	0.654	0.340	0.551	0.433
136.8	410.0	0.653	0.340	0.549	0.431
138.6	411.8	0.651	0.339	0.546	0.429

*These tables were prepared by the compiler from the published curve of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; boiling point = 101.3 °C, n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified, purity not specified; n(20 °C,D) = 1.4740, d(20 °C,4 °C) = 1.2640.
(3) Source not specified; purity not specified; boiling point = 117 °C/0.067 kPa, melting point = 30.5 °C, n(40 °C,D) = 1.4373, d(34 °C,4 °C) = 0.8223.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.37. +Propylene Carbonate+N,N-Diethylethanamine

Components:

(1) Nitromethane; CH_3NO_2; [75-52]
(2) Propylene carbonate; $C_4H_6O_3$; [108-32-7]
(3) N,N-Diethylethanamine; $C_6H_{15}N$; [121-44-8]

Original Measurements:

S. I. Sinegubova, A. G. Demakhin, V. M. Ovsyannikov, and V. Shnarevich, Zh. Obshch. Khim. **58**, 1718–23 (1988).

Variables:

T/K = 263–323

Prepared By:

V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, propylene carbonate, and N,N-diethylethanamine in mass percent over the specified temperature range was presented in graphical form in the original publication. The numerical data in Table 1 below were provided by Dr. S. I. Sinegubova at the request of the compiler.

TABLE 1. Mutual solubility of nitromethane, propylene carbonate, and N,N-diethylethanamine

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
−10.0	263.2	0.7869	0.1527	0.0973	0.8389
		0.5472	0.3929	0.2792	0.6503
		0.2613	0.6794	0.5593	0.3597
		0.0965	0.8298	0.7453	0.1449
		0.0648	0.8550	0.7798	0.0989
		0.0467	0.8699	0.8008	0.0719
20.0	293.2	0.7715	0.1475	0.0938	0.8207
		0.5317	0.3801	0.2685	0.6282
		0.3712	0.5252	0.3985	0.4711
		0.1858	0.6791	0.5595	0.2560
		0.1141	0.7256	0.6138	0.1614
		0.0897	0.7368	0.6273	0.1277
		0.0682	0.7470	0.6398	0.0977
		0.0428	0.7656	0.6630	0.0620
		0.0185	0.7656	0.6632	0.0268
		0.0119	0.7584	0.6543	0.0172
		0.0093	0.7233	0.6118	0.0132
		0.6654	0.0052	0.5453	0.0072
		0.6483	0.0032	0.5265	0.0044
		0.6348	0.0027	0.5137	0.0037
		0.6114	0.0021	0.4869	0.0028
		0.6057	0.0020	0.4809	0.0026
		0.5253	0.0054	0.4003	0.0069
		0.3496	0.0178	0.2448	0.0208
		0.1560	0.0290	0.1003	0.0312
50.0	323.2	0.1455	0.7454	0.0925	0.7925
		0.3606	0.5015	0.2525	0.5875
		0.4498	0.3852	0.3289	0.4711
		0.4813	0.3370	0.3575	0.4187
		0.5087	0.2941	0.3832	0.3705
		0.5217	0.2605	0.3957	0.3305
		0.5274	0.2328	0.4013	0.2962
		0.5276	0.2113	0.4015	0.2690
		0.5282	0.1867	0.4022	0.2378
		0.5146	0.1694	0.3893	0.2144
		0.4744	0.1374	0.3520	0.1705
50.0	323.2	0.4619	0.1353	0.3406	0.1669
		0.4556	0.1281	0.3350	0.1575
		0.4404	0.1273	0.3280	0.1537
		0.4159	0.1180	0.3001	0.1424
		0.3561	0.0981	0.2499	0.1151
		0.2612	0.0721	0.1756	0.0811
		0.1561	0.0429	0.0973	0.0447

TABLE 2. Estimated plait point of ternary system

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.0	293.2	0.6115	0.0021	0.4869	0.0028
50.0	323.2	0.4556	0.1281	0.3350	0.1575

Auxiliary Information

Method/Apparatus/Procedure:
Both titration[1] and synthetic[2] methods were used. No experimental details given.

Source and Purity of Materials:
(1) Source not specified; pure grade reagent; dried and twice distilled; boiling point = 101.°C, n(20 °C,D) = 1.3819.
(2) Source not specified, CP reagent; distilled over a packed column of 25 theoretical plates; boiling point = 91–93 °C/1.33 kPa, n(20 °C,D) = 1.4209.
(3) Source not specified technical grade; dried and distilled; boiling point = 89.5–89.7 °C, n(20 °C,D) = 1.4010.

Estimated Error:
Not specified.

References:
[1]W. D. Bancroft, Phys. Rev. 3, 21 (1896).
[2]V. F. Alekseev, Gorn. Zh. 2, 285 (1885).

6.38. +2,2′-Iminobisethanol+N,N-Diethylethanamine

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2,2′-Iminobisethanol; $C_4H_{11}NO_2$; [111-42-2]
(3) N,N-Diethylethanamine; $C_6H_{15}N$; [121-44-8]

Original Measurements:
I. K. Zhuravleva, E. F. Zhuravlev, and P. S. Islamova, Zh. Fiz. Khim. **48**, 1863 (1974)
*Deposited Doc., VINITI 855 (1974).

Variables:
T/K = 273–344

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (3) as 10.0:90.0, 20.0:80.0, 30.1:69.9, 40.0:60.0, 50.0:50.0, 60.0:40.0, 80.0:20.0, 84.5:15.5, and 89.9:10.1, respectively. These data were also reported in a graphical form.

Solubility temperatures of the liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
0.0	273.2	0.134	0.138	0.085	0.150
4.5	277.7	0.139	0.105	0.089	0.115
11.3	284.5	0.146	0.064	0.093	0.051
16.5	289.7	0.149	0.046	0.095	0.051
25.2	298.4	0.150	0.036	0.096	0.040
11.3	284.5	0.222	0.242	0.273	0.273
20.0	293.2	0.236	0.192	0.218	0.218
25.5	298.7	0.243	0.169	0.193	0.193
30.4	303.6	0.250	0.147	0.169	0.169
34.5	307.7	0.255	0.130	0.150	0.150
41.4	314.6	0.261	0.109	0.126	0.126
53.2	326.4	0.268	0.086	0.100	0.100
65.3	338.5	0.269	0.082	0.090	0.095
3.9	277.1	0.168	0.597	0.106	0.648
4.6	277.8	0.156	0.626	0.098	0.676
5.0	278.2	0.180	0.568	0.114	0.621
6.3	279.5	0.188	0.547	0.120	0.600
8.4	281.6	0.200	0.520	0.128	0.574
8.8	282.0	0.132	0.683	0.082	0.728
13.3	286.5	0.116	0.721	0.071	0.763
14.5	287.7	0.221	0.470	0.143	0.525
19.5	292.7	0.236	0.434	0.154	0.488
20.0	293.2	0.103	0.754	0.063	0.792
24.7	297.9	0.098	0.763	0.060	0.800
25.7	298.9	0.253	0.392	0.167	0.445
28.8	302.0	0.094	0.773	0.057	0.809
39.2	302.4	0.282	0.322	0.189	0.371
45.0	318.2	0.294	0.295	0.198	0.343
55.0	328.2	0.305	0.267	0.207	0.312
60.0	333.2	0.310	0.256	0.211	0.300
70.8	344.0	0.315	0.244	0.215	0.287
34.1	307.3	0.205	0.610	0.131	0.672
35.2	308.4	0.183	0.651	0.116	0.710
37.6	310.8	0.176	0.665	0.111	0.723
38.0	311.2	0.227	0.567	0.147	0.632
40.9	314.1	0.242	0.539	0.158	0.605
43.8	317.0	0.157	0.700	0.098	0.754
49.4	322.6	0.145	0.725	0.090	0.776
52.4	325.6	0.134	0.745	0.083	0.793
57.0	330.2	0.127	0.759	0.078	0.805
65.0	338.2	0.116	0.780	0.071	0.823
0.0	273.2	0.615	0.015	0.490	0.020
5.6	278.8	0.618	0.009	0.494	0.012

10.2	283.4	0.624	0.000	0.500	0.000
0.5	273.7	0.704	0.013	0.589	0.018
5.1	278.3	0.708	0.007	0.594	0.010
8.3	281.5	0.713	0.000	0.600	0.000
4.6	277.8	0.647	0.256	0.518	0.353
5.5	278.7	0.417	0.521	0.294	0.633
6.8	280.0	0.632	0.273	0.502	0.373
9.2	282.4	0.434	0.501	0.309	0.614
11.0	284.2	0.601	0.308	0.469	0.414
11.8	285.0	0.451	0.481	0.324	0.595
13.6	286.8	0.574	0.339	0.441	0.449
14.0	287.2	0.470	0.459	0.341	0.574
15.4	288.6	0.547	0.370	0.414	0.482
15.9	289.1	0.513	0.410	0.381	0.524
12.6	285.8	0.399	0.557	0.279	0.670
18.1	291.3	0.742	0.176	0.628	0.257
19.0	292.2	0.427	0.525	0.303	0.641
21.2	294.4	0.725	0.195	0.607	0.282
24.6	297.8	0.460	0.489	0.332	0.607
26.4	299.6	0.682	0.243	0.557	0.341
28.0	301.2	0.482	0.464	0.352	0.583
28.3	301.5	0.658	0.269	0.530	0.373
30.0	303.2	0.624	0.306	0.493	0.416
31.4	304.6	0.567	0.371	0.433	0.488
31.4	304.6	0.534	0.407	0.401	0.526
0.5	273.7	0.361	0.615	0.247	0.725
8.8	282.0	0.372	0.603	0.256	0.715
14.6	287.8	0.875	0.066	0.805	0.104
15.0	288.2	0.389	0.585	0.270	0.700
20.0	293.2	0.401	0.572	0.280	0.689
25.2	298.4	0.856	0.086	0.778	0.135
25.6	298.8	0.425	0.546	0.301	0.665
32.1	305.3	0.829	0.115	0.740	0.177
33.1	306.3	0.464	0.504	0.335	0.627
37.6	310.8	0.790	0.157	0.688	0.235
38.2	311.4	0.499	0.467	0.367	0.592
39.7	312.9	0.763	0.186	0.653	0.274
41.1	314.3	0.538	0.425	0.404	0.550
42.0	315.2	0.735	0.216	0.618	0.313
43.6	316.8	0.698	0.255	0.574	0.361
43.8	317.0	0.592	0.368	0.458	0.490
44.4	317.6	0.634	0.323	0.502	0.441

*This table was prepared by the compiler from the published curve of ternary system solubility.

The compositions of two coexistent liquid phases at 20 °C are presented in graphical form.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phases were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; freshly distilled.
(2) Source not specified, freshly distilled.
(3) Source not specified, freshly distilled.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

6.39. +2,2′-Iminobisethanol+1-Heptanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2,2′-Iminobisethanol; $C_4H_{11}NO_2$; [111-42-2]
(3) 1-Heptanol; $C_7H_{16}O$; [111-70-6]

Original Measurements:

I. K. Zhuravleva and T. M. Gabbasov, Zh. Obshch. Khim. **64**, 1948–50 (1994).

Variables:

T/K = 299–339

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass content of (1), as 35, 40, 50, 60, 70, and 80 mass %, respectively. The data were also reported in graphical form.

Solubility temperatures of the liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
25.5	298.7	0.487	0.394	0.350	0.487
25.9	299.1	0.486	0.419	0.350	0.520
26.0	299.2	0.488	0.369	0.350	0.455
27.7	300.9	0.490	0.343	0.350	0.423
28.1	301.3	0.485	0.444	0.350	0.553
29.0	302.2	0.491	0.318	0.350	0.390
31.1	304.3	0.492	0.292	0.350	0.357
33.3	306.5	0.484	0.469	0.350	0.585
33.4	306.6	0.493	0.266	0.350	0.325
36.2	309.4	0.495	0.240	0.350	0.293
38.3	311.5	0.496	0.214	0.350	0.260
40.0	313.2	0.497	0.188	0.350	0.227
42.0	315.2	0.482	0.494	0.350	0.617
53.1	326.3	0.481	0.519	0.350	0.650
29.5	302.7	0.540	0.353	0.400	0.450
30.0	303.2	0.542	0.330	0.400	0.420
30.3	303.5	0.539	0.376	0.400	0.480
31.5	304.7	0.543	0.307	0.400	0.390
33.4	306.6	0.544	0.284	0.400	0.360
34.4	307.6	0.538	0.398	0.400	0.510
35.4	308.6	0.545	0.261	0.400	0.330
37.2	310.4	0.547	0.238	0.400	0.300
39.1	312.3	0.537	0.421	0.400	0.540
39.4	312.6	0.548	0.215	0.400	0.270
41.1	314.3	0.549	0.191	0.400	0.240
48.0	321.2	0.536	0.443	0.400	0.570
58.9	332.1	0.534	0.467	0.400	0.600
31.1	304.3	0.638	0.278	0.500	0.375
31.7	304.9	0.637	0.296	0.500	0.400
32.3	305.5	0.639	0.260	0.500	0.350
34.6	307.8	0.640	0.242	0.500	0.325
35.2	308.4	0.636	0.314	0.500	0.425
37.3	310.5	0.642	0.223	0.500	0.300
39.6	312.8	0.643	0.205	0.500	0.275
41.5	314.7	0.644	0.187	0.500	0.250
41.6	314.8	0.635	0.332	0.500	0.450
50.7	323.2	0.634	0.350	0.500	0.475
63.5	336.7	0.633	0.367	0.500	0.500
32.5	305.7	0.725	0.224	0.600	0.320

33.2	306.4	0.726	0.211	0.600	0.300
34.2	307.4	0.724	0.238	0.600	0.340
35.5	308.7	0.727	0.197	0.600	0.280
38.2	311.4	0.728	0.183	0.600	0.260
40.9	314.1	0.723	0.252	0.600	0.360
41.5	314.7	0.729	0.169	0.600	0.240
50.7	323.9	0.722	0.265	0.600	0.380
64.8	338.0	0.721	0.279	0.600	0.400
31.8	305.0	0.803	0.170	0.700	0.255
33.1	306.3	0.804	0.160	0.700	0.240
36.8	310.0	0.805	0.150	0.700	0.225
38.1	311.3	0.802	0.180	0.700	0.270
40.5	313.7	0.805	0.140	0.700	0.210
47.9	321.1	0.801	0.190	0.700	0.285
65.8	339.0	0.801	0.199	0.700	0.300
31.1	304.3	0.874	0.114	0.800	0.180
32.2	305.4	0.875	0.108	0.800	0.170
36.6	309.8	0.875	0.102	0.800	0.160
42.7	315.9	0.874	0.120	0.800	0.190
64.3	337.5	0.873	0.127	0.800	0.200

*This table was prepared by the compiler from the published curve of ternary system solubility.

The compositions of two coexistent liquid phases at 32 °C are presented in graphical form.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phases were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; $n(20\ °C,D) = 1.3820$, $d(20\ °C,4\ °C) = 1.1320$.
(2) Source not specified, purity not specified; $n(20\ °C,D) = 1.4770$, $d(20\ °C,4\ °C) = 1.0963$.
(1) Source not specified, purity not specified; $n(20\ °C,D) = 1.4240$, $d(20\ °C,4\ °C) = 0.8235$.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian), (Saratov University Press, 1969).

6.40. +2,2′-Iminobisethanol+Octane

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2,2′-Iminobisethanol; $C_4H_{11}NO_2$; [111-42-2]
(3) Octane; C_8H_{18}; [111-65-9]

Original Measurements:

N. M. Cherkasova, I. K. Zhuravleva, E. F. Zhuravlev, and V. B. Mukhametshina, Izv. Vyssh. Uchebn. Zaved., Khim. Khim. Tekhnol. **17**, 1602 (1974).
*Deposited Doc., VINITI 1181 (1974).

Variables:

T/K = 309–366

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of the three liquid phases were determined in ternary mixtures with a constant mass content of (3), respectively, 30.0, 50.0, and 70.0 mass %. These data were also reported in graphical form. The solubility temperatures of the two liquid phases were determined in ternary mixtures with a constant mass relationship of (1) and (2) as 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, respectively.

TABLE 1. Solubility temperatures of the three liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
35.5	308.7	0.243	0.453	0.153	0.490
43.7	316.9	0.416	0.065	0.277	0.075
48.5	321.7	0.261	0.413	0.165	0.450
50.0	323.2	0.408	0.083	0.271	0.095
55.4	328.6	0.398	0.105	0.264	0.120
55.9	329.1	0.281	0.367	0.179	0.402
58.1	331.3	0.390	0.123	0.258	0.140
59.8	333.0	0.300	0.326	0.192	0.360
61.3	334.5	0.318	0.286	0.205	0.318
61.6	334.8	0.336	0.244	0.218	0.272
61.7	334.9	0.354	0.205	0.231	0.230
49.0	322.2	0.613	0.059	0.462	0.076
50.5	323.7	0.482	0.261	0.341	0.318
55.5	328.7	0.603	0.074	0.452	0.096
55.8	329.0	0.498	0.236	0.355	0.290
58.5	331.7	0.509	0.219	0.365	0.270
61.4	334.6	0.559	0.142	0.410	0.180
49.5	322.7	0.693	0.149	0.556	0.206
56.1	329.3	0.707	0.131	0.572	0.183
56.2	329.4	0.774	0.048	0.651	0.070
60.0	333.2	0.762	0.063	0.636	0.091
61.1	334.3	0.733	0.099	0.602	0.140
61.3	334.5	0.747	0.082	0.618	0.117

*This table was prepared by the compiler from the published curve of ternary system solubility.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
44.2	317.4	0.4215	0.5709	0.2970	0.6930
45.0	318.2	0.4198	0.5688	0.2955	0.6895
51.0	324.2	0.4195	0.5683	0.2952	0.6888
62.0	335.2	0.4182	0.5666	0.2940	0.6860
81.0	354.2	0.4166	0.5644	0.2925	0.6825

91.0	364.2	0.4156	0.5631	0.2916	0.6804
56.5	329.7	0.5307	0.4621	0.3960	0.5940
56.8	330.0	0.5282	0.4596	0.3932	0.5894
70.0	343.2	0.5249	0.4571	0.3900	0.5850
88.0	361.2	0.5241	0.4565	0.3892	0.5838
91.0	364.2	0.5230	0.4554	0.3880	0.5820
62.5	335.7	0.6305	0.3661	0.4975	0.4975
63.0	336.2	0.6284	0.3648	0.4950	0.4950
63.2	336.4	0.6271	0.3641	0.4935	0.4935
63.5	336.7	0.6241	0.3623	0.4900	0.4900
63.8	337.0	0.6197	0.3598	0.4850	0.4850
73.0	346.2	0.6176	0.3585	0.4825	0.4825
64.0	337.2	0.7163	0.2772	0.5940	0.3960
64.1	337.3	0.7140	0.2763	0.5910	0.3940
64.3	337.5	0.7116	0.2754	0.5880	0.3920
64.5	337.7	0.7093	0.2745	0.5850	0.3900
69.3	342.5	0.7069	0.2736	0.5820	0.3880
78.5	351.7	0.7031	0.2721	0.5772	0.3848
93.0	366.2	0.6974	0.2699	0.5700	0.3800
64.1	337.3	0.7983	0.1986	0.6965	0.2985
64.2	337.4	0.7968	0.1983	0.6944	0.2976
64.3	337.5	0.7948	0.1978	0.6916	0.2964
65.0	338.2	0.7909	0.1968	0.6860	0.2940
65.5	338.7	0.7884	0.1962	0.6825	0.2925
65.8	339.0	0.7869	0.1958	0.6804	0.2916
76.5	349.7	0.7809	0.1943	0.6720	0.2880
80.0	353.2	0.7783	0.1937	0.6685	0.2865
89.8	363.0	0.7717	0.1920	0.6594	0.2826
63.4	336.6	0.8717	0.1265	0.7976	0.1994
63.5	336.7	0.8697	0.1262	0.7944	0.1986
63.7	336.9	0.8666	0.1258	0.7896	0.1974
63.8	337.0	0.8630	0.1252	0.7840	0.1960
63.9	337.1	0.8604	0.1249	0.7800	0.1950
64.0	337.2	0.8578	0.1245	0.7760	0.1940
70.0	343.2	0.8525	0.1238	0.7680	0.1920
75.0	348.2	0.8499	0.1233	0.7640	0.1910
85.0	358.2	0.8446	0.1226	0.7560	0.1890
89.0	362.2	0.8419	0.1222	0.7520	0.1880
56.7	329.9	0.9262	0.0597	0.8775	0.0975
57.0	330.2	0.9208	0.0594	0.8685	0.0965
57.1	330.3	0.9181	0.0592	0.8640	0.0960
71.0	344.2	0.9099	0.0587	0.8505	0.0945
76.0	349.2	0.9088	0.0586	0.8487	0.0943
83.0	356.2	0.9071	0.0585	0.8460	0.0940
90.0	363.2	0.9043	0.0583	0.8415	0.0935

The compositions of two and three coexistent phases at 50 °C are also presented in graphical form.

TABLE 3. Composition of three coexistent liquid phases system nitromethane+2,2′-iminobisethanol+octane*

		Nitromethane-rich phase (compiler)		Iminobisethanol-rich phase (compiler)		Octane-rich phase (compiler)	
t/°C	T/K (compiler)	x_1'	x_2'	x_1''	x_2''	x_1'''	x_2'''
50	323	0.962	0.023	0.454	0.535	0.086	0.005

The same data are presented below in mass fractions

		Nitromethane-rich phase		Iminobisethanol-rich phase		Octane-rich phase	
t/°C	T/K (compiler)	w_1'	w_2'	w_1''	w_2''	w_1'''	w_2'''
50	323	0.934	0.039	0.325	0.660	0.048	0.005

*These data were extracted graphically by the compiler.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phases were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; freshly distilled; boiling point = 101 °C, n(20 °C,D) = 1.3816.
(2) Source not specified, freshly distilled; n(20 °C,D) = 1.4770, d(20 °C,4 °C) = 1.0970.
(3) Source not specified, freshly distilled; boiling point = 113 °C, n(20 °C,D) = 1.3975.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

6.41. +2,2′-Iminobisethanol+1-Octanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2,2′-Iminobisethanol; $C_4H_{11}NO_2$; [111-42-2]
(3) 1-Octanol; $C_8H_{18}O$; [111-87-5]

Original Measurements:

I. K. Zhuravleva and T. M. Gabbasov, Zh. Fiz. Khim. **69**, 1711–2 (1995).

Variables:

T/K=297–340

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass content of (1), as 30, 40, 50, 60, 70, and 80 mass %, respectively. These data were also reported in graphical form.

Solubility temperatures of the liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
24.1	297.3	0.434	0.471	0.300	0.560
24.6	297.8	0.437	0.444	0.300	0.525
24.7	297.9	0.432	0.497	0.300	0.595
26.5	299.7	0.439	0.417	0.300	0.490
27.2	300.4	0.429	0.524	0.300	0.630
29.3	302.5	0.442	0.389	0.300	0.455
31.8	305.0	0.444	0.361	0.300	0.420
32.6	305.8	0.427	0.550	0.300	0.665
34.5	307.7	0.447	0.333	0.300	0.385
37.2	310.4	0.450	0.304	0.300	0.350
39.4	312.6	0.452	0.276	0.300	0.315
42.3	315.5	0.455	0.246	0.300	0.280
44.6	317.8	0.458	0.217	0.300	0.245
45.0	318.2	0.425	0.575	0.300	0.300
46.8	320.0	0.460	0.187	0.300	0.210
32.9	306.1	0.544	0.379	0.400	0.480
33.4	306.6	0.547	0.357	0.400	0.450
34.4	307.6	0.542	0.401	0.400	0.510
34.6	307.8	0.549	0.335	0.400	0.420
36.5	309.7	0.552	0.312	0.400	0.390
38.7	311.9	0.539	0.423	0.400	0.540
38.8	312.0	0.554	0.290	0.400	0.360
41.8	315.0	0.557	0.267	0.400	0.330
44.7	317.9	0.560	0.244	0.400	0.300
45.5	318.7	0.537	0.444	0.400	0.570
47.8	319.0	0.562	0.220	0.400	0.270
50.5	323.7	0.565	0.197	0.400	0.240
58.9	332.1	0.535	0.465	0.400	0.600
36.2	309.4	0.642	0.298	0.500	0.400
36.8	310.0	0.644	0.280	0.500	0.375
37.4	310.6	0.639	0.316	0.500	0.425
38.8	312.0	0.646	0.263	0.500	0.350
41.2	314.4	0.649	0.245	0.500	0.325
41.4	314.6	0.637	0.333	0.500	0.450
44.3	317.5	0.651	0.227	0.500	0.300
47.4	320.6	0.653	0.209	0.500	0.275
49.4	322.6	0.635	0.350	0.500	0.475
50.4	323.6	0.656	0.190	0.500	0.250
64.4	337.6	0.633	0.367	0.500	0.500
36.2	309.4	0.729	0.226	0.600	0.320
37.5	310.7	0.727	0.239	0.600	0.340
38.4	311.6	0.731	0.212	0.600	0.300
42.0	315.2	0.733	0.198	0.600	0.280
42.7	315.9	0.725	0.252	0.600	0.360
46.0	319.2	0.735	0.185	0.600	0.260
50.0	323.2	0.737	0.171	0.600	0.240
52.1	325.3	0.723	0.266	0.600	0.380
65.5	338.7	0.721	0.279	0.600	0.400
35.9	309.1	0.805	0.170	0.700	0.255
39.4	312.6	0.807	0.161	0.700	0.240
40.0	313.2	0.804	0.180	0.700	0.270
43.4	316.6	0.808	0.151	0.700	0.225
47.9	321.1	0.810	0.141	0.700	0.210
59.4	332.6	0.802	0.190	0.700	0.285
66.5	339.7	0.801	0.199	0.700	0.300
35.3	308.5	0.875	0.114	0.800	0.180
39.3	312.5	0.876	0.108	0.800	0.170
43.1	316.3	0.877	0.102	0.800	0.160
47.1	320.3	0.874	0.121	0.800	0.190
65.5	338.7	0.873	0.127	0.800	0.200

*This table was prepared by the compiler from the published curve of ternary system solubility.

The compositions of two coexistent liquid phases at 36 °C are presented in graphical form.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phases were determined by the synthetic method. The analytical method was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; dried and distilled; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.322.
(3) Source not specified, dried and distilled; n(20 °C,D) = 1.4776, d(20 °C,4 °C) = 1.0966.
(3) Source not specified, dried and distilled; n(20 °C,D) = 1.4300, d(20 °C,4 °C) = 0.8246.

Estimated Error:

Not specified.

6.42. +2,2′-Iminobisethanol+1-Decanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2,2′-Iminobisethanol; $C_4H_{11}NO_2$; [111-42-2]
(3) 1-Decanol; $C_{10}H_{22}O$; [112-30-1]

Original Measurements:
I. K. Zhuravleva, Zh. Obshch. Khim. **54**, 982–5 (1984).

Variables:
T/K = 298–323

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass content of (1), respectively, 55, 65, and 75 mass %, and also in ternary mixtures with a constant mass relationship of (2) and (3) as 16:84, 32:68, 47:53, 61:39, 75:25, and 89:11, respectively. These data are also presented in graphical form as isothermal curves of ternary system solubility.

Solubility of nitromethane, 2.2′-iminobisethanol and decanol*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler	w_1	w_2
25	298	0.239	0.000	0.108	0.000
		0.258	0.170	0.127	0.144
		0.300	0.291	0.161	0.269
		0.373	0.358	0.221	0.365
		0.409	0.414	0.259	0.451
		0.414	0.586	0.291	0.709
		0.429	0.469	0.286	0.538
		0.459	0.501	0.322	0.605
		0.953	0.027	0.906	0.044
		0.958	0.030	0.920	0.049
		0.968	0.026	0.941	0.044
		0.970	0.013	0.935	0.021
		0.976	0.022	0.958	0.037
		0.977	0.005	0.947	0.009
		0.979	0.021	0.964	0.036
		0.981	0.000	0.953	0.000
30	303	0.272	0.000	0.126	0.000
		0.303	0.160	0.154	0.140
		0.351	0.269	0.195	0.258
		0.410	0.337	0.249	0.352
		0.443	0.557	0.316	0.684
		0.452	0.384	0.294	0.430
		0.460	0.500	0.323	0.605
		0.470	0.435	0.321	0.511
		0.948	0.030	0.896	0.049
		0.951	0.034	0.908	0.056
		0.959	0.034	0.925	0.056
		0.962	0.016	0.919	0.026
		0.970	0.030	0.949	0.051
		0.974	0.000	0.935	0.000
41	314	0.358	0.000	0.177	0.000
		0.398	0.279	0.232	0.280
		0.466	0.534	0.336	0.664
		0.491	0.212	0.302	0.224
		0.542	0.424	0.399	0.537
		0.568	0.246	0.385	0.288
		0.665	0.235	0.500	0.304
		0.697	0.233	0.545	0.314
		0.706	0.200	0.545	0.266
		0.745	0.179	0.596	0.246
		0.848	0.109	0.740	0.164
		0.853	0.095	0.740	0.142
		0.895	0.060	0.802	0.093
		0.935	0.027	0.865	0.043
		0.944	0.039	0.895	0.064
		0.947	0.012	0.882	0.019
		0.956	0.044	0.926	0.074
		0.964	0.000	0.911	0.000
45	318	0.395	0.000	0.201	0.000
		0.489	0.511	0.357	0.643
		0.493	0.116	0.289	0.117
		0.574	0.177	0.376	0.200
		0.689	0.267	0.545	0.364
		0.718	0.152	0.545	0.199
		0.772	0.186	0.642	0.267
		0.792	0.112	0.642	0.156
		0.804	0.161	0.686	0.236
		0.859	0.072	0.740	0.107
		0.873	0.105	0.785	0.162
		0.910	0.037	0.819	0.058
		0.934	0.015	0.855	0.024
		0.944	0.056	0.907	0.093
		0.954	0.000	0.888	0.000
50	323	0.466	0.000	0.252	0.000
		0.510	0.490	0.377	0.623
		0.610	0.090	0.395	0.100
		0.676	0.300	0.539	0.412
		0.733	0.094	0.545	0.120
		0.764	0.212	0.642	0.307
		0.803	0.073	0.642	0.100
		0.839	0.141	0.740	0.215
		0.868	0.044	0.740	0.064
		0.902	0.022	0.794	0.034
		0.920	0.074	0.866	0.120
		0.932	0.068	0.888	0.112
		0.940	0.000	0.858	0.000

* This table was prepared by the compiler from the published curve of ternary system solubility.

The compositions of two coexistent liquid phases at 40 °C are presented in graphical form.

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The solubility temperatures of the liquid phases were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. No experimental details given.

Source and Purity of Materials:
(1) Source not specified; purity not specified; boiling point = 101.3 °C/102 kPa, n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified, purity not specified; boiling point = 217 °C/20 kPa, melting point = 28 °C, n(20 °C,D) = 1.4780, d(20 °C,4 °C) = 1.0965.
(3) Source not specified, purity not specified; boiling point = 111 °C/1.33 kPa, melting point = 6 °C, n(20 °C,D) = 1.4370, d(20 °C,4 °C) = 0.8290.

Estimated Error:
Not specified.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

6.43. +2,2′-Iminobisethanol+1-Undecanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2,2′-Iminobisethanol; $C_4H_{11}NO_2$; [111-42-2]
(3) 1-Undecanol; $C_{11}H_{24}O$; [112-42-5]

Original Measurements:
I. K. Zhuravleva, Zh. Obshch. Khim. **54**, 982–5 (1984).

Variables:
T/K = 293–328

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (2) and (3) as 9:91, 28:72, 39:61, 49:51, 65:35, 75:25, 79:21, and 89:11, respectively. These data are also presented in graphical form as isothermal curves of ternary system solubility.

Solubility of nitromethane, 2,2′-iminobisethanol, and 1-undecanol*

t/ °C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20	293	0.171	0.000	0.068	0.000
		0.200	0.116	0.056	0.086
		0.272	0.282	0.135	0.241
		0.307	0.354	0.164	0.325
		0.335	0.408	0.190	0.399
		0.362	0.480	0.221	0.505
		0.370	0.494	0.231	0.530
		0.371	0.521	0.236	0.570
		0.374	0.539	0.242	0.600
		0.364	0.591	0.241	0.675
		0.340	0.660	0.230	0.770
		0.985	0.000	0.959	0.000
		0.973	0.017	0.943	0.028
		0.983	0.017	0.971	0.029
30	303	0.225	0.000	0.093	0.000
		0.266	0.107	0.120	0.083
		0.335	0.258	0.174	0.230
		0.368	0.322	0.205	0.309
		0.390	0.374	0.229	0.379
		0.420	0.436	0.266	0.476
		0.430	0.447	0.278	0.497
		0.437	0.466	0.289	0.530
		0.437	0.484	0.293	0.559
		0.436	0.524	0.300	0.622
		0.401	0.599	0.280	0.720
		0.979	0.000	0.943	0.000
		0.968	0.107	0.927	0.020
		0.935	0.040	0.870	0.064
		0.966	0.027	0.935	0.045
		0.975	0.025	0.957	0.043
40	313	0.276	0.000	0.119	0.000
		0.348	0.094	0.167	0.078
		0.418	0.226	0.231	0.215
		0.453	0.280	0.268	0.285
		0.490	0.313	0.309	0.340
		0.553	0.336	0.383	0.400
		0.573	0.335	0.407	0.409
		0.568	0.357	0.408	0.442
		0.502	0.463	0.359	0.570
		0.423	0.577	0.299	0.701
		0.973	0.000	0.928	0.000
		0.958	0.016	0.906	0.026
		0.949	0.026	0.892	0.042
		0.934	0.941	0.868	0.065
		0.940	0.045	0.888	0.073
		0.951	0.038	0.909	0.063
		0.966	0.034	0.943	0.057
45	318	0.331	0.000	0.149	0.000
		0.389	0.089	0.193	0.076
		0.487	0.199	0.284	0.200
		0.551	0.229	0.352	0.252
		0.617	0.235	0.429	0.281
		0.897	0.063	0.802	0.097
		0.935	0.025	0.858	0.040
		0.955	0.007	0.888	0.011
		0.966	0.000	0.910	0.000
		0.477	0.523	0.346	0.654
		0.563	0.406	0.417	0.518
		0.657	0.296	0.505	0.392
		0.699	0.249	0.548	0.337
		0.746	0.199	0.600	0.276
		0.827	0.130	0.706	0.191
		0.923	0.060	0.859	0.097
		0.962	0.038	0.937	0.063
55	328	0.445	0.000	0.221	0.000
		0.563	0.063	0.326	0.063
		0.739	0.101	0.541	0.128
		0.871	0.050	0.738	0.073
		0.935	0.000	0.836	0.000
		0.523	0.477	0.389	0.611
		0.758	0.225	0.635	0.324
		0.873	0.118	0.792	0.185
		0.931	0.069	0.887	0.113

* This table was prepared by the compiler from the published curves of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:
The solubility temperatures of the liquid phases were determined by the synthetic method.[1] No experimental details given.

Source and Purity of Materials:
(1) Source not specified; purity not specified; boiling point = 101.3 °C/102 kPa, n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified, purity not specified; boiling point = 217 °C/20 kPa, melting point = 28 °C, n(20 °C,D) = 1.4780, d(20 °C,4 °C) = 1.0965.
(3) Source not specified, purity not specified; boiling point = 123 °C/0.8 kPa, melting point = 15 °C, n(20 °C,D) = 1.4410, d(20 °C,4 °C) = 0.8280.

Estimated Error:
Not specified.

References:
[1] V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.44. +2,2′-Iminobisethanol+1-Dodecanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2,2′-Iminobisethanol; $C_4H_{11}NO_2$; [111-42-2]
(3) 1-Dodecanol; $C_{12}H_{26}O$; [112-53-8]

Original Measurements:
I. K. Zhuravleva, E. F. Zhuravlev, and R. S. Islamova, Zh. Fiz. Khim. **48**, 1863 (1974).
*Deposited Doc., VINITI 873 (1974).

Variables:
T/K = 290–338

Prepared By:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (2) and (3) as 10.0:90.0, 20.0:80.0, 30.0:70.0, 40.0.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, respectively.

Solubility temperatures of the liquid phases

t/ °C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
17.2	290.4	0.180	0.135	0.072	0.093
22.8	296.0	0.991	0.001	0.975	0.002
34.5	307.7	0.263	0.122	0.112	0.089
41.0	314.2	0.976	0.004	0.936	0.006
43.0	316.2	0.337	0.109	0.152	0.085
52.0	325.2	0.961	0.006	0.896	0.010
52.5	325.7	0.425	0.094	0.207	0.079
58.5	331.7	0.518	0.079	0.275	0.072
58.5	331.7	0.937	0.010	0.840	0.016
62.0	335.2	0.918	0.014	0.799	0.020
62.0	335.2	0.593	0.067	0.340	0.066
63.8	337.0	0.681	0.053	0.430	0.057
64.5	337.7	0.754	0.041	0.520	0.048
64.5	337.7	0.886	0.019	0.732	0.027
65.2	338.4	0.857	0.023	0.678	0.032
65.2	338.4	0.821	0.029	0.618	0.038
22.8	296.0	0.225	0.238	0.099	0.180
24.5	297.7	0.989	0.003	0.971	0.006
28.5	301.7	0.252	0.230	0.113	0.177
37.0	310.2	0.310	0.212	0.145	0.171
46.5	319.7	0.419	0.178	0.214	0.157
47.5	320.7	0.966	0.010	0.915	0.017
54.2	327.4	0.534	0.143	0.302	0.140
54.5	327.7	0.947	0.016	0.872	0.025
60.2	333.4	0.655	0.106	0.418	0.117
61.0	334.2	0.903	0.030	0.780	0.044
61.5	334.7	0.729	0.083	0.504	0.099
62.3	335.5	0.784	0.066	0.578	0.084
63.0	336.2	0.852	0.046	0.686	0.063
17.0	290.2	0.994	0.002	0.986	0.004
30.5	303.7	0.311	0.298	0.154	0.254
33.5	306.7	0.981	0.008	0.955	0.013
42.8	316.0	0.968	0.014	0.924	0.023
48.0	321.2	0.465	0.231	0.260	0.222
49.5	322.7	0.951	0.021	0.886	0.034
54.8	328.0	0.593	0.176	0.370	0.189
56.0	329.2	0.924	0.033	0.830	0.051
57.0	330.2	0.653	0.150	0.432	0.170
58.5	331.7	0.738	0.113	0.532	0.140
59.0	332.2	0.788	0.091	0.600	0.120
59.2	332.4	0.872	0.055	0.734	0.080
59.5	332.7	0.822	0.077	0.651	0.105
21.2	294.4	0.991	0.005	0.978	0.009
23.0	295.2	0.306	0.376	0.159	0.337
30.5	303.7	0.979	0.011	0.953	0.019
33.8	307.0	0.371	0.341	0.202	0.319
41.0	314.2	0.962	0.021	0.915	0.034
44.0	317.2	0.474	0.285	0.279	0.289
48.8	322.0	0.938	0.034	0.866	0.054
50.5	323.7	0.579	0.228	0.371	0.252
52.8	326.0	0.910	0.049	0.813	0.075
53.0	326.2	0.647	0.191	0.440	0.224
55.0	328.2	0.752	0.134	0.565	0.174
55.5	328.7	0.860	0.076	0.724	0.110
55.8	329.0	0.824	0.095	0.668	0.133
24.5	297.7	0.341	0.421	0.190	0.405
29.0	302.2	0.981	0.012	0.960	0.020
30.5	303.7	0.376	0.399	0.215	0.393
35.5	308.7	0.965	0.022	0.926	0.037
38.0	311.2	0.440	0.358	0.263	0.368
41.5	314.7	0.946	0.035	0.888	0.056
43.0	316.2	0.493	0.324	0.306	0.347
48.5	321.7	0.911	0.057	0.823	0.089
48.8	322.0	0.602	0.254	0.407	0.296
50.8	324.0	0.675	0.208	0.485	0.258
51.0	324.2	0.869	0.084	0.750	0.125
51.3	324.5	0.749	0.161	0.575	0.213
51.8	325.0	0.799	0.128	0.644	0.178
16.5	289.7	0.995	0.004	0.990	0.006
24.5	297.7	0.371	0.457	0.220	0.468
33.2	306.4	0.982	0.014	0.963	0.024
34.0	307.2	0.434	0.411	0.269	0.438
40.5	313.7	0.500	0.363	0.324	0.405
41.0	314.2	0.959	0.030	0.917	0.050
44.0	317.2	0.931	0.050	0.866	0.080
44.5	317.7	0.580	0.305	0.398	0.361
47.8	321.0	0.880	0.087	0.778	0.133
48.0	321.2	0.682	0.231	0.507	0.296
48.8	322.0	0.742	0.187	0.580	0.252
49.0	322.2	0.821	0.130	0.688	0.187
19.0	292.2	0.356	0.519	0.218	0.548
19.0	292.2	0.995	0.004	0.990	0.007
27.0	300.2	0.405	0.479	0.256	0.521
35.0	308.2	0.471	0.426	0.310	0.483
37.0	310.2	0.978	0.018	0.958	0.030
43.0	316.2	0.551	0.362	0.382	0.433
46.2	319.4	0.619	0.307	0.450	0.385
46.3	319.5	0.953	0.038	0.911	0.062
48.0	321.2	0.720	0.225	0.565	0.304
48.8	322.0	0.748	0.203	0.600	0.280
49.0	322.2	0.815	0.149	0.690	0.217
50.0	323.2	0.843	0.127	0.730	0.189
50.0	323.2	0.897	0.083	0.815	0.130
19.0	292.2	0.556	0.366	0.234	0.613
21.0	294.2	0.005	0.994	0.989	0.009
25.0	298.2	0.534	0.391	0.252	0.599

34.2	307.4	0.473	0.460	0.311	0.551
39.5	312.7	0.022	0.975	0.954	0.037
40.0	313.2	0.414	0.528	0.372	0.503
44.5	317.7	0.340	0.612	0.455	0.436
46.0	319.2	0.037	0.958	0.923	0.062
47.5	320.7	0.275	0.686	0.536	0.371
49.5	322.7	0.220	0.749	0.612	0.310
51.5	324.7	0.172	0.804	0.685	0.252
52.5	325.7	0.108	0.877	0.790	0.168
52.5	325.7	0.072	0.918	0.855	0.116
22.0	295.2	0.565	0.400	0.270	0.657
32.0	305.2	0.524	0.443	0.306	0.625
38.8	312.0	0.019	0.980	0.965	0.031
48.5	321.7	0.036	0.962	0.933	0.060
48.8	322.0	0.376	0.601	0.455	0.491
54.0	327.2	0.264	0.720	0.588	0.371
55.0	328.2	0.062	0.934	0.887	0.102
57.5	330.7	0.172	0.817	0.712	0.259
58.5	331.7	0.102	0.892	0.821	0.161

Compositions of coexisting liquid phases at 45 °C were also reported in graphical form.

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility temperatures of the liquid phases were determined by the synthetic method.[1] The analytical method described in Nikurashina and Mertslin[2] was used for determining equilibrium liquid phase compositions. Samples from coexisting liquid phases at equilibrium were analyzed by refractometry. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; freshly distilled.
(2) Source not specified, freshly distilled.
(3) Source not specified, freshly distilled.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]N. I. Nikurashina and R. V. Mertslin, *Method of Secants* (in Russian) (Saratov University Press, 1969).

6.45. +2,2′-Iminobisethanol+1-Tridecanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2,2′-Iminobisethanol; $C_4H_{11}NO_2$; [111-42-2]
(3) 1-Tridecanol; $C_{13}H_{28}O$; [112-70-9]

Original Measurements:

I. K. Zhuravleva, E. F. Zhuravlev, V. B. Mukhametshina, and Z. Z. Khisametdinova, Zh. Obshch. Khim. **47**, 1686–90 (1977).

Variables:

T/K=298–356

Prepared By:

V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (2) and (3) as 10.0:90.0, 30.0:70.0, 40.0.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, respectively. These data were also reported in graphical form.

Solubility temperature of the liquid phases*

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
29.2	302.4	0.994	0.001	0.981	0.002
34.7	307.9	0.990	0.002	0.971	0.003
40.4	313.6	0.305	0.121	0.127	0.087
45.0	318.2	0.984	0.003	0.953	0.005
52.9	326.1	0.429	0.100	0.200	0.080
53.2	326.4	0.975	0.004	0.929	0.007
59.0	332.2	0.963	0.006	0.896	0.010
60.7	333.9	0.957	0.008	0.881	0.012
60.8	334.0	0.542	0.080	0.282	0.072
62.9	336.1	0.945	0.010	0.852	0.015
66.4	339.6	0.908	0.016	0.767	0.023
66.5	339.7	0.675	0.057	0.408	0.059
67.8	341.0	0.778	0.039	0.538	0.046
67.9	341.1	0.857	0.025	0.665	0.033
34.6	307.8	0.987	0.006	0.968	0.010
36.8	310.0	0.347	0.294	0.171	0.249
36.9	310.1	0.984	0.007	0.959	0.012
39.6	312.8	0.981	0.008	0.952	0.014
48.8	322.0	0.968	0.014	0.922	0.023
49.0	322.2	0.464	0.241	0.251	0.225
50.7	323.9	0.962	0.017	0.908	0.028
54.6	327.8	0.952	0.022	0.885	0.034
55.2	328.4	0.551	0.202	0.322	0.203
56.7	329.9	0.941	0.027	0.861	0.042
58.4	331.6	0.932	0.030	0.842	0.047
60.4	333.6	0.916	0.038	0.808	0.058
60.5	333.7	0.675	0.146	0.446	0.166
61.5	334.7	0.735	0.119	0.518	0.145
62.3	335.5	0.869	0.059	0.719	0.084
62.7	335.9	0.835	0.074	0.662	0.101
27.5	300.7	0.311	0.386	0.158	0.337
29.2	302.4	0.982	0.010	0.958	0.017
29.6	302.8	0.058	0.527	0.025	0.390
32.1	305.3	0.343	0.368	0.178	0.329
32.2	305.4	0.979	0.012	0.951	0.020
35.0	308.2	0.976	0.013	0.945	0.022
37.5	310.7	0.972	0.016	0.935	0.026
38.2	311.4	0.387	0.343	0.208	0.317
40.4	313.6	0.968	0.018	0.927	0.029
42.3	315.5	0.432	0.318	0.240	0.304
45.9	319.1	0.957	0.024	0.903	0.039
46.2	319.4	0.469	0.297	0.268	0.293
49.0	322.2	0.515	0.272	0.306	0.278

49.4	322.6	0.019	0.549	0.008	0.397
50.4	323.6	0.943	0.032	0.873	0.051
53.3	326.5	0.000	0.560	0.000	0.400
53.9	327.1	0.928	0.040	0.843	0.063
54.4	327.6	0.601	0.223	0.385	0.246
55.3	328.5	0.643	0.200	0.428	0.229
55.7	328.9	0.916	0.047	0.819	0.072
56.8	330.0	0.689	0.174	0.479	0.208
56.9	330.1	0.904	0.054	0.796	0.082
57.7	330.9	0.736	0.148	0.536	0.186
58.2	331.4	0.772	0.127	0.584	0.166
58.7	331.9	0.802	0.111	0.627	0.149
58.9	332.1	0.878	0.068	0.749	0.100
59.3	332.5	0.834	0.093	0.675	0.130
29.7	302.5	0.153	0.555	0.074	0.463
32.1	305.3	0.370	0.413	0.206	0.397
33.0	306.2	0.970	0.020	0.934	0.033
38.0	311.2	0.419	0.381	0.242	0.379
40.5	313.7	0.956	0.029	0.906	0.047
42.5	315.7	0.465	0.351	0.278	0.361
42.8	316.0	0.950	0.033	0.894	0.053
45.3	318.5	0.506	0.324	0.312	0.344
45.6	318.8	0.940	0.039	0.874	0.063
49.2	322.4	0.929	0.047	0.852	0.074
49.7	322.9	0.568	0.283	0.368	0.316
50.2	323.4	0.061	0.616	0.028	0.486
50.9	324.1	0.920	0.052	0.836	0.082
52.4	325.6	0.632	0.241	0.432	0.284
52.6	325.8	0.908	0.060	0.814	0.093
53.6	326.8	0.894	0.070	0.788	0.106
53.9	327.1	0.692	0.202	0.498	0.251
54.4	327.6	0.772	0.149	0.600	0.200
54.6	327.8	0.048	0.624	0.022	0.489
55.2	328.4	0.826	0.114	0.678	0.161
55.3	328.5	0.864	0.089	0.738	0.131
73.3	346.5	0.000	0.656	0.000	0.500
24.7	297.9	0.387	0.454	0.229	0.463
26.0	299.2	0.347	0.484	0.200	0.480
28.3	301.5	0.972	0.021	0.941	0.035
31.7	304.9	0.451	0.407	0.279	0.433
36.7	309.9	0.954	0.034	0.907	0.056
39.0	312.2	0.575	0.315	0.389	0.367
40.3	313.5	0.944	0.041	0.889	0.067
44.9	318.1	0.925	0.055	0.853	0.088
45.2	318.4	0.101	0.666	0.050	0.570
48.0	321.2	0.907	0.069	0.821	0.107
48.3	321.5	0.615	0.285	0.429	0.343
49.4	322.6	0.651	0.259	0.467	0.320
49.9	323.1	0.874	0.093	0.766	0.140
50.7	323.9	0.722	0.206	0.550	0.270
51.0	324.2	0.828	0.128	0.693	0.184
51.1	324.3	0.775	0.167	0.619	0.229
92.9	366.1	0.000	0.741	0.000	0.600
28.3	301.5	0.979	0.017	0.959	0.029
30.7	303.9	0.409	0.483	0.256	0.521
32.4	305.6	0.972	0.023	0.945	0.039
35.7	308.9	0.173	0.675	0.094	0.634
38.9	312.1	0.485	0.421	0.319	0.477
38.9	312.1	0.957	0.035	0.917	0.058
41.9	315.1	0.948	0.043	0.900	0.070
44.2	317.4	0.551	0.367	0.379	0.435
44.6	317.8	0.932	0.055	0.873	0.089
46.1	319.3	0.919	0.066	0.850	0.105
46.7	319.9	0.912	0.072	0.837	0.114
47.7	320.9	0.624	0.307	0.452	0.384
47.8	321.0	0.897	0.085	0.812	0.132
48.1	321.3	0.879	0.098	0.784	0.151
48.3	321.5	0.734	0.217	0.578	0.295
48.7	321.9	0.850	0.122	0.739	0.183
48.8	322.0	0.758	0.198	0.609	0.274
48.9	322.1	0.674	0.266	0.507	0.345
49.2	322.4	0.824	0.144	0.700	0.210
49.3	322.5	0.790	0.172	0.652	0.244
50.5	323.7	0.101	0.734	0.053	0.663
54.7	327.9	0.083	0.749	0.043	0.670
28.8	302.0	0.985	0.013	0.971	0.023
30.0	303.2	0.226	0.685	0.133	0.694
30.7	303.9	0.430	0.504	0.284	0.573
33.6	306.8	0.980	0.018	0.962	0.030
36.6	309.8	0.486	0.454	0.332	0.534
36.8	310.0	0.972	0.025	0.948	0.042
41.6	314.8	0.963	0.032	0.932	0.054
42.7	315.9	0.566	0.383	0.407	0.474
45.8	319.0	0.955	0.040	0.917	0.066
45.9	319.1	0.625	0.331	0.467	0.426
47.3	320.5	0.668	0.294	0.514	0.389
48.3	321.5	0.945	0.049	0.900	0.080
49.2	322.4	0.706	0.260	0.558	0.354
49.7	322.9	0.124	0.775	0.069	0.745
50.3	323.5	0.775	0.199	0.644	0.285
51.1	324.3	0.816	0.163	0.700	0.240
51.8	325.0	0.929	0.063	0.872	0.102
52.2	325.4	0.839	0.142	0.732	0.214
53.3	326.5	0.866	0.118	0.772	0.182
53.3	326.5	0.884	0.103	0.800	0.160
54.7	327.9	0.110	0.787	0.061	0.751
25.2	298.4	0.227	0.730	0.140	0.774
32.6	305.8	0.981	0.018	0.966	0.031
41.9	315.1	0.500	0.473	0.356	0.580
43.6	316.8	0.963	0.035	0.935	0.058
48.8	322.0	0.576	0.401	0.429	0.514
49.7	322.9	0.946	0.051	0.906	0.085
50.6	323.8	0.087	0.863	0.050	0.885
51.9	325.1	0.633	0.347	0.488	0.461
54.4	327.6	0.925	0.071	0.872	0.115
55.0	328.2	0.689	0.294	0.551	0.404
56.4	329.6	0.740	0.246	0.611	0.350
57.1	330.3	0.904	0.091	0.839	0.145
57.3	330.5	0.796	0.193	0.683	0.285
57.8	331.0	0.825	0.165	0.723	0.249
58.1	331.3	0.855	0.137	0.766	0.211

* This table was prepared by the compiler from the published curves of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method was used. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.

(2) Source not specified, purity not specified; boiling point = 217 °C/20 kPa, melting point = 28 °C, n(20 °C,D) = 1.4780, d(20 °C,4 °C) = 1.0965.

(3) Source not specified, purity not specified; boiling point = 117 °C/0.07 kPa, melting point = 30.5 °C, d(34 °C,4 °C) = 0.8223.

Estimated Error:

Not specified.

6.46. +2,2′-Iminobisethanol+1-Pentadecanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2,2′-Iminobisethanol; $C_4H_{11}NO_2$; [111-42-2]
(3) 1-Pentadecanol; $C_{15}H_{32}O$; [629-76-5]

Original Measurements:
I. K. Zhuravleva, E. F. Zhuravlev, V. B. Mukhametshina, and Z. Z. Khisametdinova, Zh. Fiz. Khim. **51**, 1003 (1977).
*Deposited Doc., VINITI 4286 (1976).

Variables:
T/K=301–348

Prepared By:
V. P. Sazonov and M. F. Chernysheva

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (2) and (3) as 20.0:80.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, respectively.

TABLE 1. Solubility temperatures of the three liquid phases

t/ °C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
35.0	308.2	0.682	0.176	0.450	0.200
39.0	312.2	0.591	0.400	0.450	0.525
42.0	315.2	0.597	0.385	0.450	0.500
48.5	321.7	0.610	0.354	0.450	0.450
49.0	322.2	0.651	0.252	0.450	0.300
50.0	323.2	0.616	0.338	0.450	0.425
53.0	326.2	0.637	0.288	0.450	0.350
37.0	310.2	0.685	0.307	0.550	0.425
37.5	310.7	0.759	0.140	0.550	0.175
44.0	317.2	0.691	0.292	0.550	0.400
48.0	321.2	0.735	0.194	0.550	0.250
52.0	325.2	0.720	0.228	0.550	0.300
53.0	326.2	0.708	0.254	0.550	0.340
37.5	310.7	0.725	0.151	0.500	0.180
38.0	311.2	0.639	0.352	0.500	0.475
50.5	323.7	0.659	0.310	0.500	0.400
50.5	323.7	0.687	0.239	0.500	0.300
51.0	324.2	0.680	0.257	0.500	0.325
52.5	325.7	0.670	0.280	0.500	0.360

TABLE 2. Solubility temperatures of the two liquid phases

t/ °C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
33.5	306.7	0.395	0.213	0.177	0.165
33.5	306.7	0.411	0.207	0.187	0.163
36.0	309.2	0.317	0.240	0.133	0.173
36.0	309.2	0.992	0.003	0.976	0.005
42.5	315.7	0.364	0.224	0.159	0.168
47.5	320.7	0.395	0.213	0.175	0.165
49.0	322.2	0.411	0.207	0.187	0.163
52.0	325.2	0.416	0.206	0.190	0.162
56.0	329.2	0.446	0.195	0.210	0.158
56.0	329.2	0.978	0.008	0.935	0.013
57.5	330.7	0.472	0.186	0.228	0.154
61.0	334.2	0.511	0.172	0.256	0.149
61.0	334.2	0.972	0.010	0.920	0.016
63.5	336.7	0.962	0.014	0.892	0.022
64.0	337.2	0.551	0.158	0.288	0.142
66.5	339.7	0.959	0.014	0.885	0.023
67.0	340.2	0.578	0.139	0.326	0.135
68.0	341.2	0.955	0.016	0.875	0.025
69.5	342.7	0.636	0.128	0.366	0.127
70.0	343.2	0.675	0.115	0.406	0.119
71.5	344.7	0.710	0.102	0.447	0.111
72.0	345.2	0.744	0.090	0.489	0.102
73.0	346.2	0.774	0.080	0.530	0.094
73.0	346.2	0.798	0.071	0.815	0.037
74.0	347.2	0.821	0.063	0.602	0.080
74.0	347.2	0.845	0.055	0.643	0.071
74.0	347.2	0.866	0.047	0.680	0.064
74.0	347.2	0.901	0.035	0.750	0.050
74.0	347.2	0.917	0.029	0.784	0.043
74.5	347.7	0.885	0.040	0.718	0.056
33.5	306.7	0.282	0.346	0.124	0.263
34.0	307.2	0.259	0.357	0.112	0.266
35.0	308.2	0.319	0.328	0.145	0.257
36.5	309.7	0.239	0.367	0.102	0.269
38.5	311.7	0.340	0.318	0.157	0.253
41.0	314.2	0.215	0.379	0.090	0.273
44.5	317.7	0.392	0.293	0.189	0.243
45.5	318.7	0.192	0.390	0.079	0.276
49.0	322.2	0.417	0.281	0.205	0.239
49.0	322.2	0.976	0.011	0.937	0.019
52.0	325.2	0.451	0.265	0.229	0.231
52.0	325.2	0.934	0.013	0.930	0.021
55.0	328.2	0.476	0.253	0.247	0.226
57.0	330.2	0.505	0.239	0.269	0.219
59.0	332.2	0.534	0.225	0.293	0.212
59.5	332.7	0.980	0.010	0.947	0.016
61.0	334.3	0.558	0.213	0.313	0.206
62.0	335.2	0.964	0.018	0.905	0.029
63.0	336.2	0.586	0.200	0.338	0.199
63.5	336.7	0.957	0.021	0.890	0.033
64.5	337.7	0.619	0.184	0.370	0.189
65.5	338.7	0.950	0.024	0.872	0.038
66.0	339.2	0.651	0.168	0.403	0.179
67.0	340.2	0.941	0.028	0.859	0.045
67.0	340.2	0.680	0.154	0.434	0.170
67.5	340.7	0.698	0.146	0.455	0.164
68.0	341.2	0.936	0.031	0.840	0.048
69.0	342.2	0.752	0.120	0.523	0.143
69.0	342.2	0.924	0.037	0.815	0.056
69.5	342.7	0.786	0.103	0.570	0.129
70.0	343.2	0.765	0.113	0.541	0.138
70.5	343.7	0.813	0.090	0.611	0.117
70.5	343.2	0.912	0.042	0.790	0.063
71.0	344.2	0.824	0.050	0.629	0.111
71.0	344.2	0.877	0.059	0.720	0.084
71.0	344.2	0.895	0.051	0.754	0.074
33.5	306.7	0.388	0.362	0.199	0.320
35.0	308.2	0.989	0.007	0.971	0.012
37.5	310.7	0.985	0.009	0.962	0.015
40.5	313.7	0.388	0.362	0.199	0.320

41.5	314.7	0.982	0.011	0.956	0.018	60.5	333.7	0.933	0.046	0.856	0.072
42.0	315.2	0.365	0.376	0.184	0.326	61.0	334.2	0.769	0.158	0.585	0.208
43.5	316.7	0.407	0.351	0.212	0.315	62.0	335.2	0.732	0.184	0.536	0.232
44.5	317.7	0.980	0.012	0.950	0.020	62.0	335.2	0.926	0.051	0.842	0.079
46.0	319.2	0.429	0.338	0.228	0.309	63.0	336.2	0.764	0.162	0.578	0.211
46.5	319.7	0.341	0.390	0.169	0.332	63.0	336.2	0.916	0.058	0.822	0.089
48.0	321.2	0.977	0.014	0.943	0.023	64.0	337.2	0.797	0.139	0.625	0.187
49.0	322.2	0.459	0.320	0.250	0.300	64.0	337.2	0.906	0.065	0.803	0.098
49.0	322.2	0.974	0.015	0.937	0.025	64.5	337.7	0.892	0.074	0.778	0.111
50.0	323.2	0.973	0.016	0.935	0.026	65.0	338.2	0.827	0.119	0.669	0.165
51.0	324.2	0.479	0.308	0.265	0.294	65.0	338.2	0.849	0.103	0.705	0.147
52.0	325.2	0.971	0.017	0.930	0.028	65.0	338.2	0.869	0.090	0.737	0.132
52.5	325.7	0.493	0.300	0.276	0.290	65.0	338.2	0.881	0.082	0.758	0.121
53.0	326.2	0.310	0.408	0.150	0.340	33.5	306.7	0.914	0.066	0.828	0.103
53.5	326.7	0.509	0.291	0.289	0.284	33.5	306.7	0.964	0.028	0.944	0.046
54.0	327.2	0.968	0.019	0.922	0.031	34.0	307.2	0.981	0.014	0.960	0.024
56.0	329.2	0.543	0.270	0.318	0.273	36.0	309.2	0.914	0.017	0.953	0.028
56.0	329.2	0.965	0.021	0.915	0.034	39.5	312.7	0.452	0.419	0.273	0.436
58.0	331.2	0.569	0.255	0.341	0.264	40.0	313.2	0.974	0.020	0.945	0.033
58.0	331.2	0.960	0.024	0.903	0.039	41.0	314.2	0.415	0.448	0.244	0.454
59.5	332.7	0.594	0.240	0.365	0.254	41.5	314.7	0.472	0.404	0.289	0.427
60.0	333.2	0.954	0.027	0.890	0.044	41.5	314.7	0.970	0.023	0.937	0.038
60.5	333.7	0.616	0.227	0.386	0.246	43.5	316.7	0.387	0.469	0.223	0.466
62.0	335.2	0.650	0.207	0.422	0.231	45.5	318.7	0.964	0.028	0.924	0.046
62.0	335.2	0.945	0.033	0.871	0.052	46.0	319.2	0.513	0.373	0.324	0.406
63.0	336.2	0.675	0.192	0.449	0.220	48.0	321.2	0.360	0.480	0.204	0.478
63.5	336.2	0.939	0.036	0.857	0.057	49.0	322.2	0.547	0.346	0.355	0.387
64.0	337.2	0.698	0.178	0.477	0.209	49.0	322.2	0.955	0.034	0.907	0.056
64.5	337.7	0.722	0.164	0.505	0.198	51.0	324.2	0.570	0.329	0.376	0.374
65.0	338.2	0.742	0.153	0.530	0.188	52.5	325.7	0.947	0.041	0.890	0.066
65.0	338.2	0.930	0.042	0.838	0.065	53.0	326.2	0.608	0.300	0.414	0.352
65.5	338.7	0.761	0.141	0.556	0.178	54.5	327.7	0.933	0.051	0.864	0.082
66.0	339.2	0.918	0.048	0.815	0.074	55.0	328.2	0.665	0.264	0.463	0.322
67.0	340.2	0.796	0.121	0.605	0.158	56.0	329.2	0.689	0.238	0.502	0.299
67.0	340.2	0.907	0.055	0.793	0.083	56.0	329.2	0.924	0.059	0.846	0.092
68.0	341.2	0.825	0.103	0.650	0.140	57.0	330.2	0.729	0.207	0.551	0.269
68.0	341.2	0.844	0.092	0.680	0.128	57.5	330.7	0.517	0.369	0.328	0.403
68.0	341.2	0.859	0.084	0.705	0.118	58.0	331.2	0.754	0.186	0.587	0.248
68.0	341.2	0.874	0.074	0.732	0.107	58.5	331.7	0.899	0.077	0.803	0.118
68.0	341.2	0.893	0.063	0.766	0.094	59.0	332.2	0.702	0.228	0.517	0.290
33.5	306.7	0.963	0.026	0.916	0.042	59.5	332.7	0.884	0.089	0.776	0.134
34.5	307.7	0.986	0.010	0.967	0.017	60.0	333.2	0.808	0.147	0.657	0.206
40.5	313.7	0.981	0.013	0.957	0.022	60.0	333.2	0.830	0.130	0.690	0.186
42.0	315.2	0.418	0.399	0.233	0.384	60.0	333.2	0.850	0.115	0.720	0.168
44.5	317.7	0.385	0.421	0.210	0.395	60.0	333.2	0.870	0.100	0.752	0.149
45.0	318.2	0.974	0.018	0.940	0.030	64.0	337.2	0.281	0.550	0.151	0.509
46.5	319.7	0.463	0.367	0.268	0.366	33.3	306.5	0.978	0.019	0.955	0.032
51.6	324.8	0.963	0.026	0.916	0.042	37.5	310.7	0.973	0.023	0.945	0.039
54.0	327.2	0.553	0.306	0.344	0.328	40.5	313.7	0.961	0.033	0.922	0.055
54.0	327.2	0.330	0.459	0.172	0.414	43.0	316.2	0.452	0.458	0.286	0.500
55.0	328.2	0.956	0.030	0.902	0.049	44.0	317.2	0.433	0.474	0.271	0.510
56.0	329.2	0.583	0.286	0.372	0.314	44.0	317.2	0.471	0.442	0.302	0.489
57.5	330.7	0.618	0.262	0.406	0.297	44.0	317.2	0.955	0.037	0.912	0.062
57.5	330.7	0.949	0.035	0.886	0.057	45.0	318.2	0.442	0.454	0.253	0.448
59.0	332.2	0.649	0.241	0.439	0.280	46.5	319.7	0.514	0.372	0.325	0.405
59.0	332.2	0.940	0.041	0.870	0.065	47.0	320.2	0.398	0.503	0.243	0.530
60.0	333.2	0.676	0.222	0.469	0.265	47.0	320.2	0.945	0.046	0.893	0.075

48.0	321.2	0.386	0.513	0.234	0.536
48.5	321.7	0.529	0.394	0.353	0.453
49.5	322.7	0.935	0.054	0.875	0.088
50.5	323.7	0.372	0.524	0.224	0.543
50.5	323.7	0.927	0.061	0.860	0.098
51.0	324.2	0.566	0.363	0.388	0.428
51.5	324.7	0.918	0.068	0.845	0.109
52.0	325.2	0.908	0.076	0.829	0.120
52.5	325.7	0.605	0.330	0.427	0.401
53.0	326.2	0.356	0.538	0.212	0.552
53.5	326.7	0.648	0.294	0.472	0.370
54.0	327.2	0.682	0.265	0.511	0.342
54.0	327.2	0.895	0.088	0.805	0.136
54.5	327.7	0.713	0.240	0.547	0.317
55.0	328.2	0.342	0.549	0.202	0.559
55.0	328.2	0.751	0.208	0.595	0.284
55.3	328.5	0.871	0.108	0.766	0.164
55.5	328.7	0.771	0.191	0.621	0.265
56.0	329.2	0.803	0.164	0.665	0.235
56.0	329.2	0.843	0.126	0.732	0.188
56.5	329.7	0.840	0.133	0.719	0.197
59.0	332.2	0.328	0.561	0.192	0.566
28.0	301.2	0.982	0.017	0.965	0.028
36.4	309.6	0.977	0.021	0.956	0.035
40.0	313.2	0.970	0.027	0.944	0.045
42.0	315.2	0.455	0.489	0.302	0.558
42.0	315.2	0.472	0.474	0.316	0.547
42.5	315.7	0.446	0.497	0.294	0.565
44.5	317.7	0.495	0.453	0.337	0.530
45.0	318.2	0.417	0.523	0.270	0.584
45.5	318.7	0.512	0.438	0.352	0.518
45.5	318.7	0.959	0.037	0.923	0.062
47.5	320.7	0.536	0.416	0.374	0.501
48.0	321.2	0.392	0.546	0.250	0.600
49.0	322.2	0.564	0.391	0.401	0.479
49.0	322.2	0.947	0.047	0.903	0.078
51.0	324.2	0.607	0.353	0.444	0.445
52.0	325.2	0.366	0.569	0.230	0.616
52.0	325.2	0.646	0.317	0.486	0.411
52.0	325.2	0.913	0.062	0.875	0.100
53.0	326.2	0.691	0.278	0.535	0.371
53.0	326.2	0.754	0.220	0.614	0.309
53.0	326.7	0.921	0.071	0.857	0.114
53.5	326.7	0.913	0.078	0.845	0.124
54.0	327.2	0.804	0.176	0.680	0.256
54.5	327.7	0.843	0.141	0.735	0.212
54.5	327.7	0.870	0.117	0.776	0.179
55.0	328.2	0.890	0.098	0.808	0.154
56.0	329.2	0.331	0.600	0.215	0.628
59.5	332.7	0.327	0.604	0.201	0.639
35.0	308.2	0.978	0.022	0.960	0.036
40.5	313.7	0.969	0.029	0.946	0.049
40.8	314.0	0.458	0.519	0.318	0.621
42.0	315.2	0.468	0.509	0.327	0.612
43.0	316.2	0.435	0.540	0.298	0.639
43.0	316.2	0.446	0.530	0.308	0.630
43.0	316.2	0.476	0.501	0.334	0.606
43.5	316.7	0.963	0.035	0.936	0.058
45.0	318.2	0.500	0.478	0.356	0.581
45.0	318.2	0.960	0.038	0.930	0.064
46.5	319.7	0.509	0.470	0.364	0.579
47.5	320.7	0.955	0.043	0.922	0.071
49.5	322.7	0.547	0.433	0.400	0.546
51.0	324.2	0.570	0.411	0.423	0.525
53.0	326.2	0.598	0.385	0.451	0.500
54.5	327.7	0.626	0.358	0.479	0.474
56.0	329.2	0.656	0.329	0.513	0.443
56.2	329.4	0.933	0.064	0.885	0.109
57.5	330.7	0.697	0.290	0.560	0.400
58.0	331.2	0.924	0.073	0.870	0.118
59.0	332.2	0.744	0.245	0.616	0.349
59.5	332.7	0.908	0.088	0.845	0.141
60.0	333.2	0.774	0.216	0.654	0.315
60.0	333.2	0.895	0.100	0.825	0.159
61.0	334.2	0.811	0.181	0.703	0.270
61.0	334.2	0.865	0.129	0.780	0.200
61.5	334.7	0.834	0.159	0.735	0.241
62.0	335.2	0.854	0.139	0.764	0.215

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method was used. No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified; boiling point = 101.3 °C, n(20 °C,D) = 1.3820, d(20 °C,4 °C) = 1.1320.
(2) Source not specified, purity not specified; melting point = 28 °C, n(20 °C,D) = 1.4780, d(20 °C,4 °C) = 1.0965.
(3) Source not specified, purity not specified; boiling point = 162 °C/0.067 kPa, melting point = 43.0 °C, n(50 °C,D) = 1.4390.

Estimated Error:

Not specified.

6.47. +2,2′-Iminobisethanol+1-Hexadecanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2,2′-Iminobisethanol; $C_4H_{11}NO_2$; [111-42-2]
(3) 1-Hexadecanol; $C_{16}H_{34}O$; [36653-82-4]

Original Measurements:
I. K. Zhuravleva, E. F. Zhuravlev, I. A. Sukhova, and Z. Z. Khisametdinova, Zh. Fiz. Khim. **50**, 405–10 (1976).

Variables:
T/K = 323–353

Prepared:
V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass relationship of (2) and (3) as 10.0:90.0, 20.0:80.0, 30.0:70.0, 40.0:60.0, 50.0:50.0, 60.0:40.0, 70.0:30.0, 80.0:20.0, and 90.0:10.0, respectively. These data were also reported in graphical form as isothermal curves ternary system solubility.

Solubility of nitromethane, 2,2′-iminobisethanol and 1-hexadecanol*

t/ °C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
50	323	0.311	0.000	0.102	0.000
		0.346	0.134	0.131	0.087
		0.384	0.225	0.165	0.167
		0.416	0.290	0.200	0.240
		0.449	0.334	0.238	0.305
		0.495	0.352	0.290	0.355
		0.480	0.403	0.293	0.424
		0.517	0.408	0.340	0.462
		0.582	0.377	0.418	0.466
		0.603	0.379	0.454	0.491
		0.513	0.487	0.379	0.621
		0.251	0.372	0.105	0.268
		0.375	0.379	0.187	0.325
		0.423	0.402	0.234	0.383
		0.453	0.424	0.271	0.437
		0.476	0.442	0.304	0.487
		0.480	0.469	0.322	0.542
		0.433	0.541	0.295	0.635
		0.993	0.000	0.972	0.000
		0.985	0.008	0.958	0.013
		0.980	0.012	0.950	0.020
		0.975	0.017	0.942	0.029
		0.967	0.026	0.929	0.043
		0.944	0.047	0.890	0.077
		0.931	0.062	0.874	0.101
		0.939	0.058	0.894	0.095
		0.957	0.043	0.928	0.072
60	333	0.423	0.000	0.156	0.000
		0.449	0.112	0.188	0.081
		0.486	0.188	0.231	0.154
		0.522	0.238	0.277	0.217
		0.552	0.272	0.321	0.272
		0.637	0.253	0.422	0.289
		0.656	0.267	0.461	0.323
		0.660	0.287	0.483	0.362
		0.755	0.221	0.614	0.309
		0.826	0.157	0.710	0.232
		0.916	0.084	0.864	0.136
		0.952	0.034	0.892	0.054
		0.967	0.020	0.918	0.033
		0.975	0.012	0.932	0.020
		0.983	0.006	0.949	0.010
		0.990	0.000	0.961	0.000
		0.216	0.390	0.088	0.274
		0.342	0.399	0.166	0.334
		0.387	0.428	0.208	0.396
		0.414	0.454	0.241	0.455
		0.431	0.480	0.267	0.513
		0.430	0.514	0.280	0.576
		0.381	0.591	0.252	0.673
		0.741	0.247	0.611	0.350
		0.891	0.104	0.818	0.164
70	343	0.544	0.000	0.231	0.000
		0.560	0.089	0.266	0.073
		0.606	0.144	0.328	0.134
		0.683	0.158	0.430	0.171
		0.748	0.153	0.532	0.187
		0.790	0.147	0.610	0.195
		0.796	0.158	0.636	0.218
		0.825	0.147	0.695	0.213
		0.899	0.078	0.800	0.120
		0.930	0.049	0.846	0.077
		0.949	0.031	0.878	0.049
		0.960	0.021	0.897	0.034
		0.971	0.010	0.913	0.017
		0.976	0.005	0.921	0.008
		0.981	0.000	0.930	0.000
		0.170	0.413	0.067	0.280
		0.303	0.422	0.143	0.343
		0.355	0.450	0.186	0.407
		0.383	0.479	0.218	0.469
		0.393	0.511	0.238	0.533
		0.387	0.553	0.245	0.604
		0.339	0.631	0.219	0.703
80	353	0.544	0.000	0.231	0.000
		0.773	0.046	0.492	0.051
		0.829	0.063	0.606	0.079
		0.899	0.050	0.756	0.073
		0.949	0.019	0.856	0.029
		0.962	0.008	0.877	0.012
		0.973	0.000	0.899	0.000
		0.101	0.447	0.038	0.289
		0.272	0.441	0.125	0.350
		0.323	0.472	0.166	0.417
		0.345	0.508	0.191	0.485
		0.355	0.544	0.210	0.553
		0.349	0.588	0.216	0.627
		0.294	0.673	0.186	0.733

* This table was prepared by the compiler from the published curves of ternary system solubility.

Auxiliary Information

Method/Apparatus/Procedure:
The solubility temperatures of the liquid phases were determined by the synthetic method.[1] No experimental details given.

Source and Purity of Materials:
(1) Source not specified; freshly distilled.
(2) Source not specified, freshly distilled.
(3) Source not specified, freshly distilled.

Estimated Error:
Not specified.

References:
[1] V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

6.48. +2-Furancarboxaldehyde+Methylcyclohexane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Furancarboxaldehyde; $C_5H_4O_2$; [98-01-1]
(3) Methylcyclohexane; C_7H_{14}; [108-87-2]

Original Measurements:
D. S. Lafyatis, L. S. Scott, D. M. Trampe, and C. A. Eckert, Ind. Eng. Chem. Res. **28**, 585–90 (1989).

Variables:
T/K = 323

Prepared By:
V. P. Sazonov

Experimental Data

Compositions of the equilibrium of two liquid phases in the ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase x_1'	Nitromethane-rich phase x_2'	Hydrocarbon-rich phase x_1''	Hydrocarbon-rich phase x_2''	Nitromethane-rich phase (compiler) w_1'	Nitromethane-rich phase (compiler) w_2'	Hydrocarbon-rich phase (compiler) w_1''	Hydrocarbon-rich phase (compiler) w_2''
50.00	323.15	0.789	0.152	0.070	0.020	0.702	0.213	0.045	0.020
		0.529	0.386	0.056	0.051	0.415	0.477	0.036	0.051
		0.280	0.609	0.037	0.089	0.198	0.676	0.023	0.089

Auxiliary Information

Method/Apparatus/Procedure:
The analytical method was used. The equilibrium cell consisted of a vertical glass cylinder with a volume of about 80 mL. A magnetic stir bar was used for mixing the sample, and the cell was thermostated. The two partially miscible components were charged to the equilibrium cell in approximately equal volumes, and the mixture was stirred for a minimum of 15 min. Next, the third component, which distributes itself between the two phases, was added to the equilibrium cell, stirred, and allowed to equilibrate before sampling. Samples of each phase were taken and analyzed by gas chromatography.

Source and Purity of Materials:
(1) Source not specified; purity greater than 99.9 mole %; not purified.
(2) Source not specified, purity greater than 99.9 mole %; not purified.
(3) Source not specified, purity greater than 99.9 mole %; not purified.

Estimated Error:
Temperature: control to ±0.01 K;
Composition: discrepancy of 2 determinations always less than 0.005 mole fraction.

6.49. +2-Methyl-1,3-butadiene+2-Methyl-2-butene

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Methyl-1,3-butadiene; C_5H_8; [78-79-5]
(3) 2-Methyl-2-butene; C_5H_{10}; [513-35-9]

Original Measurements:
L. Boublikova, Collect. Czech. Chem. Commun. **38**, 2033–42 (1973).

Variables:
T/K = 293 and 303

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, 2-methyl-1,3-butadiene, and 2-methyl-2-butene

t/°C	T/K (compiler)	x_1	x_2	w_1 (compiler)	w_2 (compiler)
20.0	293.2	0.128	0.000	0.113	0.000
		0.168	0.070	0.150	0.070
		0.189	0.113	0.169	0.113
		0.209	0.135	0.188	0.135
		0.240	0.166	0.217	0.167
		0.247	0.176	0.223	0.178
		0.289	0.198	0.263	0.201
		0.320	0.209	0.292	0.213
		0.384	0.210	0.354	0.216
		0.496	0.185	0.464	0.193
		0.571	0.164	0.539	0.173
		0.648	0.135	0.618	0.144
		0.681	0.117	0.653	0.125
		0.720	0.096	0.693	0.103
		0.772	0.064	0.748	0.069
		0.792	0.048	0.769	0.052
		0.798	0.043	0.776	0.047
		0.836	0.015	0.817	0.016
		0.854	0.000	0.836	0.000
30.0	303.2	0.187	0.000	0.167	0.000
		0.254	0.062	0.229	0.062
		0.306	0.097	0.278	0.098
		0.351	0.116	0.321	0.119
		0.391	0.119	0.360	0.122
		0.438	0.116	0.406	0.120
		0.521	0.104	0.488	0.109
		0.566	0.097	0.533	0.102
		0.632	0.080	0.601	0.085
		0.670	0.071	0.640	0.076
		0.696	0.060	0.667	0.064
		0.761	0.028	0.736	0.030
		0.802	0.000	0.779	0.000

Auxiliary Information

Method/Apparatus/Procedure:
The titration method was used. No experimental details given.

Source and Purity of Materials:
(1) Source not specified; analytical grade reagent; dried and distilled over on a 40-plate column; n(20 °C,D) = 1.3819, d(25 °C,4 °C) = 1.1306.
(2) Source not specified; technical reagent; twice distilled under nitrogen atmosphere on an 1.5 m long packed column; n(20 °C,D) = 1.4218, d(20 °C,4 °C) = 0.6811.
(3) Prepared by dehydrating of 2-methyl-2-butanol; purified by distillation on a 60-plate column; n(20 °C,D) = 1.3873, d(20 °C,4 °C) = 0.6621.

Estimated Error:
Not specified.

6.50. +1,2-Dichlorobenzene+Heptane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Dichlorobenzene; $C_6H_4Cl_2$; [95-50-1]
(3) Heptane; C_7H_{16}; [142-82-5]

Original Measurements:
A. N. Patel, J. Chem. Eng. Data **26**, 124–7 (1981).

Variables:
T/K = 294

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, 1,2-dichlorobenzene, and heptane

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.5	293.7	0.098	0.000	0.062	0.000
		0.096	0.033	0.060	0.050
		0.093	0.101	0.056	0.146
		0.104	0.181	0.061	0.254
		0.173	0.280	0.099	0.386
		0.279	0.312	0.164	0.441
		0.376	0.315	0.229	0.462
		0.529	0.285	0.348	0.451
		0.682	0.210	0.500	0.370
		0.828	0.117	0.690	0.235
		0.866	0.090	0.750	0.188
		0.924	0.043	0.855	0.095
		0.947	0.024	0.900	0.055
		0.973	0.000	0.957	0.000

TABLE 2. Compositions of equilibrium liquid phases of the ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Heptane-rich phase (compiler)		Nitromethane-rich phase		Heptane-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.5	293.7	0.962	0.011	0.095	0.027	0.932	0.025	0.059	0.041
		0.947	0.024	0.096	0.062	0.900	0.055	0.059	0.092
		0.914	0.046	0.092	0.122	0.838	0.102	0.055	0.175
		0.868	0.083	0.129	0.211	0.755	0.175	0.075	0.295
		0.827	0.115	0.159	0.275	0.690	0.231	0.091	0.378
		0.768	0.159	0.257	0.305	0.605	0.301	0.150	0.430

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The binodal solubility curve was determined by the method of appearance and disappearance of turbidity.[1] The analytical method was used to determine equilibrium liquid phase compositions. Various mixtures of known composition within the heterogeneous region were prepared and brought to equilibrium. Conjugate phases were analyzed by refractive index measurement in conjunction with calibration curve prepared with mixtures of known composition on the solubility curve. Values of composition determined were checked by material-balance calculation.

Source and Purity of Materials:
(1) Source not specified; laboratory grade reagent; not purified.
(2) Source not specified; laboratory grade reagent; not purified.
(3) Source not specified; laboratory grade reagent; not purified.

Estimated Error:
Temperature: control to ±0.5 K;
Titer: ±0.05 mL;
Weightings: to 0.1 mg.

References:
[1]D. F. Othmer, R. E. White, and E. Trueger, Ind. Eng. Chem. **33**, 1240 (1941).

6.51. +1,4-Dichlorobenzene+Heptane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,4-Dichlorobenzene; $C_6H_4Cl_2$; [106-46-7]
(3) Heptane; C_7H_{16}; [142-82-5]

Original Measurements:
A. N. Patel, J. Chem. Eng. Data **26**, 124–7 (1981).

Variables:
T/K = 294

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, 1,4-dichlorobenzene, and heptane

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.5	293.7	0.098	0.000	0.062	0.000
		0.120	0.023	0.076	0.035
		0.123	0.077	0.076	0.114
		0.127	0.144	0.076	0.208
		0.145	0.209	0.085	0.295
		0.189	0.265	0.110	0.370
		0.330	0.278	0.201	0.408
		0.544	0.232	0.370	0.380
		0.677	0.190	0.500	0.338
		0.757	0.156	0.594	0.294
		0.839	0.104	0.710	0.211
		0.895	0.066	0.800	0.143
		0.935	0.034	0.876	0.077
		0.966	0.006	0.940	0.015
		0.973	0.000	0.957	0.000

TABLE 2. Compositions of equilibrium liquid phases of the ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Heptane-rich phase (compiler)		Nitromethane-rich phase		Heptane-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
20.5	293.7	0.961	0.007	0.125	0.021	0.933	0.017	0.079	0.032
		0.933	0.031	0.127	0.091	0.874	0.070	0.078	0.135
		0.916	0.045	0.126	0.135	0.842	0.100	0.076	0.195
		0.897	0.063	0.129	0.172	0.813	0.137	0.076	0.245
		0.882	0.073	0.145	0.209	0.780	0.155	0.085	0.295
		0.839	0.103	0.189	0.265	0.710	0.210	0.110	0.370

Auxiliary Information

Method/Apparatus/Procedure:
Two methods were used. The binodal solubility curve was determined by the method of appearance and disappearance of turbidity.[1] The analytical method was used to determine equilibrium liquid phase compositions. Various mixtures of known composition within the heterogeneous region were prepared and brought to equilibrium. Conjugate phases were analyzed by refractive index measurement in conjunction with calibration curve prepared with mixtures of known composition on the solubility curve. Values of composition determined were checked by material-balance calculation.

Source and Purity of Materials:
(1) Source not specified; laboratory grade reagent; not purified.
(2) Source not specified; laboratory grade reagent; not purified.
(3) Source not specified; laboratory grade reagent; not purified.

Estimated Error:
Temperature: control to ±0.5 K;
Titer: ±0.05 mL;
Weightings: to 0.1 mg.

References:
[1]D. F. Othmer, R. E. White, and E. Trueger, Ind. Eng. Chem. **33**, 1240 (1941).

6.52. +Benzene+Cyclohexane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Benzene; C_6H_6; [71-43-2]
(3) Cyclohexane; C_6H_{12}; [110-82-7]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+benzene+cyclohexane is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+benzene+cyclohexane

Author(s)	T/K	Type of data[a]
Weck and Hunt[1]	298	Solubility curve (17), equilibrium (3)
Suri and Rao[2]	293	Solubility curve (11)
	303	Solubility curve (10)
Suri[3]	313	Solubility curve (12)

[a] Number of experimental points in parentheses.

Solubility curve

The system nitromethane+benzene+cyclohexane forms a miscibility gap of Type I, Treybal.[4] Only one binary pair of components, nitromethane+cyclohexane, is partially miscible. The data for this system were compiled and critically evaluated.[5] The recommended values of mutual solubility of the binary nitromethane+cyclohexane system at 298 K are: $x_1''=0.040$ and $x_1'=0.960$. The solubility of nitromethane in cyclohexane (0.022 mass fraction; 0,030 mole fraction) and cyclohexane in nitromethane (0.051 mass fraction; 0.063 mole fraction) reported in Weck and Hunt,[1] are rejected as inconsistent with the recommended value.[5] Binary data were not reported in Suri and Rao[2] and Suri.[3]

Solubility data obtained by the titration method for the ternary system nitromethane+benzene+cyclohexane were reported in Weck and Hunt,[1] Suri and Rao,[2] and Suri.[3] Experimental errors were reported in Weck and Hunt,[1] composition ±0.3 mass %; temperature control to ±0.01 K, in Suri and Rao[2] and Suri[3] control of temperature to ±0.1 K. Solubility data at 293, 298, 303, and 313 K reported by various authors are in reasonable agreement. These data (nitromethane-rich and hydrocarbon-rich branches together) are described by an algebraic equation in the form:

$$x_2=a+b\cdot x_3+c\cdot \ln(x_3)+d\cdot[\ln(x_3)]^2+e\cdot(x_3)^{1/2}.$$

The proposed equation gives a smaller standard deviation than any other tested equations. The equation parameters (a, b, c, d and e) were calculated by the least squares method and presented in Table 2. Binodal curves in this system were calculated and compared separately for solubility data reported in Suri and Rao[2] and Suri.[3]

TABLE 2. Parameters equation

T/K	a	b	c	d	e	St. dev.
293, Ref. 2	−12.2518	−5.8544	−4.2035	−0.4482	18.0635	0.0057
298, Ref. 1	−9.5447	−4.9384	−3.2162	−0.3373	14.4544	0.0090
303, Ref. 2	−17.4110	−7.2418	−6.0853	−0.6622	24.6006	0.0012
313, Ref. 3	−19.0630	−7.4598	−6.7281	−0.7439	26.4616	0.0039

The solubilities calculated by the proposed equation are presented in Figs. 22, 23, and Table 3. Experimental solubility data[1–3] are presented in Figs. 22 and 23 for comparison.

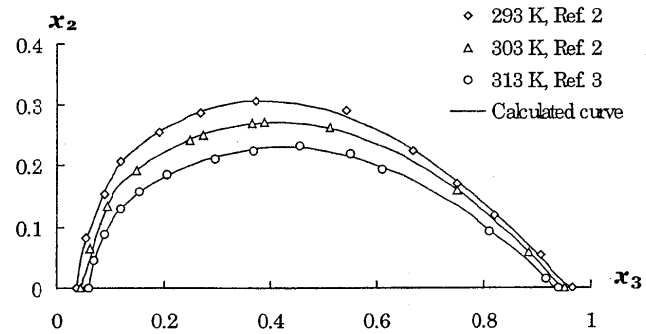

FIG. 22. Solubility curves of the system nitromethane+benzene+cyclohexane (mole fraction).

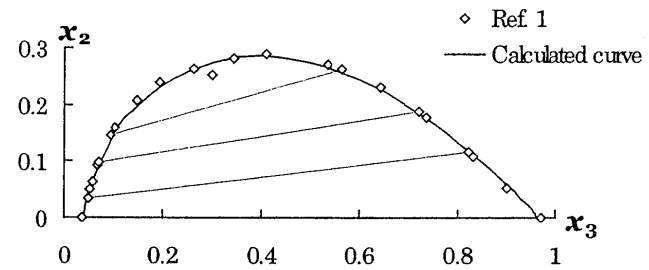

FIG. 23. Solubility curve and tie lines of the system nitromethane+benzene+cyclohexane at 298.15 K (mole fraction).

TABLE 3. Calculated mutual solubilities nitromethane, benzene, and cyclohexane

T/K	x_1	x_2	x_3	w_1	w_2	w_3
293.2	0.030	0.000	0.970	0.025	0.000	0.975
	0.043	0.007	0.950	0.032	0.007	0.961
	0.046	0.054	0.900	0.034	0.051	0.915
	0.063	0.137	0.800	0.047	0.131	0.822
	0.095	0.205	0.700	0.072	0.198	0.730
	0.142	0.258	0.600	0.109	0.254	0.637
	0.208	0.292	0.500	0.164	0.294	0.542
	0.294	0.306	0.400	0.238	0.317	0.445
	0.403	0.297	0.300	0.337	0.318	0.345
	0.540	0.260	0.200	0.470	0.290	0.240
	0.722	0.178	0.100	0.664	0.209	0.127
	0.885	0.065	0.050	0.853	0.080	0.067
	0.964	0.000	0.036	0.951	0.000	0.049
298.2	0.040	0.000	0.960	0.029	0.000	0.971
	0.034	0.016	0.950	0.025	0.015	0.960
	0.041	0.059	0.900	0.030	0.056	0.914
	0.066	0.134	0.800	0.049	0.128	0.823
	0.104	0.196	0.700	0.079	0.190	0.731
	0.157	0.243	0.600	0.121	0.240	0.639
	0.226	0.274	0.500	0.179	0.277	0.544
	0.315	0.285	0.400	0.256	0.296	0.448
	0.426	0.274	0.300	0.358	0.295	0.347
	0.565	0.235	0.200	0.495	0.263	0.242
	0.750	0.150	0.100	0.695	0.178	0.127
	0.902	0.048	0.050	0.874	0.060	0.066
	0.960	0.000	0.040	0.946	0.000	0.054
303.2	0.050	0.000	0.950	0.037	0.000	0.963
	0.053	0.007	0.940	0.039	0.007	0.954
	0.057	0.043	0.900	0.042	0.041	0.917
	0.076	0.124	0.800	0.057	0.119	0.824
	0.112	0.188	0.700	0.085	0.183	0.732
	0.165	0.235	0.600	0.128	0.233	0.639
	0.237	0.263	0.500	0.188	0.267	0.545
	0.329	0.271	0.400	0.268	0.283	0.449
	0.443	0.257	0.300	0.374	0.277	0.349
	0.579	0.221	0.200	0.509	0.249	0.242
	0.755	0.145	0.100	0.700	0.172	0.128
	0.935	0.015	0.050	0.914	0.019	0.067
	0.955	0.000	0.045	0.939	0.000	0.061
313.2	0.062	0.000	0.938	0.046	0.000	0.954
	0.068	0.002	0.930	0.050	0.002	0.948
	0.073	0.027	0.900	0.054	0.026	0.920
	0.099	0.101	0.800	0.074	0.097	0.829
	0.140	0.160	0.700	0.107	0.156	0.737
	0.199	0.201	0.600	0.155	0.200	0.645
	0.276	0.224	0.500	0.220	0.229	0.551
	0.371	0.229	0.400	0.305	0.241	0.454
	0.485	0.215	0.300	0.413	0.234	0.353
	0.619	0.181	0.200	0.550	0.206	0.244
	0.793	0.107	0.100	0.743	0.128	0.129
	0.883	0.047	0.070	0.849	0.058	0.093
	0.941	0.000	0.059	0.921	0.000	0.079

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+benzene+cyclohexane were reported in Ref. 1. Composition of each phase was calculated from the index of refraction–composition curve and of density–composition curve of saturated mixtures prepared at the time of the saturation curve measurements. The tie line at 298 K covers the whole range of the miscibility gap, Fig. 22.

All experimental data are considered tentative.

References:

[1]H. I. Weck and H. Hunt, Ind. Eng. Chem. **46**, 2521 (1954).
[2]S. K. Suri, A. R. Rao, and V. Ramakrishna, Ind. J. Chem. **4**, 194 (1966).
[3]S. K. Suri, Talanta **17**, 577 (1970).
[4]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).
[5]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Benzene; C_6H_6; [71-43-2]
(3) Cyclohexane; C_6H_{12} ; [110-82-7]

Original Measurements:
H. I. Weck and H. Hunt, Ind. Eng. Chem. **46**, 2521 (1954).

Variables:
T/K = 298

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, benzene, and cyclohexane

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
25.00	298.15	0.0301	0.0000	0.0220	0.0000
		0.0446	0.0540	0.0329	0.0509
		0.0613	0.1099	0.0456	0.1046
		0.0873	0.1767	0.0657	0.1703
		0.1265	0.2315	0.0967	0.2266
		0.1939	0.2716	0.1517	0.2719
		0.3030	0.2883	0.2452	0.2986
		0.3762	0.2808	0.3113	0.2974
		0.4477	0.2516	0.3781	0.2719
		0.4741	0.2624	0.4041	0.2863
		0.5671	0.2381	0.4973	0.2672
		0.6441	0.2078	0.5781	0.2387
		0.7372	0.1601	0.6803	0.1891
		0.8386	0.0937	0.7972	0.1140
		0.8807	0.0627	0.8476	0.0773
		0.8977	0.0494	0.8683	0.0612
		0.9625	0.0000	0.9490	0.0000

TABLE 2. Compositions of equilibrium liquid phases of the ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Cyclohexane-rich phase (compiler)		Nitromethane-rich phase		Cyclohexane-rich phase	
		x'_1	x'_2	x''_1	x''_2	w'_1	w'_2	w''_1	w''_2
25.00	298.15	0.918	0.035	0.063	0.117	0.893	0.044	0.047	0.122
		0.832	0.099	0.090	0.189	0.789	0.120	0.068	0.182
		0.759	0.147	0.174	0.263	0.705	0.175	0.135	0.263

Auxiliary Information

Method/Apparatus/Procedure:
Refractive index and density measurements were used for the analysis of equilibrium mixtures. No experimental details given.

Source and Purity of Materials:
(1) Commercial Solvents Corp.; technical grade; distilled on a column of 12 theoretical plates; n(20 °C,D) = 1.3818, d(20 °C,4 °C) = 1.1352.
(2) Source not specified; purified by crystallization; n(20 °C,D) = 1.5012, d(20 °C,4 °C) = 0.8784.
(3) Philips; technical grade; purified by crystallization; n(20 °C,D) = 1.4262, d(20 °C,4 °C) = 0.7774.

Estimated Error:
Temperature: control to ±0.01 K;
Composition: ±0.3 mass %.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Benzene; C_6H_6; [71-43-2]
(3) Cyclohexane; C_6H_{12}; [110-82

Original Measurements:
S. K. Suri, A. R. Rao, and V. Ramakrishna, Ind. J. Chem. **4**, 194–5 (1966).

Variables:
T/K = 293 and 303

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, benzene, and cyclohexane

t/°C	T/K (compiler)	x_1	x_2	w_1 (compiler)	w_2 (compiler)
20.0	293.2	0.0415	0.0535	0.0305	0.0504
		0.0627	0.1193	0.0467	0.1137
		0.0827	0.1703	0.0622	0.1638
		0.1088	0.2239	0.0827	0.2178
		0.1779	0.2904	0.1387	0.2898
		0.3217	0.3060	0.2623	0.3193
		0.4451	0.2850	0.3766	0.3086
		0.5563	0.2530	0.4867	0.2833
		0.6752	0.2062	0.6124	0.2393
		0.7596	0.1535	0.7060	0.1826
		0.8642	0.0816	0.8283	0.1001
30.0	303.2	0.0583	0.0589	0.0432	0.0558
		0.0941	0.1586	0.0709	0.1529
		0.2270	0.2627	0.1792	0.2654
		0.3418	0.2705	0.2796	0.2832
		0.3684	0.2681	0.3038	0.2829
		0.4765	0.2502	0.4060	0.2729
		0.5097	0.2410	0.4387	0.2655
		0.6599	0.1918	0.5946	0.2212
		0.7752	0.1331	0.7232	0.1589
		0.8734	0.0651	0.8386	0.0800

Auxiliary Information

Method/Apparatus/Procedure:
The titration method was used. A set of binary solutions of (1) and (2), rich in (1), was titrated with (3); a second set of binary solutions of (2) and (3), rich in (3), was titrated with (1). This was to improve accuracy at either end of the bimodal curve. Solutions and solvents were thermally equilibrated before use and titrations were done at a constant 10 mL,; when lower values were expected, microburettes were used. Titrations were carried out until a permanent opalescence developed.

Source and Purity of Materials:
(1) Source not specified; purified; ρ(20 °C) = 1138.6 g·L^{-1}, ρ(30 °C) = 1125.3 g·L^{-1}.
(2) Source not specified; purified; ρ(20 °C) = 879.0 g·L^{-1}, ρ(30 °C) = 868.5 g·L^{-1}.
(3) Source not specified; purified; ρ(20 °C) = 778.6 g·L^{-1}, ρ(30 °C) = 769.4 g·L^{-1}.

Estimated Error:
Temperature: control to ±0.1 K.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Benzene; C_6H_6; [71-43-2]
(3) Cyclohexane; C_6H_{12}; [110-82-7]

Original Measurements:
S. K. Suri, Talanta **17**, 577–82 (1970).

Variables:
T/K=313

Prepared By:
V. P. Sazonov

Experimental Data
Mutual solubility of nitromethane, benzene, and cyclohexane

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
40.0	313.2	0.069	0.016	0.051	0.015
		0.097	0.093	0.073	0.089
		0.198	0.194	0.154	0.193
		0.231	0.220	0.182	0.222
		0.312	0.233	0.252	0.241
		0.410	0.223	0.341	0.238
		0.493	0.210	0.421	0.229
		0.609	0.186	0.539	0.211
		0.689	0.157	0.625	0.182
		0.749	0.130	0.692	0.154
		0.823	0.088	0.778	0.106
		0.886	0.045	0.853	0.055

Auxiliary Information

Method/Apparatus/Procedure:
The titration method, as described in Dunnery and Atwood,[2] was used. Solutions and solvents were thermally equilibrated and held at constant temperature during titrations. Enough solution was taken to give a titer of 10–20 mL.

Source and Purity of Materials:
(1) Source not specified; purified by methods as in Weissberger;[1] $\rho(30\ °C)=1125.0\ g\cdot L^{-1}$, $\rho(40\ °C)=1110.8\ g\cdot L^{-1}$.
(2) Source not specified; purified by methods as in Weissberger;[1] $\rho(30\ °C)=868.5\ g\cdot L^{-1}$, $\rho(40\ °C)=857.5\ g\cdot L^{-1}$.
(3) Source not specified; purified by methods as in Weissberger;[1] $\rho(30\ °C)=769.4\ g\cdot L^{-1}$, $\rho(40\ °C)=759.6\ g\cdot L^{-1}$.

Estimated Error:
Temperature: control to ±0.1 K.

References:
[1]A. Weissberger, *Technique of Organic Chemistry* (Interscience, New York, 1959).
[2]D. A. Dunnery and G. R. Atwood, Talanta **15**, 855 (1968).

6.53. +Benzene+Heptane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Benzene; C_6H_6; [71-43-2]
(3) Heptane; C_7H_{16}; [142-82-5]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+benzene+heptane is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+benzene+heptane

Author(s)	T/K	Type of data
Francis[1]	298	Equilibrium (7)
Kimura *et al.*[2]	303	Solubility curve (17), equilibrium (5)

*Number of experimental points in parentheses.

Solubility curve

The system nitromethane+benzene+heptane forms a miscibility gap of Type I, Treybal.[3] Only one binary pair of components, nitromethane+heptane, is partially miscible. The data for this system were compiled and critically evaluated.[4] The recommended values of mutual solubility of the binary nitromethane+heptane system at 303.2 K are: $x_1''=0.0515$ and $x_1'=0.9838$. The solubility of nitromethane in heptane reported in Kimura *et al.*[2] (0.035 mass fraction; 0.056 mole fraction) is rejected as inconsistent with the recommended value,[4] the solubility of heptane in nitromethane reported (0.027 mass fraction; 0.017 mole fraction) agrees satisfactorily with the recommended value.[4] Solubility data obtained by the titration method for the ternary system nitromethane+benzene+heptane were reported in Kimura *et al.*[2] Experimental error was not reported in the paper. Solubility data at 303 K (nitromethane-rich and hydrocarbon-rich branches together) are described by an algebraic equation in the form:

$$x_2=a+b\cdot x_3+c\cdot(x_3)^2+d\cdot\ln(x_3).$$

The proposed equation gives a smaller standard deviation than any other tested equations. The equation parameters (a, b, c, d) were calculated by the least squares method: $a=0.6230$, $b=-0.1190$, $c=-0.5621$, and $d=0.1536$; standard deviation of calculated and experimental values is 0.0208 (2.08%). The bimodal curve for this system was calculated and compared to solubility data reported in Kimura *et al.*[2] The solubilities calculated by the proposed equation are presented in Table 2 and Fig. 24.

TABLE 2. Calculated mutual solubilities nitromethane, benzene, and heptane

T/K	x_1	x_2	x_3	w_1	w_2	w_3
303	0.052	0.000	0.948	0.032	0.000	0.968
	0.055	0.005	0.940	0.034	0.004	0.962
	0.056	0.044	0.900	0.035	0.035	0.930
	0.066	0.134	0.800	0.043	0.111	0.846
	0.091	0.209	0.700	0.060	0.177	0.763
	0.129	0.271	0.600	0.088	0.237	0.675
	0.183	0.317	0.500	0.130	0.288	0.582
	0.255	0.345	0.400	0.188	0.326	0.486
	0.348	0.352	0.300	0.270	0.349	0.381
	0.470	0.330	0.200	0.385	0.346	0.269
	0.648	0.252	0.100	0.571	0.284	0.145
	0.794	0.156	0.050	0.738	0.186	0.076
	0.984	0.000	0.016	0.974	0.000	0.026

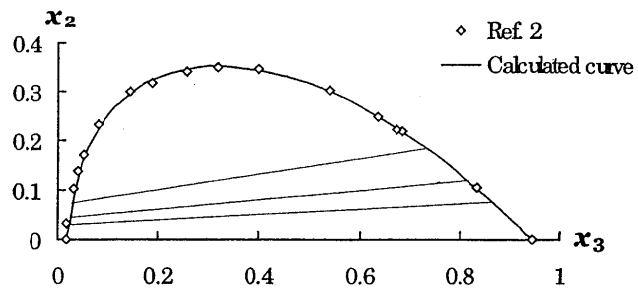

FIG. 24. Solubility curve and tie lines of the system nitromethane+benzene+heptane at 303 K (mole fraction).

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+benzene+heptane were reported in both references. Composition of each phase[2] was calculated from the index of refraction–composition curve of saturated mixtures prepared at the time of saturation curve measurements. The tie lines at 298 K in mass fraction[1,2] cover the whole range of the miscibility gap and are nearly parallel to one another and to of the tie line between nitromethane and heptane. Data reported at 298 K and at 303 K, Francis[1] and Kimura *et al.*[2] in mole fractions are in agreement. Experimental errors were not reported in the papers. The critical solubility point was reported only in Francis[1] in graphical form and determined by compiler to be $x_1=0.515$, $x_2=0.282$ at 298 K.

All experimental data are considered tentative.

References:

[1]A. W. Francis, J. Phys. Chem. **56**, 510 (1952).

[2]C. Kimura, K. Kashiwaya, and T. Asahara, Kogyo Kagaku Zasshi **59**, 1126 (1956).

[3]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).

[4]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Benzene; C_6H_6; [71-43-2]
(3) Heptane; C_7H_{16}; [142-82-5]

Original Measurements:

A. W. Francis, J. Phys. Chem. **56**, 510 (1952).

Variables:

T/K=298

Prepared By:

V. P. Sazonov

Experimental Data

The solubilities of nitromethane, benzene, and heptane, and also compositions of equilibrium liquid phases were also reported in graphical form.

Compositions of two liquid phases at equilibrium in the ternary system*

		Nitromethane-rich phase (compiler)		Heptane-rich phase (compiler)		Nitromethane-rich phase		Heptane-rich phase	
t/°C	T/K (compiler)	x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
25	298	0.911	0.064	0.100	0.114	0.881	0.079	0.065	0.095
		0.823	0.136	0.125	0.171	0.773	0.164	0.083	0.146
		0.793	0.156	0.137	0.189	0.737	0.185	0.092	0.163
		0.762	0.175	0.162	0.212	0.700	0.206	0.111	0.186
		0.724	0.198	0.179	0.238	0.655	0.229	0.124	0.211
		0.684	0.219	0.232	0.265	0.609	0.250	0.166	0.243
		0.611	0.249	0.287	0.287	0.527	0.275	0.212	0.271

*This table was prepared by the compiler from the published curve of ternary system solubility.

Estimated plait point: $w_1=0.426$, $w_2=0.299$; ($x_1=0.515$, $x_2=0.282$, compiler).

Auxiliary Information

Method/Apparatus/Procedure:

No experimental details given.

Source and Purity of Materials:

(1) Source not specified; purity not specified.
(2) Source not specified, purity not specified.
(3) Source not specified, purity not specified.

Estimated Error:

Not specified.

6.54. +Cyclohexane+Castor Oil Methyl Esters

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Benzene; C_6H_6; [71-43-2]
(3) Heptane; C_7H_{16}; [142-82-5]

Original Measurements:
C. Kimura, K. Kashiwaya, and T. Asahara, Kogyo Kagaku Zasshi **59**, 1126 (1956).

Variables:
T/K=303

Prepared By:
V. P. Sazonov and H. Akaiwa

Experimental Data

TABLE 1. Mutual solubility of nitromethane, benzene, and heptane

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
30	303	0.056	0.000	0.035	0.000
		0.060	0.105	0.038	0.086
		0.095	0.220	0.063	0.188
		0.102	0.225	0.068	0.193
		0.112	0.251	0.076	0.217
		0.156	0.304	0.109	0.272
		0.254	0.348	0.188	0.329
		0.331	0.350	0.254	0.344
		0.402	0.341	0.319	0.346
		0.492	0.319	0.406	0.337
		0.557	0.299	0.474	0.325
		0.689	0.231	0.617	0.265
		0.777	0.171	0.718	0.202
		0.823	0.137	0.773	0.165
		0.863	0.104	0.822	0.127
		0.949	0.033	0.930	0.041
		0.983	0.000	0.973	0.000

TABLE 2. Compositions of equilibrium liquid phases of the ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler)		Heptane-rich phase (compiler)		Nitromethane-rich phase		Heptane-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
30	303	0.950	0.030	0.057	0.076	0.930	0.037	0.036	0.036
		0.942	0.036	0.057	0.091	0.920	0.045	0.036	0.074
		0.934	0.043	0.062	0.121	0.910	0.054	0.040	0.099
		0.905	0.069	0.071	0.155	0.873	0.085	0.046	0.129
		0.898	0.075	0.081	0.185	0.865	0.092	0.053	0.156

Auxiliary Information

Method/Apparatus/Procedure:
The titration and analytical methods were used. To a known weight mixture of (1) and (3) (kept at 30 °C) (2) was added drop wise using a burette. Solubilities were calculated from mass % of three components at the end point. The point at which a single phase formed was determined visually. To determine the equilibrium liquid phase compositions analysis of the refractive index was used.

Source and Purity of Materials:
(1) Synthesized in the laboratory; purified; boiling point = 101 °C, n(20 °C,D) = 1.3817, d(20 °C,4 °C) = 1.1372.
(2) Commercial material; purified; boiling point = 80 °C, n(20 °C,D) = 1.5005, d(20 °C,4 °C) = 0.8786.
(3) Commercial material; purified; boiling point = 98 °C, n(20 °C,D) = 1.3878, d(20 °C,4 °C) = 0.6832.

Estimated Error:
Not specified.

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Cyclohexane; C_6H_{12}; [110-82-7]
(3) Castor oil methyl esters

Original Measurements:
C. M. Lakshmanan and S. Laddha, J. Madras Univ. **29**, 97–102 (1959).

Variables:
T/K=303

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, cyclohexane, and castor oil methyl esters

t/°C	T/K (compiler)	w_1	w_2	w_3
30	303	0.0392	0.9608	0.0000
		0.0431	0.9067	0.0502
		0.0704	0.7789	0.1508
		0.1031	0.6400	0.2569
		0.1872	0.4596	0.3532
		0.2211	0.4034	0.3755
		0.2736	0.3241	0.4023
		0.3285	0.2638	0.4076
		0.4171	0.1982	0.3847
		0.5543	0.1317	0.3139
		0.6044	0.1201	0.2755
		0.6539	0.1005	0.2456
		0.7108	0.0822	0.2070
		0.7778	0.0662	0.1560
		0.8857	0.0647	0.0496
		0.9457	0.0543	0.0000

TABLE 2. Equilibrium tie line data for the ternary system

t/°C	T/K (compiler)	(1)-rich phase w_3	(2)-rich phase w_3	Hydroxyl values of esters (1)-rich phase	Hydroxyl values of esters (2)-rich phase
30	303	0.0298	0.0819	198.6	148.3
		0.0447	0.1532	188.6	159.2
		0.0632	0.2592	186.3	155.1
		0.0669	0.3114	186.3	154.6
		0.0806	0.3535	185.0	157.4
		0.0889	0.3802	184.7	156.6
		0.1037	0.3984	179.9	158.5
		0.1451	0.3957	175.1	163.7

The plait point composition: w_1 = 0.648, w_2 = 0.102, and w_3 = 0.250.

6.55. +Hexane+Castor Oil Methyl Esters

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Hexane; C_6H_{14}; [110-54-3]
(3) Castor oil methyl esters

Original Measurements:
C. M. Lakshmanan and G. S. Laddha, J. Am. Oil Chem. Soc. **37**, 466–8 (1960).

Variables:
T/K=303

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, hexane, and castor oil methyl esters*

t/°C	T/K (compiler)	w_1	w_2	w_3
30.0	303.2	0.057	0.943	0.000
		0.061	0.850	0.089
		0.080	0.769	0.151
		0.108	0.691	0.201
		0.136	0.620	0.244
		0.170	0.533	0.297
		0.211	0.457	0.332
		0.273	0.353	0.374
		0.358	0.260	0.382
		0.422	0.211	0.367
		0.518	0.156	0.326
		0.755	0.073	0.172
		0.833	0.064	0.103
		0.939	0.061	0.000

*This table was prepared by the compiler from the published curve of ternary system solubility.

Estimated plait point: $w_1=0.649$, $w_2=0.109$, and $w_3=0.242$.

TABLE 2. Equilibrium tie lines data for the ternary system

t/°C	T/K (compiler)	(1)-rich phase w_3	(2)-rich phase w_3	Hydroxyl values of esters (1)-rich phase	Hydroxyl values of esters (2)-rich phase
30.0	303.2	0.0368	0.0753	192.1	142.8
		0.0572	0.1588	184.0	134.2
		0.0605	0.1565	190.0	149.7
		0.0679	0.1520	195.9	157.4
		0.0786	0.2818	182.7	141.5
		0.0831	0.2795	187.9	154.6
		0.0821	0.2766	191.3	159.7
		0.0975	0.3684	180.4	149.9
		0.1064	0.3656	182.4	157.2
		0.1077	0.3616	184.8	162.5
		0.1227	0.3905	175.3	156.4
		0.1314	0.3841	194.3	159.3
		0.1411	0.3794	180.5	164.1
		0.1901	0.3635	173.3	160.4

Auxiliary Information

Method/Apparatus/Procedure:
The method[1] was used. Known mixtures of (1) and (3), or of (2) and (3), were held in a water bath and titrated with the third component until turbidity. Known mixtures of (1), (2), and (3) within the heterogeneous region were placed in the bath after agitation, and allowed to attain equilibrium. Two phases were separated and weighed. The amount of (3) distributed in each phase was determined by taking a weighed quantity of each phase and distilling off the solvents on a water bath. Total weight of the esters thus obtained was checked against the weight of esters taken originally in the mixture.

Source and Purity of Materials:
(1) Fluka AG; distilled over a rectification column; boiling point=100.5–101.5 °C, n(30 °C,D)=1.3770, d(30 °C,4 °C)=1.1237.
(2) BDH Ltd.; rectified; boiling point=80.5–81.5 °C, n(30 °C,D)=1.4206, d(30 °C,4 °C)=0.7725.
(3) Prepared by methylation of castor oil; dried and distilled; n(30 °C,D)=1.4602, d(30 °C,4 °C)=0.9250.

Estimated Error:
Temperature: control to ±1 K.

References:
[1]D. F. Othmer, R. E. White, and E. Trueger, Ind. Eng. Chem. **33**, 1240 (1941).

Auxiliary Information

Method/Apparatus/Procedure:

The method of Treybal[1] was used. For determining the phase distribution data, known mixtures of ternary constituents comprising of (1), (2), and (3) well within the heterogeneous region were placed in a constant temperature bath after vigorous agitation and allowed to separate into two phases after attaining equilibrium. The two phases were separated and weighed. A weighed quantity of each phase was taken in a distilling flask, and water bath. Traces of (1) and (2) remaining were removed under vacuum by drying the esters on a water bath to constant weight under a stream of carbon dioxide. Total weight of the esters thus obtained was checked against the weight of esters taken originally in the mixture.

Source and Purity of Materials

(1) Fluka AG; distilled; boiling point=(100.5–101.5 °C), n(30 °C,D)=1.3770, d(30 °C,4 °C)=1.1237.
(2) BDH Ltd.; laboratory reagent-grade; distilled; boilingpoint =67–70 °C, n(30 °C,D)=1.3761, d(30 °C,4 °C)=0.6782.
(3) Prepared by methylation of castor oil; using HCl as catalyst; dried and distilled.

Estimated Error:

Temperature: control to ±0.1 K.

References:

[1]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1951).

6.56. +Toluene+Methylcyclohexane

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Toluene; C_7H_8; [108-88-3]
(3) Methylcyclohexane; C_7H_{14}; [108-87-2]

Evaluator:

V. P. Sazonov, Technical University, Samara, Russia, May, 1999.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting phases in equilibrium for the system nitromethane+toluene+methylcyclohexane is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+toluene+methylcyclohexane

Author(s)	T/K	Type of data[a]
Kotarski	293	Solubility curve (18), equilibrium (11)
Lafyatis *et al.*[2]	323	Equilibrium (9)
	348	Equilibrium (5)
	363	Equilibrium (3)

[a]Number of experimental points in parentheses.

Solubility curve

The system nitromethane+toluene+methylcyclohexane forms a miscibility gap of Type I, Treybal.[3] Only one binary pair of components, nitromethane+methylcyclohexane, is partially miscible. The data for this system were compiled and critically evaluated.[4] The tentative values of mutual solubility of the binary nitromethane+methylcyclohexane system at 293 K are: $x_1''=0.013$ and $x_1'=0.994$. The solubility of nitromethane in methylcyclohexane (0.018 mass fraction; 0.029 mole fraction) and cyclohexane in nitromethane (0.042 mass fraction; 0.027 mole fraction) reported in Kotarski,[1] differ from tentative values noticeably.[4] Binary data reported in Lafyatis *et al.*[2] also differ from tentative values Sazonov *et al.*[4]

Solubility data obtained by the titration method for the ternary system nitromethane+toluene+methylcyclohexane were reported in Kotarski.[1] Experimental error of titration was reported in the paper as ±0.005 mL. Solubility data at 293 K (nitromethane-rich and hydrocarbon-rich branches together) are described by an algebraic equation in the form:

$$x_2=a+b\cdot x_3+c\cdot \ln(x_3)+d\cdot[\ln(x_3)]^2+e\cdot(x_3)^{1/2}$$

The proposed equation gives a smaller standard deviation than any other tested equations. The equation parameters (a, b, c, d, e) were calculated by the least squares method: $a=-5.0920$, $b=-3.6993$, $c=-1.6341$, and $d=-0.1647$, $e=8.7560$; standard deviation of calculated and experimental values is 0.0053 (0.53%). The binodal curve for this system was calculated and compared to solubility data reported in Kotarski.[1] The solubilities calculated by the proposed equation are presented in Table 2 and Fig. 25.

TABLE 2. Calculated mutual solubilities nitromethane, toluene, and methylcyclohexane

T/K	x_1	x_2	x_3	w_1	w_2	w_3
293.2	0.013	0.000	0.987	0.008	0.000	0.992
	0.039	0.011	0.950	0.025	0.010	0.965
	0.044	0.056	0.900	0.028	0.054	0.918
	0.063	0.137	0.800	0.040	0.133	0.827
	0.094	0.206	0.700	0.061	0.203	0.736
	0.137	0.263	0.600	0.091	0.265	0.644
	0.197	0.303	0.500	0.135	0.314	0.551
	0.275	0.325	0.400	0.195	0.348	0.457
	0.377	0.323	0.300	0.280	0.362	0.358
	0.513	0.287	0.200	0.405	0.342	0.253
	0.704	0.196	0.100	0.607	0.255	0.138
	0.852	0.098	0.050	0.789	0.137	0.074
	0.994	0.000	0.006	0.990	0.000	0.010

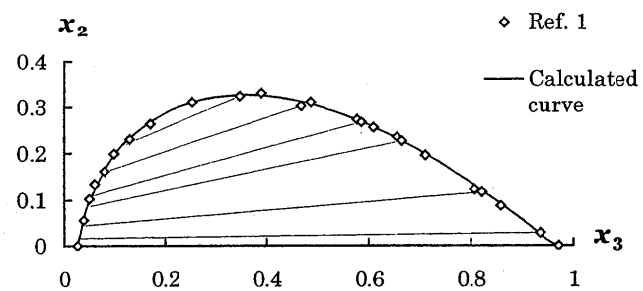

FIG. 25. Solubility curve and tie lines of the system nitromethane+toluene+methylcyclohexane at 293.2 K (mole fraction).

Liquid–liquid equilibrium (LLE) data

LLE data for the ternary system nitromethane+toluene+methylcyclohexane were reported in both references. Composition of each phase, Kotarski,[1] was calculated from the index of refraction–composition curve of the saturated mixtures prepared at the time of the saturation curve measurements. Samples of each phase, Lafyatis *et al.*,[2] were analyzed by gas chromatography. Data reported at 293.2, 323.15, 348.15, and 363.15 K, Kotarski[1] and Lafyatis *et al.*,[2] are in reasonable agreement. Experimental errors were reported in Lafyatis *et al.*:[2] the discrepancy between two determinations always less than 0.005 mole fraction. The critical solubility point was presented only in Kotarski[1] to be $x_1=0.520$, $x_2=0.280$ at 293.2 K.

All experimental data are considered tentative.

References:

[1]A. Kotarski, Przem. Chem. **42**, 413 (1963).
[2]D. S. Lafyatis, L. S. Scott, D. M. Trampe, and C. A. Eckert, Ind. Eng. Chem. Res. **28**, 585 (1989).
[3]R. E. Treybal, *Liquid Extraction* (McGraw-Hill, New York, 1963).
[4]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Toluene; C_7H_8; [108-88-3]
(3) Methylcyclohexane; C_7H_{14}; [108-87-2]

Original Measurements:
A. Kotarski, Przem. Chem. **42**, 413–6 (1963).

Variables:
T/K=293

Prepared By:
V. P. Sazonov

Experimental Data

TABLE 1. Mutual solubility of nitromethane, toluene, and methylcyclohexane

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
20.0	293.2	0.029	0.000	0.018	0.000
		0.055	0.087	0.035	0.084
		0.070	0.123	0.045	0.120
		0.093	0.196	0.061	0.193
		0.109	0.236	0.072	0.234
		0.134	0.257	0.089	0.258
		0.149	0.274	0.100	0.277
		0.202	0.312	0.139	0.324
		0.280	0.331	0.199	0.356
		0.435	0.311	0.331	0.357
		0.565	0.264	0.456	0.322
		0.640	0.230	0.535	0.290
		0.701	0.199	0.603	0.259
		0.758	0.161	0.670	0.215
		0.806	0.133	0.729	0.182
		0.847	0.103	0.782	0.143
		0.905	0.056	0.860	0.081
		0.973	0.000	0.958	0.000

TABLE 2. Compositions of two liquid phases at equilibrium for the ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase (compiler) x_1'	x_2'	Hydrocarbon-rich phase (compiler) x_1''	x_2''	Nitromethane-rich phase w_1'	w_2'	Hydrocarbon-rich phase w_1''	w_2''
20.0	293.2	0.956	0.016	0.037	0.028	0.933	0.023	0.023	0.027
		0.941	0.029	0.047	0.064	0.911	0.042	0.030	0.061
		0.923	0.043	0.062	0.117	0.885	0.063	0.040	0.114
		0.921	0.046	0.068	0.127	0.883	0.066	0.044	0.123
		0.870	0.085	0.108	0.227	0.813	0.119	0.071	0.225
		0.864	0.089	0.117	0.234	0.805	0.125	0.077	0.233
		0.837	0.109	0.146	0.269	0.769	0.151	0.098	0.272
		0.837	0.108	0.160	0.274	0.769	0.150	0.108	0.279
		0.771	0.156	0.230	0.303	0.686	0.210	0.160	0.318
		0.683	0.208	0.314	0.327	0.583	0.268	0.227	0.356
		0.666	0.217	0.330	0.324	0.564	0.277	0.240	0.355

Auxiliary Information

Method/Apparatus/Procedure:

The solubility curve was determined by the method of Rifai and Durandet.[1] The analytical method was used to determine coexisting liquid phase compositions. A known weight of a two-phase mixture was equilibrated in a thermostat, separated, liquid phases weighed, and the refractive index of coexisting phases measured. Concentrations of (1) and (3) in both phases were measured using calibrated plots, which allowed determination of coexisting phase compositions.

Source and Purity of Materials:

(1) Source not specified; dried over molecular sieve and distilled; $n(20\ °C,D) = 1.3820$.
(2) Source not specified; dried over molecular sieve and distilled; $n(20\ °C,D) = 1.4968$.
(3) Source not specified; purified on silica gel and fractionally distilled; $n(20\ °C,D) = 1.4233$, $d(20\ °C,4\ °C) = 0.7695$.

Estimated Error:

Titer: ±0.005 mL.

References:

[1]T. Rifai and J. Durandet, Rev. Inst. Franc. Petrole **17**, 1232 (1962).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Toluene; C_7H_8; [108-88-3]
(3) Methylcyclohexane; C_7H_{14}; [108-87-2]

Original Measurements:

D. S. Lafyatis, L. S. Scott, D. M. Trampe, and C. A. Eckert, Ind. Eng. Chem. Res. **28**, 585–90 (1989).

Variables:

T/K = 323–363

Prepared By:

V. P. Sazonov

Experimental Data

Compositions of two liquid phases at equilibrium for the ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase x_1'	x_2'	Hydrocarbon-rich phase x_1''	x_2''	Nitromethane-rich phase (compiler) w_1'	w_2'	Hydrocarbon-rich phase (compiler) w_1''	w_2''
50.00	323.15	0.961	0.000	0.066	0.000	0.939	0.000	0.042	0.000
		0.944	0.013	0.077	0.038	0.914	0.019	0.049	0.037
		0.926	0.026	0.094	0.071	0.888	0.038	0.061	0.069
		0.905	0.041	0.119	0.108	0.859	0.059	0.078	0.107
		0.889	0.054	0.137	0.137	0.837	0.077	0.091	0.137
		0.856	0.074	0.176	0.167	0.792	0.103	0.119	0.170
		0.825	0.094	0.216	0.194	0.752	0.129	0.148	0.201
		0.786	0.116	0.287	0.217	0.703	0.156	0.203	0.232
		0.696	0.154	0.370	0.225	0.595	0.199	0.272	0.249
75.00	348.15	0.941	0.000	0.188	0.000	0.908	0.000	0.126	0.000
		0.917	0.012	0.215	0.027	0.874	0.017	0.146	0.028
		0.893	0.023	0.237	0.051	0.840	0.033	0.162	0.053
		0.867	0.036	0.295	0.080	0.805	0.050	0.208	0.085
		0.838	0.053	0.355	0.096	0.766	0.073	0.257	0.105
90.00	363.15	0.898	0.000	0.229	0.000	0.846	0.000	0.156	0.000
		0.885	0.012	0.238	0.029	0.828	0.017	0.163	0.030
		0.873	0.020	0.266	0.042	0.812	0.028	0.184	0.044

Auxiliary Information

Method/Apparatus/Procedure:

The analytical method was used. The equilibrium cell consisted of a vertical glass cylinder with a volume of about 80 mL. A magnetic stir bar was used for mixing the sample, and the cell was thermostated. The two partially miscible components were charged to the equilibrium cell in approximately equal volumes, and the mixture was stirred for a minimum of 15 min. Next, the third component, which distributes itself between the two phases, was added to the equilibrium cell, stirred, and allowed to equilibrate before sampling. Samples of each phase were analyzed by gas chromatography.

Source and Purity of Materials:

(1) Source not specified; purity greater than 99.9 mole %; not purified.
(2) Source not specified, purity greater than 99.9 mole %; not purified.
(3) Source not specified, purity greater than 99.9 mole %; not purified.

Estimated Error:

Temperature: control to ±0.01 K;
Composition: discrepancy of 2 determinations always less than 0.005 mole fraction.

6.57. +Toluene+Heptane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Toluene; C_7H_8; [108-88-3]
(3) Heptane; C_7H_{16}; [142-82-5]

Original Measurements:
C. Kimura, K. Kashiwaya, and T. Asahara, Kogyo Kagaku Zasshi **59**, 1126–8 (1956).

Variables:
T/K = 303

Prepared By:
V. P. Sazonov and H. Akaiwa

Experimental Data

TABLE 1: Mutual solubility of nitromethane, toluene, and heptane

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	w_1	w_2
30	303	0.056	0.000	0.035	0.000
		0.070	0.102	0.044	0.097
		0.077	0.161	0.049	0.155
		0.093	0.206	0.060	0.200
		0.109	0.261	0.071	0.256
		0.163	0.304	0.109	0.307
		0.206	0.338	0.141	0.348
		0.314	0.350	0.225	0.379
		0.414	0.337	0.311	0.382
		0.527	0.296	0.417	0.353
		0.595	0.269	0.486	0.332
		0.644	0.244	0.538	0.308
		0.700	0.218	0.602	0.283
		0.757	0.178	0.669	0.238
		0.830	0.127	0.760	0.176
		0.905	0.066	0.860	0.095
		0.937	0.037	0.905	0.054
		0.983	0.000	0.973	0.000

TABLE 2. Compositions of equilibrium liquid phases of the ternary system

t/°C	T/K (compilers)	Nitromethane-rich phase (compilers)		Heptane-rich phase (compilers)		Nitromethane-rich phase		Heptane-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
30	303	0.957	0.022	0.065	0.083	0.934	0.033	0.041	0.079
		0.951	0.028	0.067	0.096	0.925	0.041	0.042	0.091
		0.945	0.033	0.071	0.117	0.916	0.049	0.045	0.112
		0.933	0.044	0.077	0.148	0.899	0.064	0.049	0.142
		0.930	0.046	0.083	0.174	0.895	0.067	0.053	0.168

Auxiliary Information

Method/Apparatus/Procedure:
The titration and analytical methods were used. To a known weight mixture of (1) and (3) (kept at 30 °C), (2) was added drop wise using a burette. Solubilities were calculated from mass % of three components at the end point. The point at which two phases combined to form a homogenous solution was determined visually. To determine the equilibrium liquid phase compositions analysis of the refractive index was used.

Source and Purity of Materials:
(1) Synthesized in the laboratory; purified; boiling point = 101 °C, n(20 °C,D) = 1.3817, d(20 °C,4 °C) = 1.1372.
(2) Commercial material; purified; boiling point = 111 °C, n(20 °C,D) = 1.4958, d(20 °C,4 °C) = 0.8650.
(3) Commercial material; purified; boiling point = 98 °C, n(20 °C,D) = 1.3878, d(20 °C,4 °C) = 0.6832.

Estimated Error:
Not specified.

6.58. +Heptane+1,2-Dimethylbenzene

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Heptane; C_7H_{16}; [142-82-5]
(3) 1,2-Dimethylbenzene (*o*-xylene); C_8H_{10}; [95-47-6]

Original Measurements:
C. Kimura, K. Kashiwaya, and T. Asahara, Kogyo Kagaku Zasshi **59**, 1126–8 (1956).

Variables:
T/K = 303

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, heptane, and 1,2-dimethylbenzene

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
30	303	0.056	0.944	0.035	0.965
		0.056	0.882	0.035	0.899
		0.074	0.809	0.046	0.827
		0.088	0.756	0.055	0.776
		0.107	0.682	0.067	0.702
		0.110	0.665	0.069	0.685
		0.142	0.583	0.090	0.607
		0.164	0.515	0.105	0.539
		0.279	0.353	0.186	0.387
		0.377	0.268	0.263	0.307
		0.486	0.192	0.357	0.231
		0.602	0.129	0.470	0.165
		0.656	0.102	0.527	0.135
		0.779	0.054	0.673	0.076
		0.857	0.035	0.778	0.052
		0.918	0.025	0.868	0.039
		0.983	0.017	0.973	0.027

Auxiliary Information

Method/Apparatus/Procedure:
The titration method was used. To a known weights of (1) and (2), kept in a bath at 30 °C, (3) was added drop wise from a burette. Solubilities were calculated from mass % of three components at the end point. The point at which two phases combined to form a homogeneous solution was determined visually. In the case of (3), turbidity occurred at the end point.

Source and Purity of Materials:
(1) Synthesized in the laboratory; purified; boiling point = 101 °C, n(20 °C,D) = 1.3817, d(20 °C,4 °C) = 1.1372.
(2) Commercial material; purified; boiling point = 98 °C, n(20 °C,D) = 1.3878, d(20 °C,4 °C) = 0.6832.
(3) Commercial material; purified; boiling point = 141 °C, n(20 °C,D) = 1.5027, d(20 °C,4 °C) = 0.8762.

Estimated Error:
Not specified.

6.59. +Heptane+1,3-Dimethylbenzene

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Heptane; C_7H_{16}; [142-82-5]
(3) 1,3-Dimethylbenzene (*m*-xylene); C_8H_{10}; [108-38-3]

Original Measurements:
C. Kimura, K. Kashiwaya, and T. Asahara, Kogyo Kagaku Zasshi **59**, 1126–8 (1956).

Variables:
T/K = 303

Prepared By:
V. P. Sazonov

Experimental Data

Mutual solubility of nitromethane, heptane, and 1,3-dimethylbenzene

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
30	303	0.056	0.944	0.035	0.965
		0.072	0.865	0.045	0.887
		0.097	0.748	0.061	0.770
		0.143	0.597	0.091	0.622
		0.187	0.481	0.120	0.508
		0.265	0.368	0.176	0.401
		0.398	0.248	0.280	0.286
		0.508	0.178	0.377	0.217
		0.576	0.145	0.443	0.183
		0.700	0.085	0.577	0.115
		0.784	0.053	0.679	0.076
		0.855	0.036	0.775	0.053
		0.943	0.022	0.907	0.035
		0.983	0.017	0.973	0.027

Auxiliary Information

Method/Apparatus/Procedure:
The titration method was used. To a known weights of (1) and (2), kept in a bath at 30 °C, (3) was added drop wise from a burette. Solubilities were calculated from mass % of three components at the end point. The point at which two phases combined to form a homogenous solution was determined visually. In the case of (3), turbidity occurred at the end point.

Source and Purity of Materials:
(1) Synthesized in the laboratory; purified; boiling point = 101 °C, n(20 °C,D) = 1.3817, d(20 °C,4 °C) = 1.1372.
(2) Commercial material; purified; boiling point = 98 °C, n(20 °C,D) = 1.3878, d(20 °C,4 °C) = 0.6832.
(3) Commercial material; purified; boiling point = 139 °C, n(20 °C,D) = 1.4970, d(20 °C,4 °C) = 0.8638.

Estimated Error:
Not specified.

6.60. +Heptane+1,4-Dimethylbenzene

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Heptane; C_7H_{16}; [142-82-5]
(3) 1,4-Dimethylbenzene (*p*-xylene); C_8H_{10}; [106-42-3]

Original Measurements:
C. Kimura, K. Kashiwaya, and T. Asahara, Kogyo Kagaku Zasshi **59**, 1126–8 (1956).

Variables:
T/K = 303

Prepared By:
V. P. Sazonov and H. Akaiwa

Experimental Data

TABLE 1. Mutual solubility of nitromethane, heptane, and 1,4-dimethylbenzene

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
30	303	0.056	0.944	0.035	0.965
		0.061	0.865	0.038	0.882
		0.099	0.735	0.062	0.757
		0.111	0.674	0.070	0.695
		0.128	0.618	0.081	0.640
		0.173	0.507	0.111	0.533
		0.257	0.371	0.170	0.403
		0.384	0.254	0.268	0.291
		0.487	0.189	0.358	0.228
		0.589	0.131	0.456	0.167
		0.713	0.080	0.592	0.109
		0.791	0.051	0.688	0.073
		0.900	0.031	0.825	0.047
		0.954	0.019	0.925	0.030
		0.983	0.017	0.973	0.027

TABLE 2. Compositions of equilibrium liquid phases of the ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase (compilers)		Heptane-rich phase (compilers)		Nitromethane-rich phase		Heptane-rich phase	
		x_1'	x_2'	x_1''	x_2''	w_1'	w_2'	w_1''	w_2''
30	303	0.964	0.019	0.069	0.839	0.940	0.031	0.043	0.857
		0.960	0.019	0.071	0.826	0.934	0.031	0.044	0.844
		0.956	0.020	0.077	0.805	0.927	0.032	0.048	0.824
		0.952	0.021	0.085	0.770	0.920	0.033	0.053	0.789
		0.950	0.021	0.090	0.748	0.919	0.033	0.056	0.768

Auxiliary Information

Method/Apparatus/Procedure:
The titration and analytical methods were used. To a known weight mixture of (1) and (3) (kept at 30 °C), (2) was added drop wise using a burette. Solubilities were calculated from mass % of three components at the end point. The point at which two phases combined to form a homogeneous solution was determined visually. To determine the equilibrium liquid phase compositions analysis of the refractive index was used.

Source and Purity of Materials:
(1) Synthesized in the laboratory; purified; boiling point = 101 °C, n(20 °C,D) = 1.3817, d(20 °C,4 °C) = 1.1372.
(2) Commercial material; purified; boiling point = 98 °C, n(20 °C,D) = 1.3878, d(20 °C,4 °C) = 0.6832.
(3) Commercial material; purified; boiling point = 136 °C, n(20 °C,D) = 1.4958, d(20 °C,4 °C) = 0.8603.

Estimated Error:
Not specified.

6.61. +1-Nonanol+Naphthalene

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(3) Naphthalene; $C_{10}H_8$; [91-20-3]

Evaluator:
V. P. Sazonov, Technical University, Samara, Russia, March, 2000.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting liquid phases in equilibrium for the system nitromethane+1-nonanol+naphthalene is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+1-nonanol+naphthalene

Author(s)	T/K	Type of data[a]
Sazonov and Chernysheva[1]	291–298	Solubility curve, three phases (73)
	294–322	Solubility curve, two phases (83)
Sazonov and Chernysheva[2]	293	Equilibrium(6)
	296	Equilibrium (8)
	298	Equilibrium (10)

[a]Number of experimental points in parentheses.

Solubility data

The system nitromethane+1-nonanol+naphthalene includes a three-phase region, although only one binary pair of components, nitromethane+1-nonanol, are partially miscible. The data for this system were compiled and critically evaluated.[3] The UCST (upper critical solution temperature) of the binary system nitromethane+1-nonanol has been reported in Sazonov and Chernysheva[1] as 327.96 K and to agrees with the recommended value in Sazonov *et al.*[3]

The solubility temperatures of the liquid and solid phases were determined[1] by the synthetic method in ternary mixtures with constant mass content of naphthalene, and also in ternary mixtures with a constant relationship of (1) and (2). Experimental errors were reported in Sazonov and Chernysheva[1] as ±0.02 K (for liquid phases) and ± 0.03 K (for solid phase). Maximal temperature of the three-phase equilibrium was reported to be as 298.1 K.[1] Between 298.1 and 327.96 K exist two separate regions of two-phase state, one of them can be described by a band type curve.

Liquid–liquid equilibrium data

Compositions of two and three coexisting phases for the ternary system nitromethane+1-nonanol+naphthalene were determined in Sazonov and Chernysheva[2] at 293.2, 296.2, and 298.1 K by gas chromatography and presented in Fig. 26 at 296.2 K. Experimental errors were reported as ±0.02 K.

All experimental data are considered tentative.

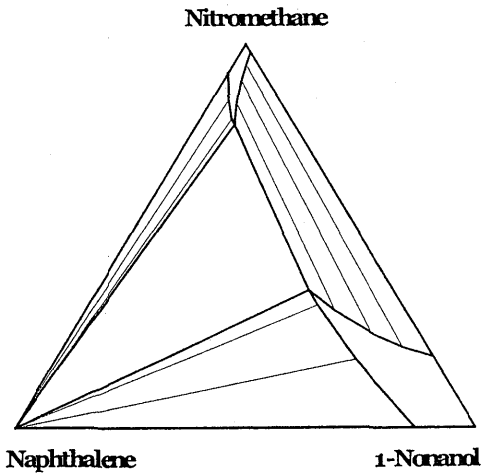

FIG. 26. Phase diagram of the ternary system nitromethane+1-nonanol+naphthalene at 296.2 K.

References:
[1]V. P. Sazonov and M. F. Chernysheva, Zh. Obshch. Khim. **46**, 219 (1976); M. F. Chernysheva, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1982.
[2]V. P. Sazonov and M. F. Chernysheva, Zh. Prikl. Khim. (Leningrad) **51**, 1019 (1978).
[3]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, *IUPAC-NIST* Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(3) Naphthalene; $C_{10}H_8$; [91-20-3]

Original Measurements:

V. P. Sazonov, and M. F. Chernysheva. Zh. Obshch. Khim. 46, 219–22 (1976).
M. F. Chernysheva, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1982.

Variables:

T/K = 291–322

Prepared By:

N. V. Sazonov and V. P. Sazonov

Experimental Data

The temperatures of phase transitions were determined in ternary mixtures with a constant mass content of (3), respectively 25.0, 30.0, and 40 mass %, and also in ternary mixtures with a constant mass relationship of (1) and (2) as 20.0:80.0, 40.0:60.0, 55.0:45.0, 70.0:30.0, and 85.0:15.0, respectively. L_1 nitromethane-rich phase; L_2 alcohol-rich phase; S solid naphthalene. The phase which is being dissolved is indicated in the table.

TABLE 1. Temperatures of phase transition $L_1+L_2+S \leftrightarrow L+S$

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
18.17(L_2)	291.32	0.8174	0.0384	0.6750	0.0750
21.09(L_1)	294.24	0.2868	0.4855	0.1500	0.6000
21.45(L_2)	294.60	0.7927	0.0592	0.6374	0.1126
22.83(L_1)	295.98	0.3443	0.4371	0.1875	0.5625
23.10(L_2)	296.25	0.7667	0.0812	0.6000	0.1500
23.84(L_1)	296.99	0.3974	0.3923	0.2250	0.5250
24.00(L_2)	297.15	0.7393	0.1042	0.5625	0.1875
24.39(L_1)	297.54	0.4465	0.3510	0.2625	0.4875
24.54(L_2)	297.69	0.7102	0.1287	0.5250	0.2250
24.73(L_1)	297.88	0.4922	0.3124	0.3000	0.4500
24.76(L_2)	297.91	0.6793	0.1548	0.4875	0.2625
24.84(L_2)	297.99	0.6465	0.1824	0.4500	0.3000
24.88(L_1)	298.03	0.6115	0.2119	0.4123	0.3377
24.88[a]	298.03	0.5351	0.2763	0.3378	0.4122
24.92[a]	298.07	0.5745	0.2431	0.3750	0.3750
21.14(L_1)	294.29	0.2696	0.4556	0.1402	0.5598
21.52(L_2)	294.77	0.7606	0.0568	0.5950	0.1050
22.74(L_1)	295.89	0.3244	0.4111	0.1752	0.5248
23.01(L_2)	296.16	0.7348	0.0777	0.5600	0.1400
23.88(L_1)	297.03	0.3749	0.3701	0.2100	0.4900
24.02(L_2)	297.17	0.7082	0.0993	0.5257	0.1743
24.44(L_1)	297.59	0.4220	0.3318	0.2449	0.4551
24.53(L_2)	297.68	0.6789	0.1232	0.4900	0.2100
24.73(L_1)	297.88	0.4662	0.2959	0.2800	0.4200
24.77(L_2)	297.92	0.6486	0.1478	0.4550	0.2450
24.88(L_1)	298.03	0.5074	0.2674	0.3150	0.3850
24.89(L_2)	298.04	0.6164	0.1739	0.4200	0.2800
24.91[a]	298.06	0.5461	0.2310	0.3500	0.3500
24.92[a]	298.07	0.5823	0.2016	0.3850	0.3150
20.86(L_2)	294.01	0.6904	0.0517	0.5099	0.0901
21.20(L_1)	294.35	0.2338	0.3953	0.1201	0.4799
22.83(L_1)	295.98	0.2830	0.3583	0.1503	0.4497
22.85(L_2)	296.00	0.6656	0.0703	0.4801	0.1199
23.81(L_1)	296.96	0.3282	0.3243	0.1799	0.4201
24.00(L_2)	297.15	0.6392	0.0902	0.4500	0.1500
24.41(L_1)	297.56	0.3715	0.2917	0.2101	0.3899
24.52(L_2)	297.67	0.6117	0.1109	0.4200	0.1800
24.68(L_2)	297.83	0.5827	0.1327	0.3900	0.2100
24.71(L_1)	297.86	0.4118	0.2613	0.2400	0.3600
24.83(L_1)	297.98	0.4498	0.2327	0.2699	0.3301
24.85(L_2)	298.00	0.5534	0.1548	0.3612	0.2388
24.85(L_2)	298.00	0.5200	0.1799	0.3301	0.2699
24.88(L_1)	298.03	0.4859	0.2056	0.3000	0.3000
21.30(L_2)	294.45	0.8252	0.0617	0.6829	0.1205
21.30(L_2)	294.45	0.8118	0.0606	0.6638	0.1172
21.30(L_2)	294.45	0.7996	0.0597	0.6469	0.1141
21.30(L_2)	294.45	0.7867	0.0587	0.6293	0.1111
24.52(L_2)	297.67	0.7159	0.1298	0.5316	0.2278
24.52(L_2)	297.67	0.7041	0.1277	0.5181	0.2220
24.90(L_2)	298.05	0.6058	0.2098	0.4069	0.3330
24.90(L_2)	298.05	0.5945	0.2058	0.3963	0.3242
24.70(L_1)	297.85	0.4976	0.3158	0.3042	0.4563
24.70(L_1)	297.85	0.4859	0.3084	0.2951	0.4426
21.12(L_1)	294.27	0.3042	0.5148	0.1600	0.6401
21.12(L_1)	294.27	0.2971	0.5029	0.1559	0.6237
21.10(L_1)	295.25	0.2834	0.4796	0.1480	0.5921

[a]Critical opalescence.

TABLE 2. Temperatures of phase transition $L_1+L_2+S \leftrightarrow L_1+L_2$

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
17.77	290.92	0.8519	0.0635	0.7221	0.1274
20.46	293.61	0.8351	0.0623	0.6972	0.1230
17.65	290.80	0.7672	0.1391	0.5935	0.2543
20.73	293.88	0.7503	0.1361	0.5726	0.2454
21.65	294.80	0.7420	0.1346	0.5625	0.2411
23.25	296.40	0.7322	0.1271	0.5458	0.2339
17.62	290.77	0.6672	0.2310	0.4676	0.3826
20.50	293.65	0.6513	0.2256	0.4514	0.3694
22.09	295.24	0.6401	0.2217	0.4402	0.3602
23.55	296.70	0.6283	0.2175	0.4285	0.3506
24.50	297.65	0.6178	0.2139	0.4184	0.3424
17.85	291.00	0.5418	0.3439	0.3398	0.5097
20.69	293.84	0.5280	0.3352	0.3285	0.4928
22.36	295.51	0.5175	0.3284	0.3200	0.4799
23.68	296.83	0.5074	0.3220	0.3119	0.4679
17.72	290.87	0.3211	0.5435	0.1699	0.6797
21.06	294.21	0.3110	0.5262	0.1640	0.6558

TABLE 3. Temperatures of phase transitions $L_1+L_2 \leftrightarrow L$

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
23.00(L_2)	296.15	0.8351	0.0623	0.6972	0.1230
26.60(L_2)	299.75	0.8519	0.0635	0.7221	0.1274
33.38(L_2)	306.53	0.8798	0.0657	0.7654	0.1351
39.60(L_2)	312.75	0.9060	0.0677	0.8081	0.1426
27.21(L_2)	300.36	0.7322	0.1270	0.5458	0.2239
30.28(L_2)	303.43	0.7420	0.1346	0.5625	0.2411
32.13(L_2)	305.28	0.7503	0.1361	0.5726	0.2454
35.81(L_2)	308.96	0.7672	0.1391	0.5935	0.2543
42.19(L_2)	315.34	0.7950	0.1442	0.6292	0.2697
47.82(L_2)	320.97	0.8204	0.1488	0.6634	0.2843
25.87(L_2)	299.02	0.6178	0.2139	0.4184	0.3424
28.17(L_2)	301.32	0.6283	0.2175	0.4285	0.3506
30.97(L_2)	304.12	0.6401	0.2217	0.4402	0.3602
33.58(L_2)	306.73	0.6513	0.2256	0.4514	0.3694
37.19(L_2)	310.34	0.6672	0.2310	0.4676	0.3826
43.30(L_2)	316.45	0.6932	0.2400	0.4949	0.4050
49.00(L_2)	322.15	0.7187	0.2488	0.5227	0.4277
27.18(L_1)	300.33	0.5074	0.3220	0.3119	0.4679
29.83(L_1)	302.98	0.5175	0.3285	0.3200	0.4799
30.82(L_1)	303.97	0.5280	0.3352	0.3285	0.4928
36.27(L_1)	309.42	0.5418	0.3439	0.3398	0.5097
42.60(L_1)	315.75	0.5659	0.3592	0.3600	0.5400
48.43(L_1)	321.58	0.5894	0.3740	0.3802	0.5702
21.12(L_1)	294.27	0.3042	0.5148	0.1600	0.6401
21.48(L_1)	294.63	0.3110	0.5262	0.1640	0.6558
25.79(L_1)	298.94	0.3211	0.5435	0.1699	0.6797
32.05(L_1)	305.20	0.3370	0.5703	0.1793	0.7171
38.82(L_1)	321.97	0.3549	0.6006	0.1900	0.7600

TABLE 4. Temperatures of phase transition $L+S \leftrightarrow L$

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
22.05	295.20	0.8252	0.0617	0.6829	0.1205
24.63	297.78	0.8118	0.0606	0.6638	0.1172
26.98	300.13	0.7996	0.0597	0.6469	0.1141
28.85	302.00	0.7867	0.0587	0.6293	0.1111
24.50	297.65	0.7159	0.1298	0.5316	0.2278
26.03	299.18	0.7041	0.1277	0.5181	0.2220
25.84	298.99	0.6058	0.2098	0.4069	0.3330
27.75	300.90	0.5945	0.2058	0.3963	0.3242
24.70	297.85	0.4976	0.3158	0.3042	0.4563
27.08	300.23	0.4859	0.3084	0.2951	0.4426
23.81	296.96	0.3042	0.5148	0.1600	0.6401
27.12	300.27	0.2971	0.5029	0.1559	0.6237
32.13	305.28	0.2834	0.4796	0.1480	0.5921
25.17	298.32	0.6465	0.1824	0.4500	0.3000
25.19	298.34	0.6115	0.2119	0.4123	0.3377
25.25	298.40	0.6893	0.1548	0.4875	0.2625
25.25	298.40	0.5745	0.2431	0.3750	0.3750
25.40	298.55	0.7102	0.1287	0.5250	0.2250
25.80	298.95	0.5351	0.2763	0.3378	0.4122
25.90	299.05	0.4922	0.3124	0.3000	0.4500
25.95	299.10	0.7393	0.1042	0.5625	0.1875
26.80	299.95	0.7667	0.0812	0.6000	0.1500
26.80	299.95	0.4465	0.3510	0.2625	0.4875
27.65	300.80	0.3974	0.3923	0.2250	0.5250
28.12	301.27	0.7927	0.0592	0.6374	0.1126
28.80	301.95	0.3443	0.4371	0.1875	0.5625
29.45	302.60	0.8174	0.0384	0.6750	0.0750
31.01	304.16	0.2868	0.4855	0.1500	0.6000
29.20	302.35	0.6486	0.1478	0.4550	0.2450
29.75	302.90	0.6164	0.1739	0.4200	0.2800
29.83	302.98	0.5823	0.2016	0.3850	0.3150
29.96	303.11	0.6789	0.1232	0.4900	0.2100
30.23	303.38	0.5461	0.2310	0.3500	0.3500
30.50	303.65	0.5074	0.2674	0.3150	0.3850
30.55	303.70	0.7082	0.0993	0.5257	0.1743
31.40	304.55	0.7348	0.0777	0.5600	0.1400
31.43	304.58	0.4662	0.2959	0.2800	0.4200
31.95	305.10	0.4220	0.3318	0.2449	0.4551
32.38	305.53	0.7606	0.0568	0.5950	0.1050
33.18	306.33	0.3749	0.3701	0.2100	0.4900
34.80	307.95	0.3244	0.4111	0.1752	0.5248
37.20	310.35	0.2696	0.4556	0.1402	0.5598
38.08	311.23	0.1548	0.5534	0.3612	0.2388
38.11	311.26	0.1327	0.5827	0.3900	0.2100
38.22	311.37	0.1109	0.6117	0.4200	0.1800
38.43	311.58	0.1799	0.5200	0.3301	0.2699
38.53	311.68	0.0902	0.6392	0.4500	0.1500
38.75	311.90	0.2056	0.4859	0.3000	0.3000
38.99	312.14	0.0703	0.6656	0.4801	0.1199
39.32	312.47	0.2327	0.4498	0.2699	0.3301
39.78	312.93	0.0517	0.6904	0.5099	0.0901
40.15	313.30	0.2613	0.4118	0.2400	0.3600
41.25	314.40	0.2917	0.3715	0.2101	0.3899
42.38	315.53	0.3243	0.3282	0.1799	0.4201
44.05	317.20	0.3583	0.2830	0.1503	0.4497
45.90	319.05	0.3953	0.2338	0.1201	0.4799

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. Ampoules containing mixtures were suspended from a vertical roller linked to a shaking machine, which switched on at definite time intervals. Water bath temperature was controlled with a proportional temperature regulator and checked with mercury thermometers. Close to a phase transition, heating or cooling was effected at 0.03° h^{-1}. Solubility temperature of the liquid phase was determined both with heating and cooling, and the average taken.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled on a packed column of 20 theoretical plates; no impurities detectable by gas chromatography.
(2) Source not specified, pure grade reagent; dried and distilled under vacuum; 99.5 mole % purity.
(3) Source not specified, analytical purity; purified by recrystallization; melting point = 80.2 °C.

Estimated Error:

Temperature: ±0.02 K for liquid phase and ±0.03 K for solid phase.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(3) Naphthalene; $C_{10}H_8$; [91-20-3]

Original Measurements:

V. P. Sazonov and M. F. Chernysheva, Zh. Prikl. Khim. (Leningrad) **51**, 1019–22 (1978).

Variables:

T/K = 293–298

Prepared By:

N. V. Sazonov and V. P. Sazonov

Experimental Data

Compositions of the equilibrium liquid phases of the ternary system

		Nitromethane-rich phase (compilers)		Alcohol-rich phase (compilers)	
t/°C	T/K (compiler)	x_1'	x_2'	x_1''	x_2''
20.0	293.2	0.982	0.018	0.171	0.829
		0.958	0.019	0.190	0.759
		0.924	0.027	0.225	0.673
		0.888	0.036	0.257	0.601
		0.877	0.035[a]	—	—
		0.852	0.046	0.272	0.556[b]
		—	—	0.186	0.656[a]
23.0	296.2	0.977	0.023	0.186	0.814
		0.946	0.029	0.210	0.736
		0.905	0.039	0.246	0.651
		0.847	0.059	0.304	0.542
		0.854	0.037[a]	—	—
		0.804	0.069[a]	—	—
		0.790	0.082	0.357	0.459[a]
		—	—	0.318	0.498[a]
		—	—	0.178	0.651[a]
24.9	298.1	0.972	0.028	0.193	0.807
		0.946	0.032	0.232	0.715
		0.905	0.045	0.293	0.607
		0.845	0.065	0.333	0.521
		0.755	0.108	0.430	0.388
		0.850	0.035[a]	—	—
		0.797	0.067[a]	—	—
		0.669	0.165[a]	—	—
		—	—	0.511	0.297[a]
		—	—	0.311	0.494[a]
		—	—	0.169	0.648[a]

The same data are presented below in mass fractions

t/°C	T/K (compiler)	Nitromethane-rich phase w_1'	Nitromethane-rich phase w_2'	Alcohol-rich phase w_1''	Alcohol-rich phase w_2''
20.0	293.2	0.958	0.042	0.080	0.920
		0.912	0.043	0.091	0.858
		0.847	0.058	0.111	0.783
		0.784	0.076	0.130	0.719
		0.767	0.072[a]	—	—
		0.721	0.091	0.140	0.674[b]
		—	—	0.090	0.750
23.0	296.2	0.948	0.052	0.088	0.912
		0.887	0.065	0.102	0.843
		0.816	0.082	0.123	0.769
		0.715	0.119	0.159	0.671
		0.730	0.075[a]	—	—
		0.652	0.132[a]	—	—
		0.631	0.154	0.195	0.594[b]
		—	—	0.169	0.626[a]
		—	—	0.086	0.741[a]
24.9	298.1	0.937	0.063	0.092	0.908
		0.880	0.071	0.114	0.831
		0.803	0.095	0.151	0.741
		0.712	0.129	0.178	0.658
		0.581	0.198	0.249	0.531
		0.724	0.071[a]	—	—
		0.643	0.128[a]	—	—
		0.475	0.277[a]	—	—
		—	—	0.316	0.435[a]
		—	—	0.165	0.618[a]
		—	—	0.081	0.735[a]

[a]Equilibrium of liquid phase with solid phase.
[b]Equilibrium of two liquid phases with the solid phase.

Auxiliary Information

Method/Apparatus/Procedure:
The analytical method was used. Thermostated glass vessels (15 mL capacity) were agitated with the aid of a sealed magnetic stirrer. Water temperature was regulated to ±0.02 K and monitored with thermometers with 0.01 K scale divisions. Mixtures were held 1.5–2 h with periodic stirring, and samples of liquid phases were taken with an MSh-10 micro syringe through a rubber stopper. Compositions of equilibrium liquid phases were determined by gas chromatography.

Source and Purity of Materials:
(1) Source not specified; pure grade reagent; dried and twice distilled on a packed column of 20 theoretical plates; no impurities detectable by gas chromatography.
(2) Source not specified, pure grade reagent; dried and distilled under vacuum; 99.5 mole % purity.
(3) Source not specified, analytical purity; purified by recrystallization; melting point = 80.2 °C.

Estimated Error:
Temperature: control to ±0.02 K.

6.62. +1-Nonanol +1-Decanol

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(3) 1-Decanol; $C_{10}H_{22}O$; [112-30-1]

Original Measurements:
V. P. Sazonov, A. G. Gromakovskaya, and E. F. Zhuravlev, Zh. Prikl. Khim. (Leningrad) **50**, 587–90 (1977).

Variables:
T/K = 298–332

Prepared By:
N. V. Sazonov and V. P. Sazonov

Experimental Data

The solubility temperatures of the liquid phases were determined in ternary mixtures with a constant mass content of nitromethane, respectively 20.0, 40.0, 55.0, 70.0, and 85.0 mass %.

TABLE 1. Solubility temperatures of the two liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	w_1	w_2
45.5	318.7	0.373	0.569	0.200	0.720
45.8	319.0	0.376	0.508	0.200	0.640
46.4	319.6	0.378	0.447	0.200	0.560
47.0	320.2	0.380	0.386	0.200	0.480
47.4	320.6	0.382	0.323	0.200	0.400
47.8	321.0	0.384	0.259	0.200	0.318
48.3	321.5	0.387	0.195	0.200	0.239
48.8	322.0	0.389	0.132	0.200	0.160
49.2	322.4	0.391	0.066	0.200	0.080
54.6	327.8	0.614	0.349	0.400	0.537
55.2	328.4	0.616	0.313	0.400	0.480
55.6	328.8	0.618	0.269	0.400	0.411
56.2	329.4	0.620	0.236	0.400	0.360
56.5	329.7	0.622	0.198	0.400	0.300
57.0	330.2	0.625	0.157	0.400	0.237
57.5	330.7	0.627	0.119	0.400	0.180
58.1	331.3	0.629	0.079	0.400	0.119
58.5	331.7	0.631	0.038	0.400	0.057
55.3	328.5	0.745	0.231	0.550	0.403
55.7	328.9	0.746	0.207	0.550	0.360
56.2	329.4	0.748	0.181	0.550	0.315
56.6	329.8	0.750	0.156	0.550	0.270
57.0	330.2	0.751	0.130	0.550	0.225
57.4	330.6	0.753	0.104	0.550	0.180
57.9	331.1	0.755	0.078	0.550	0.135
58.7	331.9	0.757	0.051	0.550	0.088
59.2	332.4	0.759	0.025	0.550	0.043
54.2	327.4	0.848	0.138	0.700	0.270
54.7	327.9	0.849	0.123	0.700	0.240
55.3	328.5	0.850	0.108	0.700	0.210
55.8	329.0	0.851	0.093	0.700	0.180
56.2	329.4	0.852	0.077	0.700	0.150
56.8	330.0	0.854	0.061	0.700	0.119
57.3	330.5	0.855	0.046	0.700	0.090
57.9	331.1	0.856	0.031	0.700	0.059
58.3	331.5	0.857	0.015	0.700	0.028
46.0	319.2	0.931	0.063	0.850	0.135
46.9	320.1	0.932	0.052	0.850	0.112
47.7	320.9	0.933	0.042	0.850	0.090
48.7	321.9	0.934	0.031	0.850	0.068
49.6	322.8	0.935	0.020	0.850	0.044
50.3	323.5	0.935	0.011	0.850	0.023

TABLE 2. Compositions of liquid phases at equilibrium for the ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase (compilers) x_1'	x_2'	Alcohol-rich phase (compilers) x_1''	x_2''	Nitromethane-rich phase w_1'	w_2'	Alcohol-rich phase w_1''	w_2''
25.0	298.2	9.977	0.018	0.192	0.655	0.947	0.042	0.090	0.725
		0.979	0.014	0.191	0.495	0.950	0.032	0.087	0.532
		0.983	0.007	0.180	0.258	0.959	0.017	0.080	0.271
		0.986	0.002	0.179	0.088	0.964	0.005	0.078	0.091

Auxiliary Information

Method/Apparatus/Procedure:
The synthetic method[1] was used to determined solubility temperatures of the liquid phases. Compositions of liquid phases were determined by the method in Palatink *et al.*[2] Positions of the tie lines were determined by the lever rule from weights of the equilibrium phases and overall composition of the starting mixture.

Source and Purity of Materials:
(1) Source not specified; pure grade reagent; dried and twice distilled on a laboratory packed column; purity 99.9 mole %.
(2) Source not specified, pure grade reagent; dried and distilled under vacuum; 99.5 mole % purity.
(3) Source not specified, pure grade reagent; dried and repeatedly distilled; purity 99.5 mole %.

Estimated Error:
Temperature: ±0.02 K.

References:
[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).
[2]L. S. Palatnik, G. R. Vonogorov, M. B. Kagan, and V. B. Kuropyatnik, Zh. Fiz. Khim. **33**, 1939 (1959).

6.63. +2,6,6-Trimethylbicyclo [3.1.1] hept-2-ene+3,7,7-Trimethylbicyclo [4.1.0] hept-3-ene

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2,6,6-Trimethylbicyclo [3.1.1.] hept-2-ene (α-pinene); $C_{10}H_{16}$; [7785-70-8]
(3) 3,7,7-Trimethylbicyclo [4.1.0.] hept-3-ene (Δ_3-carene); $C_{10}H_{16}$; [13466-78-9]

Original Measurements:
M. Antosik and R. Stryjek, Fluid Phase Equilib. **71**, 321–31 (1992).

Variables:
T/K = 298

Prepared By:
V. P. Sazonov

Experimental Data
Compositions of liquid phases at equilibrium for the ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase x_1'	x_2'	Terpene-rich phase x_1''	x_2''	Nitromethane-rich phase (compiler) w_1'	w_2'	Terpene-rich phase (compiler) w_1''	w_2''
25.00	298.15	0.9763	0.0229	0.0695	0.8886	0.9486	0.0497	0.0324	0.9240
		0.9733	0.0192	0.0755	0.6839	0.9423	0.0415	0.0353	0.7136
		0.9736	0.0179	0.0787	0.6503	0.9429	0.0387	0.0369	0.6798
		0.9716	0.0165	0.0814	0.5569	0.9388	0.0356	0.0382	0.5831
		0.9721	0.0149	0.0788	0.5328	0.9398	0.0322	0.0369	0.5570
		0.9698	0.0146	0.0810	0.4642	0.9350	0.0314	0.0380	0.4859
		0.9695	0.0103	0.0845	0.3533	0.9344	0.0222	0.0397	0.3706
		0.9668	0.0058	0.0897	0.1859	0.9288	0.0124	0.0423	0.1956
		0.9636	0.0036	0.0887	0.0885	0.9222	0.0077	0.0418	0.0931

Auxiliary Information

Method/Apparatus/Procedure:
The analytical method was used. Liquid–liquid equilibrium was determined as described in Antosik.[1] The equilibrium cell of about 50 mL capacity, equipped with a magnetic stirrer, was sealed in a water jacket, and circulating water from a thermostat ensured temperature constancy. The three-component mixture was stirred in the equilibrium cell for about 30 min, then the mixture was left for about 1 h for complete phase separation, and samples of about 0.2 mL of each of the two phases were withdrawn from the equilibrium cell through a silicone-rubber septum using a syringe for gas chromatography analyses.

Source and Purity of Materials:
(1) Source not specified; purity 99.8 mass % by GLC; 0.025 mass % water by the Karl Fischer method.
(2) Isolated from turpentine and purified by fractional distillation at subambient pressure; purity above 99.9 mass % by GLC.
(3) Isolated from turpentine and purified by fractional distillation at subambient pressure; purity above 99.9 mass % by GLC.

Estimated Error:
Temperature: control to ±0.02 K.

References:
[1]M. Antosik, J. Chem. Thermodyn. **22**, 85 (1990).

6.64. +2-Methylnaphthalene+Hexadecane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Methylnaphthalene; $C_{11}H_{10}$; [91-57-6]
(3) Hexadecane; $C_{16}H_{34}$; [544-76-3]

Original Measurements:
M. Fedorko and R. Stryjek, Pol. J. Chem. **54**, 1949–56 (1980).

Variables:
T/K = 298

Prepared By:
V. P. Sazonov

Experimental Data
Compositions of liquid phases at equilibrium for the ternary system

t/°C	T/K (compiler)	Nitromethane-rich phase x_1'	x_2'	Hexadecane-rich phase x_1''	x_2''	Nitromethane-rich phase (compiler) w_1'	w_2'	Hexadecane-rich phase (compiler) w_1''	w_2''
25.0	298.2	0.9786	0.0205	0.0534	0.1203	0.9504	0.0464	0.0157	0.0824
		0.9592	0.0395	0.0798	0.1916	0.9083	0.0871	0.0247	0.1382
		0.9514	0.0473	0.0928	0.2211	0.8921	0.1033	0.0294	0.1634
		0.9375	0.0605	0.1044	0.2471	0.8634	0.1298	0.0338	0.1865
		0.9171	0.0804	0.1348	0.3135	0.8235	0.1682	0.0463	0.2508
		0.8895	0.1068	0.1566	0.3555	0.7721	0.2160	0.0560	0.2963
		0.8383	0.1550	0.2048	0.4008	0.6847	0.2950	0.0787	0.3589
		0.7992	0.1914	0.2317	0.4234	0.6244	0.3484	0.0928	0.3949
		0.7336	0.2485	0.2963	0.4499	0.5320	0.4198	0.1296	0.4585
		0.7144	0.2645	0.3317	0.4473	0.5071	0.4374	0.1512	0.4750

Estimated plait point: $x_1 = 0.492$, $x_2 = 0.405$ ($w_1 = 0.271$, $w_2 = 0.519$, compiler).

Auxiliary Information

Method/Apparatus/Procedure:
The analytical method was used. The three-component mixture was stirred in an equilibrium cell immersed in a water bath, maintaining constant temperature then, after reaching the equilibrium, it was left for a complete phase separation, samples were withdrawn from each layer with a preheated syringe, transferred to small tubes and diluted with carbon tetrachloride to avoid phase splitting due to cooling to ambient temperature. The composition of the homogeneous samples was determined by gas chromatography.

Source and Purity of Materials:
(1) Source not specified; purified by distillation; purity 99.7 mass % by GLC.
(2) Source not specified; purified by sublimation; purity 99.83 mass % by GLC.
(3) Source not specified; purified by fractional distillation at sub-atmospheric pressure; purity 99.98 mass % by GLC.

Estimated Error:
Temperature: control to ±0.05 K,
Composition: ±0.001 mole fraction.

7. Quaternary Systems Nitromethane+Water+Two Organic Compounds

7.1. +1,2-Ethanediol+2-Methoxy-2-methylpropane

Components:
(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) 2-Methoxy-2-methylpropane; $C_5H_{12}O$; [1634-04-4]
(4) Water; H_2O; [7732-18-5]

Original Measurements:
V. Kubicek, J. P. Novak, and J. Matous, Collect. Czech. Chem. Commun. **58**, 983–95 (1993).

Variables:
T/K = 293

Prepared By:
V. P. Sazonov

Experimental Data
TABLE 1. *Compositions of liquid phases at equilibrium*

t/°C	T/K (compiler)	Nitromethane (ether)-rich phase x_1'	x_2'	x_3'	Water (glycol)-rich phase x_1''	x_2''	x_3''
20	293	0.260	0.067	0.632	0.062	0.595	0.045
		0.443	0.103	0.407	0.108	0.577	0.050
		0.585	0.117	0.256	0.153	0.579	0.049
		0.236	0.046	0.662	0.038	0.459	0.028
		0.456	0.064	0.407	0.065	0.430	0.026
		0.559	0.065	0.309	0.082	0.454	0.026
		0.206	0.015	0.696	0.017	0.196	0.012
		0.420	0.022	0.459	0.028	0.193	0.011
		0.646	0.020	0.252	0.038	0.200	0.008
		0.202	0.006	0.703	0.013	0.083	0.006
		0.413	0.009	0.476	0.023	0.093	0.008
		0.631	0.009	0.258	0.030	0.099	0.006

The same data are presented below in mass fractions

t/°C	T/K (compiler)	Nitromethane (ether)-rich phase (compiler) w_1'	w_2'	w_3'	Water (glycol)-rich phase (compiler) w_1''	w_2''	w_3''
20	293	0.207	0.054	0.728	0.076	0.738	0.079
		0.385	0.091	0.511	0.128	0.694	0.085
		0.539	0.110	0.373	0.174	0.671	0.081
		0.188	0.037	0.762	0.055	0.681	0.059
		0.403	0.058	0.520	0.095	0.642	0.055
		0.512	0.061	0.409	0.115	0.650	0.053
		0.165	0.012	0.804	0.037	0.431	0.037
		0.370	0.020	0.584	0.060	0.420	0.034
		0.613	0.019	0.345	0.080	0.428	0.024
		0.162	0.005	0.812	0.035	0.227	0.023
		0.362	0.008	0.603	0.059	0.244	0.030
		0.605	0.009	0.357	0.076	0.255	0.022

TABLE 2. Estimated plait points of the quaternary system

x_1	x_2	x_3	w_1 (compiler)	w_2 (compiler)	w_3 (compiler)
0.394	0.419	0.170	0.368	0.398	0.229
0.412	0.415	0.154	0.388	0.397	0.209
0.450	0.400	0.134	0.427	0.386	0.183

Auxiliary Information

Method/Apparatus/Procedure:

Two methods were used. The solubility curve was determined by the titration method. The compositions of liquid phases at equilibrium were determined by the analytical method with the apparatus described in Kubicek *et al.*[1]

Source and Purity of Materials:

(1) Xenon (Poland); dried with sodium and distilled on a packed column with 40 theoretical plates; $n(20\ °C,D) = 1.3820$, $\rho(20\ °C) = 1138.2\ g \cdot L^{-1}$.
(2) Lachema (Czech); not purified; stored over Dusimo S4 molecular sieve and its water content monitored by the Karl Fischer method during the measurement; $n(20\ °C,D) = 1.4297$, $\rho(20\ °C) = 1109.5\ g \cdot L^{-1}$.
(3) Obtained from the Synthetic Rubber Research Institute (Czech); dried with sodium and distilled on a packed column; 0.005 mass % of water by the Karl Fischer analysis; $n(20\ °C,D) = 1.3688$, $\rho(20\ °C) = 740.3\ g \cdot L^{-1}$.
(4) Twice distilled.

Estimated Error:

Concentration: ±0.001 mole fraction.

References:

[1]V. Kubicek, J. Matous, and J. P. Novak, Collect. Czech. Chem. Commun. **57**, 2021 (1992).

7.2. +1-Propanol+1-Nonanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Propanol; C_3H_8O; [71-23-8]
(3) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(4) Water, H_2O; [7732-18-5]

Original Measurements:

V. P. Sazonov and A. G. Gromakovskaya, Zh. Fiz. Khim. **50**, 1061 (1976).
*Deposited Doc., VINITI 3809 (1975).

Variables:

T/K = 278–427

Prepared By:

N. V. Sazonov and V. P. Sazonov

Experimental Data

The solubility temperatures of liquid phases were determined in quaternary mixtures with a constant mass content of (2) as 5.0, 10.0, and 15.0 mass % and with a constant mass content of (4) as 9.5, 23.7 and 38.0; 9.0, 22.5, 36.0, and 54.0; 8.5, 21.2, and 34 mass %, respectively. L_1 nitromethane-rich phase; L_2 alcohol-rich phase; L_3 water-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	x_3 (compilers)	w_1	w_2	w_3
24.30(L_2)	297.45	0.653	0.043	0.031	0.769	0.050	0.086
30.00(L_2)	303.15	0.630	0.044	0.047	0.727	0.050	0.128
30.70(L_1)	303.85	0.250	0.059	0.316	0.214	0.050	0.641
33.40(L_2)	306.55	0.607	0.045	0.063	0.686	0.050	0.169
33.80(L_1)	306.95	0.291	0.057	0.287	0.257	0.050	0.598
35.45(L_2)	308.60	0.581	0.046	0.082	0.641	0.050	0.214
36.60(L_1)	309.75	0.367	0.055	0.233	0.342	0.050	0.513
36.65(L_2)	309.80	0.557	0.047	0.099	0.603	0.050	0.252
37.20(L_2)	310.35	0.528	0.048	0.119	0.558	0.050	0.297
37.45[a]	310.60	0.498	0.049	0.141	0.513	0.050	0.342
37.70(L_1)	310.85	0.403	0.053	0.208	0.385	0.050	0.470
37.80(L_1)	310.95	0.436	0.052	0.184	0.428	0.050	0.427
37.85(L_1)	311.00	0.468	0.050	0.162	0.470	0.050	0.385
21.00(L_2)	294.15	0.426	0.033	0.016	0.653	0.050	0.060
28.60(L_1)	301.75	0.141	0.040	0.180	0.178	0.050	0.535
30.40(L_2)	303.55	0.402	0.034	0.030	0.606	0.050	0.107
32.50(L_1)	305.65	0.167	0.040	0.165	0.214	0.050	0.499
33.45(L_2)	306.60	0.384	0.034	0.041	0.570	0.050	0.143
35.35(L_2)	308.50	0.365	0.035	0.051	0.535	0.050	0.177
36.15(L_2)	309.30	0.345	0.035	0.063	0.499	0.050	0.214
36.20(L_1)	309.35	0.216	0.038	0.137	0.285	0.050	0.428
36.80[a]	309.95	0.325	0.036	0.074	0.463	0.050	0.249
37.00(L_1)	310.15	0.239	0.038	0.124	0.321	0.050	0.392
37.05[a](L_1)	310.20	0.305	0.036	0.086	0.428	0.050	0.285
37.30(L_1)	310.45	0.262	0.037	0.111	0.356	0.050	0.357
37.30(L_1)	310.45	0.283	0.037	0.098	0.392	0.050	0.321
24.00(L_1)	297.15	0.086	0.031	0.109	0.142	0.050	0.428
25.30(L_2)	298.45	0.274	0.027	0.013	0.513	0.050	0.057
29.15(L_1)	302.30	0.102	0.030	0.101	0.172	0.050	0.398
31.00(L_2)	304.15	0.261	0.027	0.019	0.485	0.050	0.085
33.40(L_2)	306.55	0.247	0.028	0.026	0.456	0.050	0.114
34.40(L_1)	307.55	0.133	0.030	0.085	0.228	0.050	0.342
34.85(L_2)	308.00	0.234	0.028	0.033	0.427	0.050	0.142
35.50(L_2)	308.65	0.221	0.028	0.040	0.400	0.050	0.170
35.80(L_1)	308.95	0.149	0.029	0.077	0.258	0.050	0.312
36.00[a]	309.15	0.207	0.028	0.047	0.371	0.050	0.199
36.30(L_1)	309.45	0.192	0.029	0.054	0.342	0.050	0.228

36.35(L_1)	309.50	0.164	0.029	0.069	0.285	0.050	0.285
36.40(L_1)	309.55	0.178	0.029	0.062	0.313	0.050	0.257
14.20(L_1)	287.35	0.110	0.083	0.186	0.135	0.100	0.540
18.35(L_2)	291.50	0.405	0.068	0.019	0.607	0.100	0.068
22.30(L_2)	295.45	0.388	0.069	0.029	0.574	0.100	0.101
24.00(L_1)	297.15	0.160	0.080	0.158	0.203	0.100	0.473
25.00(L_2)	298.15	0.370	0.069	0.039	0.540	0.100	0.135
27.80(L_2)	300.95	0.333	0.071	0.060	0.474	0.100	0.201
28.30(L_1)	301.45	0.208	0.078	0.131	0.271	0.100	0.404
28.60[a]	301.75	0.312	0.072	0.072	0.438	0.100	0.237
29.30(L_1)	302.45	0.293	0.073	0.083	0.405	0.100	0.270
29.30(L_1)	302.45	0.229	0.074	0.094	0.304	0.100	0.371
29.40(L_1)	302.55	0.273	0.074	0.094	0.373	0.100	0.302
29.60(L_1)	302.75	0.251	0.076	0.106	0.338	0.100	0.337
4.80(L_1)	277.95	0.067	0.063	0.113	0.108	0.100	0.432
17.80(L_2)	290.95	0.266	0.056	0.012	0.486	0.100	0.054
21.70(L_2)	294.85	0.253	0.056	0.019	0.459	0.100	0.081
25.90(L_2)	299.05	0.227	0.057	0.032	0.405	0.100	0.135
26.05(L_1)	299.20	0.129	0.061	0.082	0.216	0.100	0.324
27.00[a]	300.15	0.216	0.057	0.038	0.382	0.100	0.158
27.70[a](L_1)	300.85	0.200	0.058	0.046	0.350	0.100	0.190
28.20(L_1)	301.35	0.187	0.059	0.052	0.325	0.100	0.215
28.20(L_1)	301.35	0.144	0.060	0.074	0.243	0.100	0.297
28.70(L_1)	301.85	0.159	0.059	0.067	0.271	0.100	0.269
8.50(L_1)	281.65	0.050	0.047	0.050	0.108	0.100	0.252
17.30(L_1)	290.45	0.067	0.047	0.042	0.145	0.100	0.215
17.30(L_2)	290.45	0.143	0.045	0.007	0.324	0.100	0.036
20.05(L_2)	293.20	0.135	0.045	0.010	0.306	0.100	0.054
22.20(L_2)	295.35	0.128	0.045	0.014	0.288	0.100	0.072
23.15(L_1)	296.30	0.082	0.046	0.035	0.180	0.100	0.180
23.30(L_2)	296.45	0.121	0.045	0.017	0.271	0.100	0.089
23.95(L_1)	297.10	0.091	0.046	0.031	0.199	0.100	0.161
24.00(L_2)	297.15	0.113	0.046	0.020	0.252	0.100	0.108
24.30[a]	297.45	0.106	0.046	0.024	0.236	0.100	0.124
24.50(L_1)	297.65	0.098	0.046	0.027	0.217	0.100	0.143
13.20(L_1)	286.35	0.130	0.123	0.164	0.161	0.150	0.477
14.50(L_2)	287.65	0.373	0.105	0.028	0.543	0.150	0.095
17.05(L_2)	290.20	0.356	0.106	0.037	0.511	0.150	0.127
17.30(L_1)	290.45	0.153	0.122	0.151	0.191	0.150	0.446
20.90[a]	294.05	0.320	0.109	0.057	0.448	0.150	0.190
21.75(L_1)	294.90	0.198	0.118	0.126	0.256	0.150	0.382
22.05(L_1)	295.20	0.302	0.110	0.067	0.418	0.150	0.220
22.60(L_1)	295.75	0.281	0.112	0.079	0.383	0.150	0.254
22.95(L_1)	296.10	0.261	0.113	0.090	0.351	0.150	0.287
23.15(L_1)	296.30	0.244	0.115	0.100	0.324	0.150	0.313
13.05(L_1)	286.20	0.085	0.096	0.095	0.134	0.150	0.356
15.70(L_2)	288.85	0.232	0.087	0.025	0.408	0.150	0.102
17.30(L_2)	290.45	0.220	0.087	0.031	0.383	0.150	0.127
18.70(L_1)	291.85	0.126	0.093	0.078	0.206	0.150	0.304
19.05[a]	292.20	0.207	0.088	0.038	0.357	0.150	0.153
19.80(L_1)	292.95	0.194	0.089	0.044	0.332	0.150	0.178
20.20(L_1)	293.35	0.140	0.092	0.071	0.231	0.150	0.278
20.80(L_1)	293.95	0.167	0.091	0.058	0.281	0.150	0.229
21.05(L_1)	294.20	0.153	0.091	0.065	0.255	0.150	0.255

[a]Critical opalescence.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	x_3 (compilers)	w_1	w_2	w_3
63.9	337.1	0.653	0.043	0.031	0.769	0.050	0.086
64.2	337.4	0.630	0.044	0.047	0.727	0.050	0.128
64.7	337.9	0.607	0.045	0.063	0.686	0.050	0.169
65.4	338.6	0.581	0.046	0.082	0.641	0.050	0.214
65.8	339.0	0.557	0.047	0.099	0.603	0.050	0.252
70.6	343.8	0.498	0.049	0.141	0.513	0.050	0.342
71.8	345.0	0.468	0.050	0.162	0.470	0.050	0.385
73.4	346.6	0.436	0.052	0.184	0.428	0.050	0.427
76.0	349.2	0.403	0.053	0.208	0.385	0.050	0.470
90.0	363.2	0.291	0.058	0.287	0.257	0.050	0.598
103.2	396.4	0.250	0.059	0.316	0.214	0.050	0.641
93.5	366.7	0.426	0.033	0.016	0.653	0.050	0.060
102.2	375.4	0.402	0.034	0.030	0.600	0.050	0.107
107.0	380.2	0.384	0.034	0.041	0.570	0.050	0.143
113.0	386.2	0.365	0.035	0.051	0.535	0.050	0.177
120.2	393.4	0.345	0.035	0.063	0.499	0.050	0.214
126.8	400.0	0.325	0.036	0.074	0.463	0.050	0.249
134.2	407.4	0.305	0.036	0.086	0.428	0.050	0.285
142.8	416.0	0.283	0.037	0.098	0.392	0.050	0.321
104.9	378.1	0.274	0.027	0.013	0.513	0.050	0.057
112.7	385.9	0.261	0.027	0.019	0.485	0.050	0.085
122.3	395.5	0.247	0.028	0.026	0.456	0.050	0.114
132.2	405.4	0.234	0.028	0.033	0.427	0.050	0.142
143.0	416.2	0.221	0.028	0.040	0.400	0.050	0.170
42.2	315.4	0.527	0.094	0.096	0.567	0.100	0.243
42.3	315.5	0.500	0.096	0.114	0.526	0.100	0.284
42.8	316.0	0.472	0.099	0.133	0.486	0.100	0.324
42.8	316.0	0.552	0.092	0.078	0.607	0.100	0.203
43.2	316.4	0.577	0.090	0.061	0.648	0.100	0.162
43.5	316.7	0.601	0.089	0.044	0.689	0.100	0.121
43.6	316.8	0.443	0.101	0.153	0.446	0.100	0.364
44.0	317.2	0.413	0.103	0.174	0.406	0.100	0.404
46.5	319.7	0.381	0.106	0.196	0.365	0.100	0.445
48.6	321.8	0.346	0.108	0.220	0.324	0.100	0.486
56.1	329.3	0.274	0.114	0.269	0.244	0.100	0.566
75.5	348.7	0.194	0.120	0.324	0.164	0.100	0.646
82.1	355.3	0.627	0.086	0.027	0.736	0.100	0.074
81.0	354.2	0.405	0.068	0.019	0.607	0.100	0.068
84.6	357.8	0.388	0.069	0.029	0.574	0.100	0.101
88.0	361.2	0.370	0.069	0.039	0.540	0.100	0.135
99.0	372.2	0.333	0.071	0.060	0.474	0.100	0.201
106.0	379.2	0.312	0.072	0.072	0.438	0.100	0.237
113.0	386.2	0.274	0.074	0.094	0.373	0.100	0.302
130.0	403.2	0.252	0.075	0.106	0.338	0.100	0.337
140.4	413.2	0.220	0.077	0.119	0.304	0.100	0.371
149.2	422.4	0.208	0.078	0.131	0.271	0.100	0.404
86.0	359.2	0.266	0.056	0.012	0.486	0.100	0.054
93.0	366.2	0.253	0.056	0.019	0.459	0.100	0.081
121.9	395.1	0.216	0.057	0.038	0.382	0.100	0.158
132.7	405.9	0.200	0.058	0.046	0.350	0.100	0.190
142.9	416.1	0.187	0.059	0.052	0.325	0.100	0.215
90.5	363.7	0.143	0.045	0.007	0.324	0.100	0.036

105.6	378.8	0.135	0.045	0.010	0.306	0.100	0.054
122.4	395.5	0.128	0.045	0.014	0.288	0.100	0.072
135.8	409.0	0.121	0.045	0.017	0.271	0.100	0.089
151.0	424.2	0.113	0.046	0.020	0.252	0.100	0.108
15.10	288.25	0.219	0.174	0.278	0.191	0.150	0.574
16.40	289.55	0.572	0.134	0.042	0.652	0.150	0.113
19.85	293.00	0.256	0.170	0.253	0.229	0.150	0.536
20.05	293.20	0.548	0.136	0.058	0.612	0.150	0.153
22.00	295.15	0.524	0.139	0.074	0.574	0.150	0.191
23.50	296.65	0.473	0.145	0.108	0.497	0.150	0.268
24.60	297.75	0.446	0.148	0.126	0.459	0.150	0.306
24.90	298.05	0.325	0.162	0.207	0.306	0.150	0.459
25.40	298.55	0.418	0.151	0.145	0.421	0.150	0.344
67.0	340.2	0.373	0.105	0.027	0.543	0.150	0.095
70.1	343.3	0.356	0.106	0.037	0.511	0.150	0.127
79.0	352.2	0.320	0.109	0.057	0.448	0.150	0.190
84.0	357.2	0.302	0.110	0.067	0.418	0.150	0.220
91.0	364.2	0.281	0.112	0.079	0.383	0.150	0.254
98.4	371.6	0.261	0.113	0.090	0.351	0.150	0.287
106.0	379.2	0.244	0.115	0.100	0.324	0.150	0.313
124.4	397.6	0.198	0.118	0.125	0.256	0.150	0.382
150.0	423.2	0.153	0.122	0.151	0.191	0.150	0.446
160.0	433.2	0.130	0.123	0.163	0.161	0.150	0.477
83.6	356.8	0.232	0.087	0.025	0.408	0.150	0.102
91.0	364.2	0.220	0.087	0.031	0.383	0.150	0.127
101.0	374.2	0.207	0.088	0.038	0.357	0.150	0.153
132.4	405.6	0.167	0.091	0.058	0.281	0.150	0.229
143.6	416.8	0.153	0.091	0.065	0.255	0.150	0.255
154.0	427.2	0.140	0.092	0.071	0.231	0.150	0.278

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. The temperatures of phase transitions were determined both on heating and cooling of the mixtures and the average of the values of temperature obtained was taken. Measurements were carried out in thermostat with silicone oil at temperatures above 80 °C.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled on a laboratory packed column; purity 99.9 mole %.
(2) Source not specified; CP reagent; dried and repeatedly distilled on a laboratory packed column; purity 99.9 mole %.
(3) Source not specified; pure grade reagent; dried and repeatedly distilled under vacuum; purity 99.5 mole %.
(4) Twice distilled.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

7.3. +1-Nonanol+Naphthalene

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(3) Naphthalene; $C_{10}H_8$; [91-20-3]
(4) Water; H_2O; [7732-18-5]

Evaluator:

V. P. Sazonov, Technical University, Samara, Russia, March, 2000.

Critical Evaluation

A survey of reported compositions along the solubility curve and compositions of coexisting liquid phases in equilibrium for the system nitromethane+1-nonanol+naphthalene+water is given in Table 1.

TABLE 1. Summary of experimental data for the system nitromethane+1-nonanol+naphthalene+water

Author(s)	T/K	Type of data[a]
Sazonov and Chernysheva[1]	285–296	Solubility curve, four phases (73)
	291–324	Solubility curve, three phases (89)
	299–369	Solubility curve, two phases (55)
Sazonov and Chernysheva[2]	293	Equilibrium (8)
	296	Equilibrium (11)
	303	Equilibrium (9)

[a]Number of experimental points in parentheses.

Solubility data

The system nitromethane+1-nonanol+naphthalene+water includes a four-phase region, although only four of six binary pairs of components, nitromethane+1-nonanol, nitromethane+water, 1-nonanol+water and naphthalene+water are partially miscible. The data for this system were compiled and critically evaluated (Sazonov *et al.*,[3] Barton,[4] and Shaw[5]). The UCST (upper critical solution temperature) of the binary system nitromethane+1-nonanol has been reported in Sazonov and Chernysheva[1] as 327.96 K which agrees with the recommended value in Sazonov *et al.*[3]

The solubility temperatures of the liquid and solid phases were determined[5] by the synthetic method in quaternary mixtures with constant mass content of naphthalene and water; in quaternary mixtures with a constant mass content of water and with a constant mass relationship of nitromethane and 1-nonanol, and also in quaternary mixtures with a constant relationship of (1), (2), and (3). Experimental errors were reported as ±0.02 K (288–323 K) and ±0.1 K (above 323 K). Maximal temperature of the four-phase equilibrium was reported to be as 296.1 K.[1] Above 296.1 K exist three separate regions of three-phase state.

Liquid–liquid equilibrium data

Compositions of coexisting liquid phases for the system nitromethane+1-nonanol+naphthalene+water were determined[4] at 293.2, 296.2, and 303.2 K by gas chromatography. Thus, the water-rich phase contains traces of alcohol and naphthalene, and the solid phase is pure naphthalene. Relative error of 3–5 determinations less than 1%.

All experimental data are considered tentative.

References:

[1]V. P. Sazonov and M. F. Chernysheva, Zh. Obshch. Khim. **48**, 1682 (1978); M. F. Chernysheva, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1982.
[2]V. P. Sazonov and M. F. Chernysheva, Zh. Prikl. Khim. (Leningrad) **52**, 2717 (1979).
[3]V. P. Sazonov, K. N. Marsh, and G. T. Hefter, Nitromethane with Water or Organic Solvents: Binary Systems, IUPAC-NIST Solubility Data Series, Vol. 71; J. Phys. Chem. Ref. Data **29**, 1165 (2000).
[4]A. F. M. Barton, *Alcohols with Water*, IUPAC Solubility Data Series, Vol. 15 (Pergamon, Oxford, 1984).
[5]D. G. Shaw, *Hydrocarbons with Water and Seawater*, Part II: Hydrocarbons C8 to C36, IUPAC Solubility Data Series, Vol. 38 (Pergamon, Oxford, 1989).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(3) Naphthalene; $C_{10}H_8$; [91-20-3]
(4) Water; H_2O; [7732-18-5]

Original Measurements:

V. P. Sazonov and M. F. Chernysheva, Zh. Obshch. Khim. **48**, 1682–8 (1978).
M. F. Chernysheva, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1982.

Variables:

T/K = 285–369

Prepared By:

V. P. Sazonov

Experimental Data

The temperatures of phase transitions were determined in quaternary mixtures with a constant mass content of (3) and (4), respectively, 25.0 and 7.5; 25.0 and 30.0; 40.0 and 6.0 mass %; in quaternary mixtures with a constant mass content of (3) as (25.0 mass %) and with a constant mass relationship of (1) and (2) as 20.0:80.0, 40.0:60.0, 55.0:45.0, 70.0:30.0, and 85.0:15.0, respectively; and also in quaternary mixtures with a constant mass relationship of (1), (2), and (4) as 37.6:56.4:6.0, 51.7:42.3:6.0, and 65.0:28.2:6.0, respectively. L_1 nitromethane-rich phase; L_2 alcohol-rich phase; S naphthalene; L_4 water-rich phase. The phase that is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of the four phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	x_3 (compiler)	w_1	w_2	w_3
16.16(L_2)	289.31	0.6019	0.0283	0.1181	0.6075	0.0675	0.2500
17.05(L_1)	290.20	0.1833	0.3102	0.1617	0.1350	0.5400	0.2500
21.10(L_1)	294.25	0.2611	0.2578	0.1536	0.2025	0.4725	0.2500
21.50(L_2)	294.65	0.5566	0.0589	0.1227	0.5400	0.1350	0.2500
22.52(L_1)	295.67	0.3315	0.2104	0.1562	0.2700	0.4050	0.2500
22.80(L_2)	295.95	0.5073	0.0920	0.1279	0.4725	0.2025	0.2500
22.80(L_1)	295.95	0.3643	0.1881	0.1430	0.3038	0.3712	0.2500
22.91(L_1)	296.06	0.3954	0.1674	0.1364	0.3375	0.3375	0.2500
22.94(L_1)	296.09	0.4252	0.1474	0.1364	0.3712	0.3038	0.2500
22.94(L_2)	296.09	0.4811	0.1097	0.1306	0.4387	0.2363	0.2500
23.01[a]	296.16	0.4538	0.1280	0.1334	0.4050	0.2700	0.2500
19.66(L_1)	292.81	0.0962	0.0950	0.0848	0.1350	0.3150	0.2500
21.62(L_2)	294.77	0.2348	0.0248	0.0777	0.3600	0.0900	0.2500
22.10(L_1)	295.25	0.1259	0.0799	0.0834	0.1800	0.2700	0.2500
22.60(L_1)	295.75	0.1404	0.0725	0.0826	0.2025	0.2475	0.2500
22.83(L_2)	295.98	0.2090	0.0379	0.0790	0.3150	0.1350	0.2500
22.83(L_1)	295.98	0.1546	0.0654	0.0818	0.2250	0.2250	0.2500
22.93(L_1)	296.08	0.1686	0.0584	0.0810	0.2475	0.2050	0.2500
22.94(L_2)	296.09	0.1957	0.0446	0.0797	0.2925	0.1575	0.2500
22.98[a]	296.13	0.1822	0.0514	0.0804	0.2700	0.1800	0.2500
21.10(L_1)	294.25	0.2264	0.2234	0.2662	0.1620	0.3780	0.4000
21.35(L_2)	294.50	0.4958	0.0523	0.2186	0.4320	0.1080	0.4000
22.50(L_1)	293.65	0.2892	0.1836	0.2551	0.2160	0.3240	0.4000
22.73(L_2)	295.88	0.4498	0.0816	0.2267	0.3780	0.1620	0.4000
22.74(L_1)	295.89	0.3187	0.1648	0.2499	0.2430	0.2970	0.4000
22.88(L_2)	296.03	0.4237	0.1010	0.2300	0.3510	0.1890	0.4000
22.88(L_1)	296.03	0.3470	0.1469	0.2449	0.2700	0.2700	0.4000
22.94(L_1)	296.09	0.3743	0.1295	0.2401	0.2970	0.2430	0.4000
22.95[a]	296.10	0.4006	0.1125	0.2355	0.3240	0.2160	0.4000
19.67(L_2)	292.82	0.7338	0.0548	0.1404	0.6224	0.1098	0.2500
19.74(L_2)	292.89	0.7089	0.0529	0.1372	0.6155	0.1086	0.2500
19.74(L_2)	292.89	0.6961	0.0520	0.1355	0.6118	0.1080	0.2500
19.74(L_2)	292.89	0.6803	0.0507	0.1334	0.6072	0.1071	0.2500
19.74(L_2)	292.89	0.6624	0.0495	0.1311	0.6017	0.1062	0.2500
22.77(L_2)	295.92	0.6456	0.1170	0.1505	0.5108	0.2189	0.2500
22.77(L_2)	295.92	0.6212	0.1126	0.1466	0.5049	0.2164	0.2500
22.77(L_2)	295.92	0.6030	0.1093	0.1436	0.5003	0.2144	0.2500
22.77(L_2)	295.92	0.5966	0.1081	0.1425	0.4986	0.2137	0.2500
22.77(L_2)	295.92	0.5863	0.1063	0.1408	0.4959	0.2125	0.2500
22.97[a]	296.12	0.5416	0.1875	0.1615	0.3994	0.3268	0.2500
22.97[a]	296.12	0.5240	0.1815	0.1577	0.3957	0.3238	0.2500
23.00[a]	296.15	0.5083	0.1759	0.1543	0.3923	0.3209	0.2500
23.00[a]	296.15	0.4653	0.1610	0.1451	0.3820	0.3126	0.2500
22.56(L_1)	295.71	0.4136	0.2626	0.1713	0.2875	0.4312	0.2500
22.56(L_1)	295.71	0.4024	0.2554	0.1679	0.2854	0.4281	0.2500
22.56(L_1)	295.71	0.3957	0.2511	0.1659	0.2841	0.4262	0.2500
22.60(L_1)	295.75	0.4208	0.2670	0.1735	0.2888	0.4331	0.2500
17.31(L_1)	290.46	0.2442	0.4136	0.2006	0.1450	0.5802	0.2500
17.38(L_1)	290.53	0.2323	0.3931	0.1929	0.1434	0.5735	0.2500
17.38(L_1)	290.53	0.2275	0.3850	0.1899	0.1427	0.5707	0.2500
17.38(L_1)	290.53	0.2208	0.3736	0.1856	0.1417	0.5666	0.2500
12.60(S)	285.75	0.6367	0.1154	0.0512	0.5922	0.2538	0.1000
19.24(S)	292.39	0.6181	0.1121	0.0789	0.5593	0.2397	0.1500
21.92(S)	295.07	0.6064	0.1100	0.0963	0.5396	0.2312	0.1800
22.81(L_2)	295.96	0.5984	0.1086	0.1082	0.5264	0.2256	0.2000
22.81(L_2)	295.96	0.5860	0.1063	0.1267	0.5067	0.2171	0.2300
22.81(L_2)	295.96	0.5775	0.1047	0.1394	0.4935	0.2115	0.2500
22.81(L_2)	295.96	0.5554	0.1007	0.1723	0.4606	0.1974	0.3000
12.10(S)	285.25	0.5430	0.1880	0.0556	0.4653	0.3807	0.1000
19.17(S)	292.32	0.5259	0.1820	0.0854	0.4395	0.3595	0.1500
21.87(S)	295.02	0.5150	0.1784	0.1041	0.4239	0.3469	0.1800
22.92[a]	296.07	0.5077	0.1758	0.1169	0.4138	0.3384	0.2000
22.92[a]	296.07	0.4964	0.1719	0.1366	0.3981	0.3257	0.2300
22.92[a]	296.07	0.4887	0.1692	0.1501	0.3878	0.3172	0.2500
22.92[a]	296.07	0.4847	0.1678	0.1569	0.3826	0.3130	0.2600
22.92[a]	296.07	0.4685	0.1622	0.1850	0.3619	0.2961	0.3000
12.10(S)	285.25	0.4318	0.2741	0.0607	0.3384	0.5076	0.1000
19.17(S)	292.32	0.4169	0.2646	0.0932	0.3196	0.4794	0.1500
21.88(S)	295.03	0.4076	0.2587	0.1133	0.3083	0.4625	0.1800
22.58(L_1)	295.73	0.3775	0.2395	0.1790	0.3010	0.4514	0.1996
22.58(L_1)	295.73	0.3916	0.2485	0.1482	0.2895	0.4342	0.2301
22.58(L_1)	295.73	0.3851	0.2445	0.1624	0.2821	0.4232	0.2497
22.58(L_1)	295.73	0.3679	0.2335	0.1997	0.2632	0.3948	0.3000

[a]Critical opalescence.

TABLE 2. Solubility temperatures of the three phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	x_3 (compiler)	w_1	w_2	w_3
29.44(S)	302.59	0.4538	0.1280	0.1334	0.4050	0.2700	0.2500
29.52(S)	202.67	0.4252	0.1474	0.1364	0.3712	0.3038	0.2500
29.56(S)	302.71	0.4811	0.1097	0.1306	0.4387	0.2363	0.2500
29.78(S)	302.93	0.3954	0.1674	0.1395	0.3375	0.3375	0.2500
30.70(S)	303.85	0.3643	0.1881	0.1430	0.3038	0.3712	0.2500
30.80(S)	303.95	0.3315	0.2104	0.1462	0.2700	0.4050	0.2500
31.24(S)	304.39	0.5566	0.0589	0.1227	0.5400	0.1350	0.2500
32.90(S)	306.05	0.2611	0.2578	0.1536	0.2025	0.4725	0.2500
33.72(S)	306.87	0.6019	0.0283	0.1181	0.6075	0.675	0.2500
36.30(S)	309.45	0.1833	0.3102	0.1617	0.1350	0.5400	0.2500
41.68(S)	314.83	0.0968	0.3684	0.1707	0.0675	0.6075	0.2500

38.25(S)	311.40	0.2090	0.0379	0.0790	0.3150	0.1350	0.2500
38.30(S)	311.45	0.1957	0.0446	0.0797	0.2925	0.1575	0.2500
38.45(S)	311.60	0.1822	0.0514	0.0804	0.2700	0.1800	0.2500
38.70(S)	311.85	0.1686	0.0584	0.0810	0.2475	0.2025	0.2500
39.03(S)	312.18	0.2348	0.0248	0.0777	0.3600	0.0900	0.2500
39.24(S)	312.39	0.1546	0.0654	0.0818	0.2250	0.2250	0.2500
40.08(S)	313.23	0.1404	0.0725	0.0826	0.2025	0.2475	0.2500
40.75(S)	313.90	0.2597	0.0122	0.0764	0.4050	0.0450	0.2500
40.85(S)	314.00	0.1257	0.0799	0.0834	0.1800	0.2700	0.2500
43.31(S)	316.46	0.0962	0.0950	0.0848	0.1350	0.3150	0.2500
46.70(S)	319.85	0.0653	0.1106	0.0864	0.0900	0.3600	0.2500
50.84(S)	323.99	0.0333	0.1268	0.0881	0.0450	0.4050	0.2500
41.98(S)	315.13	0.4498	0.0816	0.2267	0.3780	0.1620	0.4000
42.18(S)	315.33	0.4006	0.1125	0.2355	0.3240	0.2160	0.4000
42.53(S)	315.68	0.4958	0.0523	0.2186	0.4320	0.1080	0.4000
43.70(S)	316.85	0.3470	0.1469	0.2449	0.2700	0.2700	0.4000
43.70(S)	316.85	0.3187	0.1648	0.2499	0.2430	0.2970	0.4000
43.73(S)	316.88	0.5384	0.0253	0.2111	0.4860	0.0540	0.4000
44.55(S)	317.70	0.2892	0.1836	0.2551	0.2160	0.3240	0.4000
50.60(S)	323.75	0.1577	0.2671	0.2783	0.1080	0.4320	0.4000
20.08(L_2)	293.23	0.7468	0.0557	0.1421	0.6259	0.1104	0.2500
20.75(L_2)	293.90	0.7728	0.0577	0.1455	0.6326	0.1116	0.2500
30.82(S)	303.97	0.7089	0.0529	0.1372	0.6155	0.1086	0.2500
30.93(S)	304.08	0.6961	0.0520	0.1355	0.6118	0.1080	0.2500
31.16(S)	304.31	0.6803	0.0507	0.1334	0.6072	0.1071	0.2500
31.65(S)	304.80	0.6624	0.0495	0.1311	0.6017	0.1062	0.2500
22.99(L_2)	296.14	0.6591	0.1195	0.1527	0.5139	0.2203	0.2500
23.72(L_2)	296.87	0.6885	0.1248	0.1576	0.5205	0.2230	0.2500
28.10(S)	301.25	0.6456	0.1170	0.1505	0.5108	0.2189	0.2500
28.30(S)	301.45	0.6212	0.1126	0.1466	0.5049	0.2164	0.2500
28.50(S)	301.65	0.6030	0.1093	0.1436	0.5003	0.2144	0.2500
28.75(S)	301.90	0.5966	0.1081	0.1425	0.4986	0.2137	0.2500
28.93(S)	302.08	0.5863	0.1063	0.1408	0.4959	0.2125	0.2500
23.17[a]	296.32	0.5576	0.1930	0.1649	0.4026	0.3294	0.2500
23.44[a]	296.59	0.5705	0.1974	0.1677	0.4051	0.3314	0.2500
24.05[a]	297.20	0.5932	0.2053	0.1726	0.4093	0.3348	0.2500
27.90(S)	301.05	0.5416	0.1875	0.1615	0.3994	0.3268	0.2500
27.90(S)	301.05	0.5240	0.1815	0.1577	0.3957	0.3238	0.2500
28.20(S)	301.35	0.5083	0.1759	0.1543	0.3923	0.3209	0.2500
28.40(S)	301.55	0.4653	0.1610	0.1451	0.3820	0.3126	0.2500
22.89(L_1)	296.04	0.4410	0.2800	0.1797	0.2922	0.4384	0.2500
23.36(L_1)	296.51	0.4598	0.2919	0.1855	0.2952	0.4429	0.2500
23.81(L_1)	296.96	0.4755	0.3018	0.1902	0.2976	0.4464	0.2500
28.95(S)	302.10	0.4208	0.2670	0.1735	0.2888	0.4331	0.2500
29.20(S)	302.35	0.4136	0.2626	0.1713	0.2875	0.4312	0.2500
29.45(S)	302.60	0.4024	0.2554	0.1679	0.2845	0.4281	0.2500
29.75(S)	302.90	0.3957	0.2511	0.1659	0.2841	0.4262	0.2500
17.78(L_1)	290.93	0.2526	0.4274	0.2058	0.1461	0.5844	0.2500
18.74(L_1)	291.89	0.2593	0.4390	0.2102	0.1469	0.5878	0.2500
19.65(L_1)	292.80	0.2760	0.4595	0.2213	0.1486	0.5945	0.2500
34.50(S)	307.65	0.2323	0.3931	0.1929	0.1434	0.5735	0.2500
34.76(S)	307.91	0.2275	0.3850	0.1899	0.1427	0.5707	0.2500
34.94(S)	308.09	0.2208	0.3736	0.1856	0.1417	0.5666	0.2500
23.48(S)	296.63	0.5984	0.1086	0.1082	0.5264	0.2256	0.2000
24.52(L_2)	297.67	0.6064	0.1100	0.0963	0.5396	0.2312	0.1800
26.90(S)	300.05	0.5860	0.1063	0.1267	0.5067	0.2171	0.2300
27.88(L_2)	301.03	0.6181	0.1121	0.0789	0.5593	0.2397	0.1500
28.91(S)	302.06	0.5775	0.1047	0.1394	0.4935	0.2115	0.2500
33.57(L_2)	306.72	0.6367	0.1154	0.0512	0.5922	0.2535	0.1000
33.61(S)	306.76	0.5554	0.1007	0.1723	0.4606	0.1974	0.3000
39.24(L_2)	312.39	0.6550	0.1188	0.0241	0.6265	0.2686	0.0478
23.06(S)	296.21	0.5077	0.1758	0.1169	0.4136	0.3384	0.2000
25.19[a]	298.34	0.5150	0.1784	0.1041	0.4239	0.3469	0.1800
26.35(S)	299.50	0.4964	0.1719	0.1366	0.3981	0.3257	0.2300
28.75(S)	301.90	0.4887	0.1692	0.1501	0.3878	0.3172	0.2500
28.76[a]	301.91	0.5259	0.1820	0.0854	0.4395	0.3595	0.1500
30.66(S)	303.81	0.4847	0.1678	0.1569	0.3826	0.3130	0.2600
33.40(S)	306.55	0.4685	0.1622	0.1850	0.3619	0.2961	0.3000
34.33[a]	307.48	0.5430	0.1880	0.0556	0.4653	0.3807	0.1000
39.60[a]	312.75	0.5595	0.1937	0.0269	0.4914	0.4020	0.0496
23.61(S)	296.76	0.3775	0.2395	0.1790	0.3010	0.4514	0.1996
23.99(L_1)	297.14	0.4076	0.2587	0.1133	0.3083	0.4625	0.1800
27.40(S)	300.55	0.3916	0.2485	0.1482	0.2895	0.4342	0.2301
27.68(L_1)	300.83	0.4169	0.2646	0.0932	0.3196	0.4791	0.1500
29.71(S)	302.86	0.3851	0.2445	0.1624	0.2821	0.4232	0.2497
33.31(L_1)	306.46	0.4318	0.2741	0.0607	0.3384	0.5076	0.1000
35.09(S)	308.24	0.3679	0.2335	0.1997	0.2632	0.3948	0.3000
38.75(L_1)	311.90	0.4461	0.2831	0.0297	0.3572	0.5358	0.0500

[a]Critical opalescence

TABLE 3. Solubility temperatures of the two phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	x_3 (compiler)	w_1	w_2	w_3
28.75(S)	301.90	0.7728	0.0577	0.1455	0.6326	0.1116	0.2500
29.92(S)	303.07	0.7468	0.0557	0.1421	0.6259	0.1104	0.2500
65.22(L_4)	338.37	0.6961	0.0520	0.1355	0.6118	0.1080	0.2500
73.95(L_4)	347.10	0.6803	0.0507	0.1334	0.6072	0.1071	0.2500
26.25(S)	299.40	0.6885	0.1248	0.1576	0.5205	0.2230	0.2500
27.38(S)	300.53	0.6591	0.1195	0.1527	0.5139	0.2203	0.2500
29.10(L_4)	302.25	0.6456	0.1170	0.1505	0.5108	0.2189	0.2500
57.25(L_4)	330.40	0.6212	0.1126	0.1466	0.5049	0.2164	0.2500
72.40(L_4)	345.55	0.6030	0.1093	0.1436	0.5003	0.2144	0.2500
77.50(L_4)	350.65	0.5966	0.1081	0.1425	0.4986	0.2137	0.2500
80.10(L_4)	353.25	0.5863	0.1063	0.1408	0.4959	0.2125	0.2500
25.60(S)	298.75	0.5932	0.2053	0.1726	0.4093	0.3348	0.2500
26.53(S)	296.68	0.5705	0.1974	0.1677	0.4051	0.3314	0.2500
27.15(S)	300.30	0.5576	0.1930	0.1649	0.4026	0.3294	0.2500
29.40(L_4)	302.55	0.5416	0.1875	0.1615	0.3994	0.3268	0.2500
60.10(L_4)	333.25	0.5240	0.1815	0.1577	0.3957	0.3238	0.2500
75.75(L_4)	348.90	0.5083	0.1759	0.1543	0.3923	0.3209	0.2500
26.35(S)	299.50	0.4755	0.3018	0.1902	0.2976	0.4464	0.2500
27.20(S)	300.35	0.4598	0.2919	0.1855	0.2952	0.4429	0.2500
28.12(S)	301.27	0.4410	0.2800	0.1797	0.2922	0.4384	0.2500
31.43(L_4)	304.58	0.4208	0.2670	0.1735	0.2888	0.4331	0.2500
61.65(L_4)	334.80	0.4236	0.2626	0.1713	0.2875	0.4312	0.2500
75.90(L_4)	349.05	0.4024	0.2554	0.1679	0.2854	0.4281	0.2500
81.90(L_4)	355.05	0.3957	0.2511	0.1659	0.2841	0.4262	0.2500
31.63(S)	304.78	0.2760	0.4593	0.2213	0.1486	0.5945	0.2500
32.62(S)	305.77	0.2593	0.4390	0.2102	0.1469	0.5878	0.2500
33.51(S)	306.66	0.2526	0.4274	0.2058	0.1461	0.5844	0.2500
34.01(S)	307.16	0.2442	0.4136	0.2006	0.1450	0.5802	0.2500
73.80(L_4)	346.95	0.2323	0.3931	0.1929	0.1434	0.5735	0.2500

85.70(L_4)	358.85	0.2275	0.3850	0.1899	0.1427	0.5707	0.2500
96.00(L_4)	369.15	0.2208	0.3736	0.1856	0.1417	0.5666	0.2500
61.92(L_4)	335.07	0.6550	0.1188	0.0241	0.6265	0.2686	0.0478
66.56(L_4)	339.71	0.6367	0.1154	0.0512	0.5922	0.2538	0.1000
72.30(L_4)	345.45	0.6181	0.1121	0.0789	0.5593	0.2397	0.1500
74.60(L_4)	347.75	0.6064	0.1100	0.0963	0.5396	0.2312	0.1800
78.90(L_4)	352.05	0.5984	0.1086	0.1082	0.5264	0.2256	0.2000
81.90(L_4)	355.05	0.5860	0.1063	0.1267	0.5067	0.2171	0.2300
84.90(L_4)	358.05	0.5775	0.1047	0.1394	0.4935	0.2115	0.2500
88.60(L_4)	361.75	0.5554	0.1007	0.1723	0.4606	0.1974	0.3000
62.26(L_4)	335.41	0.5595	0.1937	0.0269	0.4914	0.4020	0.0496
68.95(L_4)	342.10	0.5430	0.1880	0.0556	0.4656	0.3807	0.1000
74.90(L_4)	348.05	0.5259	0.1820	0.0854	0.4395	0.3595	0.1500
76.60(L_4)	349.75	0.5150	0.1784	0.1041	0.4239	0.3469	0.1800
79.10(L_4)	352.25	0.5077	0.1758	0.1169	0.4138	0.3384	0.2000
82.05(L_4)	355.20	0.4964	0.1719	0.1366	0.3981	0.3257	0.2300
85.60(L_4)	358.75	0.4685	0.1622	0.1850	0.3619	0.2961	0.3000
85.90(L_4)	359.05	0.4887	0.1692	0.1501	0.3878	0.3172	0.2500
63.03(L_4)	336.18	0.4461	0.2831	0.0297	0.3572	0.5358	0.0500
72.40(L_4)	345.55	0.4318	0.2741	0.0607	0.3384	0.5076	0.1000
78.80(L_4)	351.95	0.4169	0.2646	0.0932	0.3196	0.4791	0.1500
85.50(L_4)	358.65	0.4076	0.2587	0.1133	0.3083	0.4625	0.1800
86.70(L_4)	359.85	0.3775	0.2395	0.1790	0.3010	0.4514	0.1996
90.10(L_4)	363.25	0.3916	0.2485	0.1482	0.2895	0.4342	0.2301
92.60(L_4)	365.75	0.3851	0.2445	0.1624	0.2821	0.4232	0.2497
96.10(L_4)	369.25	0.3679	0.2335	0.1997	0.2632	0.3948	0.3000

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. Ampoules containing mixtures were suspended from a vertical roller linked to a shaking machine, which switched on at definite time intervals. Water bath temperature was controlled with a proportional temperature regulator and checked with mercury thermometers. Close to a phase transition, heating or cooling was effected at 0.03° h^{-1}. Solubility temperature of the liquid phase was determined both with heating and cooling, and the average taken. Measurements were carried out in thermostat with silicone oil at temperatures above 80 °C.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled on a packed column of 20 theoretical plates; no impurities detectable by gas chromatography.
(2) Source not specified, pure grade reagent; dried and distilled under vacuum; 99.5 mole % purity.
(3) Source not specified, analytical purity; purified by recrystallization; melting point = 80.2 °C.
(4) Twice distilled.

Estimated Error:

Temperature: ±0.02 K in 285–323 K and ±0.1 K for (above 323 K).

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(3) Naphthalene; $C_{10}H_8$; [91-20-3]
(4) Water; H_2O; [7732-18-5]

Original Measurements:

V. P. Sazonov and M. F. Chernysheva, Zh. Prikl. Khim. (Leningrad) **52**, 2717–22 (1979).

Variables:

T/K = 293–303

Prepared By:

V. P. Sazonov

Experimental Data

Type of phase equilibrium: [a]$L_1+L_2+L_3$; [b]$L_1+L_2+L_3+S$; [c]L_1+L_2+S; [d]L_1+L_3+S; [f]L_2+L_3+S; L_1 nitromethane-rich phase; L_2 alcohol-rich phase; L_3 water-rich phase; S naphthalene. According to the results obtained, the water phase had traces of 1-nonanol and naphthalene. For this reason, the water-rich phase may be considered to be a two component one in all equilibria regardless of temperature. At 20 °C the water phase in the equilibrium $L_1+L_2+L_3+S$ had the following composition: $w_1=0.096$, $w_2=0.0006$, $w_3=0.0004$, and $w_4=0.903$ ($x_1=0.0304$, $x_2=0.0001$, $x_3=0.0001$, and $x_4=0.9696$, compiler).

Compositions of liquid phases at equilibrium

		Nitromethane-rich phase (compiler)			Alcohol-rich phase (compiler)		
t/°C	T/K	x_1'	x_2'	x_3'	x_1''	x_2''	x_3''
20.0	293.2	0.863	0.033	0.022	0.208	0.520	0.036[a]
		0.835	0.039	0.048	0.271	0.452	0.076[a]
		0.790	0.055	0.077	0.336	0.381	0.112[a]
		0.777	0.061	0.086	0.350	0.366	0.124[b]
		0.799	0.057	0.090	0.335	0.410	0.134[c]
		0.826	0.051	0.096	0.308	0.480	0.152[c]
		0.817	0.039	0.077[d]	—	—	—
		—	—	—	0.278	0.427	0.118[f]
23.0	296.2	0.852	0.039	0.023	0.232	0.500	0.036[a]
		0.816	0.049	0.049	0.321	0.410	0.075[a]
		0.770	0.070	0.076	0.381	0.347	0.107[a]
		0.573	0.192	0.124[d]	—	—	—
		0.557	0.205	0.125[d]	—	—	—
		0.672	0.138	0.121	0.475	0.283	0.142[c]
		0.747	0.099	0.125	0.407	0.375	0.167[c]
		0.799	0.040	0.090[d]	—	—	—
		0.706	0.098	0.108[d]	—	—	—
		—	—	—	0.422	0.308	0.131[f]
		—	—	—	0.275	0.421	0.131[f]
30.0	303.2	0.815	0.057	0.020	0.306	0.440	0.033[a]
		0.783	0.072	0.044	0.416	0.342	0.066[a]
		0.593	0.192	0.079[d]	—	—	—
		0.767	0.037	0.123[d]	—	—	—
		0.662	0.102	0.144[d]	—	—	—
		0.579	0.158	0.156[d]	—	—	—
		0.534	0.194	0.162[d]	—	—	—
		—	—	—	0.424	0.270	0.168[f]
		—	—	—	0.263	0.394	0.165[f]

The same data are presented below in mass fractions

t/°C	T/K (compiler)	Nitromethane-rich phase w_1'	w_2'	w_3'	Alcohol-rich phase w_1''	w_2''	w_3''
20.0	293.2	0.853	0.077	0.046	0.132	0.776	0.048[a]
		0.795	0.088	0.095	0.174	0.685	0.103[a]
		0.715	0.118	0.146	0.221	0.591	0.155[a]
		0.691	0.128	0.161	0.230	0.569	0.170[b]
		0.701	0.119	0.166	0.207	0.598	0.173[c]
		0.715	0.104	0.174	0.173	0.637	0.180[c]
		0.748	0.085	0.149[d]	—	—	—
		—	—	—	0.175	0.636	0.156[f]
23.0	296.2	0.838	0.090	0.047	0.149	0.758	0.049[a]
		0.770	0.110	0.096	0.213	0.644	0.105[a]
		0.687	0.148	0.143	0.258	0.556	0.153[a]
		0.434	0.344	0.197[d]	—	—	—
		0.417	0.362	0.196[d]	—	—	—
		0.528	0.256	0.200	0.322	0.455	0.203[c]
		0.597	0.187	0.209	0.246	0.533	0.212[c]
		0.724	0.086	0.171[d]	—	—	—
		0.593	0.195	0.190[d]	—	—	—
		—	—	—	0.288	0.496	0.188[f]
		—	—	—	0.172	0.623	0.173[f]
30.0	303.2	0.796	0.132	0.0.41	0.207	0.702	0.047[a]
		0.729	0.158	0.085	0.294	0.571	0.098[a]
		0.473	0.363	0.132[d]	—	—	—
		0.676	0.077	0.228[d]	—	—	—
		0.537	0.196	0.245[d]	—	—	—
		0.441	0.286	0.249[d]	—	—	—
		0.391	0.336	0.249[d]	—	—	—
		—	—	—	0.292	0.438	0.242[f]
		—	—	—	0.165	0.584	0.218[f]

Auxiliary Information

Method/Apparatus/Procedure:

The analytical method was used. Thermostated glass vessels (15 mL capacity) were agitated with the aid of a sealed magnetic stirrer. Water temperature was regulated to ±0.02 K and monitored with thermometers with 0.01 K scale divisions. Mixtures were held 1.5–2 h with periodic stirring, and samples of liquid phases were taken with a MSh-10 micro syringe through a rubber stopper. Compositions of equilibrium liquid phases were determined by gas chromatography.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled on a packed column of 20 theoretical plates; no impurities detectable by gas chromatography.
(2) Source not specified, pure grade reagent; dried and distilled under vacuum; 99.5 mole % purity.
(3) Source not specified, analytical purity; purified by recrystallization; melting point = 80.2 °C.
(4) Twice distilled.

Estimated Error:

Composition: relative error of 3–5 determinations less than 1%.

7.4. +1-Nonanol+1-Decanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1-Nonanol; $C_9H_{20}O$; [143-08-8]
(3) 1-Decanol; $C_{10}H_{22}O$; [112-30-1]
(4) Water; H_2O; [7732-18-5]

Original Measurements:

V. P. Sazonov, A. G. Gromakovskaya, and E. F. Zhuravlev, Zh. Fiz. Khim. **51**, 2150–1 (1977).
*Deposited Doc., VINITI 1487 (1977).

Variables:

T/K=288–437

Prepared By:

V. P. Sazonov and N. V. Sazonov

Experimental Data

The solubility temperatures of liquid phases were determined in quaternary mixtures with a constant mass content of (4) as 10.0 or 40.0 mass % and with a constant mass relationship of (2) and (3) as 20.0:80.0, 40.0:60.0, 60.0:40.0, and 80.0:20.0; in quaternary mixtures with a constant mass relationship of (1), (2), and (3) as 20.0:32.0:48.0, 55.0:18.0:27.7, and 85.0:6.0:9.0, respectively. L_1 nitromethane-rich phase; L_2 alcohol-rich phase; L_3 water-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	x_3 (compilers)	w_1	w_2	w_3
31.05(L_1)	304.20	0.174	0.084	0.305	0.135	0.153	0.612
31.50(L_2)	304.65	0.706	0.003	0.011	0.855	0.009	0.036
37.75(L_1)	310.90	0.225	0.076	0.277	0.180	0.144	0.576
43.95(L_2)	317.10	0.661	0.010	0.036	0.765	0.027	0.108
45.70(L_1)	318.85	0.315	0.062	0.227	0.270	0.126	0.504
48.95(L_1)	322.10	0.395	0.050	0.183	0.360	0.108	0.432
49.60(L_2)	322.75	0.586	0.021	0.078	0.630	0.054	0.216
50.05[a]	323.20	0.499	0.034	0.126	0.495	0.081	0.324
28.40(L_1)	301.55	0.173	0.166	0.227	0.135	0.306	0.459
30.90(L_2)	304.05	0.706	0.006	0.009	0.855	0.018	0.027
36.20(L_1)	309.35	0.223	0.151	0.206	0.180	0.288	0.432
42.75(L_2)	315.90	0.661	0.020	0.027	0.765	0.054	0.081
44.50(L_1)	317.65	0.314	0.124	0.169	0.270	0.252	0.378
47.70(L_1)	320.85	0.393	0.100	0.137	0.360	0.216	0.324
48.45(L_2)	321.60	0.585	0.042	0.058	0.630	0.108	0.162
48.80[a]	321.95	0.497	0.069	0.094	0.495	0.162	0.243
27.50(L_1)	300.65	0.172	0.247	0.150	0.135	0.459	0.306
30.15(L_2)	303.30	0.705	0.009	0.006	0.855	0.027	0.018
35.10(L_1)	308.25	0.221	0.225	0.137	0.180	0.432	0.288
41.45(L_2)	314.60	0.660	0.030	0.018	0.765	0.081	0.054
43.20(L_1)	316.35	0.312	0.185	0.112	0.270	0.378	0.252
46.40(L_1)	319.55	0.392	0.149	0.091	0.360	0.324	0.216
47.30(L_2)	320.45	0.584	0.063	0.039	0.630	0.162	0.108
47.50[a]	320.65	0.496	0.103	0.062	0.495	0.243	0.162
26.55(L_1)	299.70	0.171	0.327	0.074	0.135	0.612	0.153
29.10(L_2)	302.25	0.705	0.013	0.003	0.855	0.036	0.009
33.55(L_1)	306.70	0.220	0.298	0.068	0.180	0.576	0.144
40.35(L_2)	313.50	0.660	0.039	0.009	0.765	0.108	0.027
42.00(L_1)	315.15	0.310	0.245	0.056	0.270	0.504	0.126
45.10(L_1)	318.25	0.390	0.198	0.045	0.360	0.432	0.108
46.15(L_2)	319.30	0.583	0.085	0.019	0.630	0.216	0.054
46.20[a]	319.35	0.494	0.137	0.031	0.495	0.324	0.081
16.00(L_1)	289.15	0.055	0.026	0.096	0.090	0.102	0.408
26.20(L_2)	299.35	0.294	0.001	0.005	0.570	0.006	0.024
27.20(L_1)	300.35	0.072	0.025	0.089	0.120	0.096	0.384

40.00(L_1)	313.15	0.106	0.021	0.076	0.180	0.084	0.336
47.40(L_1)	320.55	0.138	0.018	0.064	0.240	0.072	0.288
49.45(L_2)	322.60	0.268	0.004	0.015	0.510	0.018	0.072
49.95(L_2)	323.10	0.228	0.008	0.030	0.420	0.036	0.144
50.05[a]	323.20	0.184	0.013	0.047	0.330	0.054	0.216
14.70(L_1)	287.85	0.055	0.052	0.072	0.090	0.204	0.306
24.80(L_1)	297.95	0.072	0.049	0.067	0.120	0.192	0.288
25.50(L_2)	298.65	0.294	0.003	0.004	0.570	0.012	0.018
39.95(L_1)	313.10	0.106	0.042	0.057	0.180	0.168	0.252
46.15(L_1)	319.30	0.138	0.035	0.048	0.240	0.144	0.216
48.00(L_2)	321.15	0.268	0.008	0.011	0.510	0.036	0.054
48.65(L_2)	321.80	0.227	0.017	0.022	0.420	0.072	0.108
48.70[a]	321.85	0.184	0.025	0.035	0.330	0.108	0.162
24.00(L_2)	297.15	0.294	0.004	0.002	0.570	0.018	0.012
24.60(L_1)	297.75	0.072	0.073	0.044	0.120	0.288	0.192
38.90(L_1)	312.05	0.106	0.062	0.038	0.180	0.252	0.168
45.00(L_1)	318.15	0.138	0.052	0.032	0.240	0.216	0.144
46.85(L_2)	320.00	0.268	0.012	0.007	0.510	0.054	0.036
47.40(L_2)	320.55	0.227	0.025	0.015	0.420	0.108	0.072
47.40[a]	320.55	0.184	0.038	0.023	0.330	0.162	0.108
22.00(L_2)	295.15	0.294	0.005	0.001	0.570	0.024	0.006
24.00(L_1)	297.15	0.072	0.097	0.022	0.120	0.384	0.096
37.00(L_1)	310.15	0.105	0.083	0.019	0.180	0.336	0.084
43.80(L_1)	316.95	0.138	0.070	0.016	0.240	0.288	0.072
45.50(L_2)	318.65	0.268	0.016	0.004	0.510	0.072	0.018
46.10(L_2)	319.25	0.227	0.033	0.008	0.420	0.144	0.036
46.20[a]	319.35	0.184	0.051	0.012	0.330	0.216	0.054
37.05(L_1)	310.20	0.277	0.188	0.257	0.189	0.302	0.453
37.10(L_1)	310.25	0.266	0.180	0.246	0.187	0.300	0.449
37.60(L_1)	310.75	0.289	0.196	0.268	0.190	0.305	0.457
48.80[a]	321.95	0.590	0.082	0.112	0.519	0.170	0.255
48.80[a]	321.95	0.572	0.079	0.108	0.515	0.168	0.253
42.30(L_2)	315.45	0.765	0.023	0.031	0.802	0.057	0.085
42.30(L_2)	315.45	0.742	0.022	0.030	0.795	0.056	0.084
42.35(L_2)	315.50	0.786	0.024	0.032	0.809	0.057	0.086

[a]Critical opalescence.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	x_3 (compilers)	w_1	w_2	w_3
81.0	354.2	0.706	0.003	0.011	0.855	0.009	0.036
83.5	356.7	0.661	0.010	0.036	0.765	0.027	0.108
88.0	361.2	0.586	0.021	0.078	0.630	0.054	0.216
99.8	373.0	0.499	0.034	0.126	0.495	0.081	0.324
114.0	387.2	0.395	0.050	0.183	0.360	0.108	0.432
132.0	405.2	0.315	0.062	0.227	0.270	0.126	0.504
164.0	437.2	0.174	0.084	0.305	0.135	0.153	0.612
77.5	350.7	0.706	0.006	0.009	0.855	0.018	0.027
81.2	354.4	0.661	0.020	0.027	0.765	0.054	0.081
87.8	361.0	0.585	0.042	0.058	0.630	0.108	0.162
99.7	372.9	0.497	0.069	0.094	0.495	0.162	0.243
112.0	385.2	0.393	0.100	0.137	0.360	0.216	0.324
131.0	404.2	0.314	0.124	0.169	0.270	0.252	0.378
157.0	430.2	0.223	0.151	0.206	0.180	0.288	0.432
161.0	434.2	0.173	0.166	0.227	0.135	0.306	0.459
68.8	342.0	0.705	0.009	0.006	0.855	0.027	0.018
82.7	355.9	0.660	0.030	0.018	0.765	0.081	0.054
86.5	359.7	0.584	0.063	0.039	0.630	0.162	0.108
95.0	368.2	0.496	0.103	0.062	0.495	0.243	0.162
108.0	381.2	0.392	0.149	0.091	0.360	0.324	0.216
149.0	422.2	0.221	0.225	0.137	0.180	0.432	0.288
160.0	433.2	0.172	0.247	0.150	0.135	0.459	0.306
79.5	352.7	0.583	0.085	0.019	0.630	0.216	0.054
80.0	353.2	0.705	0.013	0.003	0.855	0.036	0.009
80.1	353.3	0.660	0.039	0.009	0.765	0.108	0.027
93.5	366.7	0.494	0.137	0.031	0.495	0.324	0.081
106.5	379.7	0.390	0.198	0.045	0.360	0.432	0.108
122.0	395.2	0.310	0.245	0.056	0.270	0.504	0.126
143.0	416.2	0.220	0.298	0.068	0.180	0.576	0.144
160.0	433.2	0.171	0.327	0.074	0.135	0.612	0.153
111.8	385.0	0.294	0.001	0.005	0.570	0.006	0.024
156.4	429.6	0.268	0.004	0.015	0.510	0.018	0.072
111.2	384.4	0.294	0.003	0.004	0.570	0.012	0.018
154.0	427.2	0.268	0.008	0.011	0.510	0.036	0.054
112.0	385.2	0.294	0.004	0.002	0.570	0.018	0.012
150.9	424.1	0.268	0.012	0.007	0.510	0.054	0.036
112.2	385.4	0.294	0.005	0.001	0.570	0.024	0.006
152.9	426.1	0.268	0.016	0.004	0.510	0.072	0.018
38.75	311.90	0.302	0.205	0.280	0.192	0.307	0.461
40.10	313.25	0.317	0.214	0.292	0.194	0.310	0.464
41.80	314.95	0.331	0.224	0.307	0.195	0.312	0.469
43.50	316.65	0.348	0.235	0.321	0.197	0.315	0.472
45.45	318.60	0.364	0.248	0.338	0.198	0.318	0.476
49.00	322.15	0.289	0.196	0.268	0.190	0.305	0.457
66.85	340.00	0.277	0.188	0.257	0.189	0.302	0.453
49.50	322.65	0.611	0.084	0.116	0.524	0.171	0.257
50.55	323.70	0.631	0.088	0.119	0.528	0.173	0.259
51.55	324.70	0.654	0.090	0.123	0.533	0.174	0.261
53.05	326.20	0.676	0.094	0.128	0.537	0.176	0.263
54.55	327.70	0.700	0.097	0.133	0.541	0.177	0.266
55.85	329.00	0.723	0.100	0.137	0.545	0.178	0.268
61.40	334.55	0.572	0.079	0.108	0.515	0.168	0.253
42.50	315.65	0.809	0.024	0.033	0.816	0.058	0.086
43.80	316.95	0.829	0.025	0.034	0.822	0.058	0.087
44.85	318.00	0.856	0.025	0.035	0.830	0.058	0.088
46.20	319.35	0.881	0.026	0.036	0.836	0.059	0.089
47.60	320.75	0.907	0.027	0.037	0.843	0.060	0.089
49.40	322.55	0.786	0.024	0.032	0.809	0.057	0.086
57.20	330.35	0.765	0.023	0.031	0.802	0.057	0.085
63.10	336.25	0.742	0.022	0.030	0.795	0.056	0.084

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. The temperatures of phase transitions were determined both on heating and cooling of the mixtures and the average of the values of temperature obtained were taken. Measurements were carried out in thermostat with silicone oil at temperatures above 80 °C.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled on a laboratory packed column; purity 99.9 mole %.
(2) Source not specified; pure grade reagent; dried and repeatedly distilled under vacuum; purity 99.5 mole %.
(3) Source not specified; pure grade reagent; dried and repeatedly distilled under vacuum; purity 99.5 mole %.
(4) Twice distilled.

Estimated Error:

Not specified.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

8. Quaternary Systems Nitromethane+Three Organic Compounds

8.1. +Diiodomethane+1,2-Ethanediol+Cyclohexane

Components:

(1) Nitromethane; CH_3NO_2 ; [75-52-5]
(2) Diiodomethane; CH_2I_2 ; [75-11-6]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(4) Cyclohexane; C_6H_{12} ; [110-82-7]

Original Measurements:

V. P. Sazonov, I. N. Zhilyaeva, and L. V. Gudkina, Zh. Fiz. Khim. **49**, 1594-5 (1975).
*Deposited Doc., VINITI 618 and 619 (1975).

Variables:

T/K=281–417

Prepared By:

V. P. Sazonov and N. V. Sazonov

Experimental Data

The temperatures of phase transitions were determined in quaternary mixtures with a constant mass content of (3), respectively 5.0, 10.0, 20.0, 30.0, 40.0, and 50.0 mass %, and with a constant mass content of (1), respectively, 9.5, 19.0 and 38.0; 9.0, 18.0 and 36.0; 4.0, 8.0, 16.0 and 32.0; 21.0 and 28.0; 6.0, 12.0 and 24.0; 5.0, 10.0, and 20.0 mass %, and in quaternary mixtures with a constant mass content of (3), respectively, 5.0, 10.0, and 20.0, and with a constant mass relationship of (2) and (4), namely 72.5:27.5 ratio. L_1 nitromethane-rich phase; L_2 diiodomethane-rich phase; L_3 ethanediol-rich phase; L_4 cyclohexane-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of the four liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	x_3 (compilers)	w_1	w_2	w_3
10.42(L_2)	283.57	0.187	0.230	0.096	0.095	0.513	0.050
11.12(L_2)	284.27	0.191	0.244	0.099	0.095	0.535	0.050
11.62(L_2)	284.77	0.195	0.260	0.101	0.095	0.556	0.050
11.96(L_2)	285.11	0.199	0.276	0.103	0.095	0.577	0.050
12.05(L_4)	285.20	0.219	0.347	0.113	0.095	0.662	0.050
12.12(L_2)	285.27	0.204	0.292	0.105	0.095	0.598	0.050
12.23(L_4)	285.38	0.213	0.328	0.111	0.095	0.641	0.050
12.37[a]	285.52	0.208	0.310	0.108	0.095	0.620	0.050
9.08(L_2)	282.23	0.337	0.185	0.087	0.190	0.456	0.050
9.34(L_4)	282.49	0.405	0.314	0.105	0.190	0.646	0.050
11.07(L_2)	284.22	0.349	0.207	0.090	0.190	0.494	0.050
11.42(L_4)	284.57	0.397	0.299	0.103	0.190	0.627	0.050
11.62(L_2)	284.77	0.355	0.218	0.092	0.190	0.513	0.050
12.07(L_2)	285.22	0.361	0.231	0.094	0.190	0.532	0.050
12.12(L_4)	285.27	0.389	0.284	0.101	0.190	0.608	0.050
12.23(L_2)	285.38	0.368	0.243	0.095	0.190	0.551	0.050
12.23(L_2)	285.38	0.375	0.256	0.097	0.190	0.570	0.050
12.35[a]	285.50	0.382	0.270	0.099	0.190	0.589	0.050
8.28(L_4)	281.43	0.639	0.191	0.083	0.380	0.499	0.050
9.52(L_2)	282.67	0.590	0.141	0.076	0.380	0.399	0.050
10.97(L_2)	284.12	0.596	0.148	0.077	0.380	0.413	0.050
11.17(L_4)	284.32	0.632	0.184	0.082	0.380	0.485	0.050
11.92(L_2)	285.07	0.603	0.155	0.078	0.380	0.428	0.050
12.28(L_4)	285.43	0.624	0.176	0.081	0.380	0.470	0.050
12.33(L_2)	285.48	0.610	0.162	0.079	0.380	0.442	0.050
12.43[a]	285.58	0.617	0.169	0.080	0.380	0.456	0.050
9.58(L_2)	282.73	0.307	0.168	0.168	0.180	0.432	0.100
10.53(L_2)	283.68	0.312	0.178	0.170	0.180	0.450	0.100
10.53(L_4)	283.68	0.363	0.281	0.198	0.180	0.612	0.100
11.43(L_2)	284.58	0.317	0.188	0.173	0.180	0.468	0.100
11.97(L_2)	285.12	0.322	0.198	0.176	0.180	0.486	0.100
12.28(L_4)	285.43	0.356	0.268	0.195	0.180	0.594	0.100

12.28(L_4)	285.43	0.350	0.256	0.191	0.180	0.576	0.100
12.38(L_2)	285.53	0.327	0.209	0.179	0.180	0.504	0.100
12.49(L_2)	285.64	0.333	0.220	0.182	0.180	0.522	0.100
12.51(L_4)	285.66	0.344	0.243	0.188	0.180	0.558	0.100
12.53[a]	285.68	0.338	0.231	0.185	0.180	0.540	0.100
8.83(L_4)	281.98	0.585	0.175	0.160	0.360	0.472	0.100
9.71(L_2)	282.86	0.544	0.130	0.149	0.360	0.378	0.100
10.92(L_2)	284.07	0.549	0.136	0.150	0.360	0.391	0.100
11.37(L_4)	284.52	0.579	0.168	0.158	0.360	0.459	0.100
11.86(L_2)	285.01	0.555	0.142	0.152	0.360	0.405	0.100
12.39(L_4)	285.54	0.573	0.162	0.156	0.360	0.446	0.100
12.43(L_2)	285.58	0.561	0.149	0.153	0.360	0.419	0.100
12.54[a]	285.69	0.567	0.155	0.155	0.360	0.432	0.100
9.90(L_2)	283.05	0.257	0.147	0.316	0.160	0.400	0.200
10.40(L_4)	283.55	0.291	0.225	0.357	0.160	0.544	0.200
11.45(L_2)	284.60	0.261	0.154	0.320	0.160	0.416	0.200
11.51(L_4)	284.66	0.287	0.216	0.352	0.160	0.528	0.200
11.81(L_2)	284.96	0.264	0.162	0.325	0.160	0.432	0.200
12.00(L_4)	285.15	0.283	0.206	0.347	0.160	0.512	0.200
12.15(L_2)	285.30	0.267	0.171	0.329	0.160	0.448	0.200
12.35(L_2)	285.50	0.271	0.179	0.333	0.160	0.464	0.200
12.40(L_4)	285.55	0.279	0.197	0.343	0.160	0.496	0.200
12.42[a]	285.57	0.275	0.188	0.338	0.160	0.480	0.200
9.60(L_2)	282.75	0.458	0.110	0.282	0.320	0.336	0.200
10.61(L_2)	283.76	0.463	0.115	0.284	0.320	0.348	0.200
11.25(L_4)	284.40	0.483	0.141	0.297	0.320	0.408	0.200
11.70(L_2)	284.85	0.466	0.120	0.287	0.320	0.360	0.200
12.20(L_4)	285.35	0.479	0.135	0.295	0.320	0.396	0.200
12.41(L_4)	285.56	0.475	0.130	0.292	0.320	0.384	0.200
12.45[a]	285.60	0.471	0.125	0.289	0.320	0.372	0.200
10.05(L_2)	283.20	0.312	0.075	0.511	0.240	0.252	0.400
11.15(L_2)	284.30	0.314	0.078	0.514	0.240	0.261	0.400
11.35(L_4)	284.50	0.323	0.094	0.530	0.240	0.306	0.400
12.10(L_2)	285.25	0.316	0.081	0.517	0.240	0.270	0.400
12.37(L_4)	285.52	0.321	0.091	0.527	0.240	0.297	0.400
12.48[a]	285.63	0.318	0.084	0.520	0.240	0.279	0.400
12.56[a]	285.71	0.319	0.087	0.524	0.240	0.288	0.400
10.08(L_2)	283.23	0.249	0.059	0.611	0.200	0.210	0.500
11.41(L_2)	284.56	0.250	0.062	0.614	0.200	0.218	0.500
11.62(L_4)	284.77	0.256	0.074	0.628	0.200	0.255	0.500
12.17(L_4)	285.32	0.251	0.064	0.617	0.200	0.225	0.500
12.38(L_4)	285.53	0.254	0.072	0.626	0.200	0.247	0.500
12.45[a]	285.60	0.252	0.067	0.619	0.200	0.232	0.500
12.51[a]	285.66	0.253	0.069	0.623	0.200	0.240	0.500
12.57[a]	285.72	0.191	0.317	0.109	0.086	0.626	0.050
12.62[a]	285.77	0.208	0.310	0.108	0.095	0.620	0.050
12.62[a]	285.77	0.245	0.294	0.105	0.115	0.605	0.050
12.47[a]	285.62	0.220	0.264	0.198	0.109	0.574	0.100
12.47[a]	285.62	0.264	0.247	0.192	0.135	0.555	0.100
12.38[a]	285.53	0.234	0.192	0.343	0.134	0.483	0.200
12.45[a]	285.60	0.187	0.208	0.355	0.104	0.505	0.200
12.48[a]	285.63	0.178	0.211	0.357	0.098	0.509	0.200
12.49[a]	285.64	0.206	0.201	0.350	0.116	0.496	0.200

[a]Critical opalescence.

TABLE 2. Solubility temperatures of the three liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	x_3 (compilers)	w_1	w_2	w_3
10.01(L_1)	283.16	0.236	0.411	0.122	0.095	0.727	0.050
11.02(L_1)	284.17	0.230	0.389	0.119	0.095	0.705	0.050
11.92(L_1)	285.07	0.224	0.368	0.116	0.095	0.684	0.050
12.76(L_1)	285.91	0.219	0.347	0.113	0.095	0.662	0.050
14.31(L_1)	287.46	0.213	0.328	0.111	0.095	0.641	0.050
15.22(L_1)	288.37	0.208	0.310	0.108	0.095	0.620	0.050
17.43(L_1)	290.58	0.204	0.292	0.105	0.095	0.598	0.050
18.21(L_1)	291.36	0.199	0.276	0.103	0.095	0.577	0.050
22.36(L_1)	295.51	0.195	0.260	0.101	0.095	0.556	0.050
23.52(L_1)	296.67	0.191	0.244	0.099	0.095	0.535	0.050
24.67(L_1)	297.82	0.187	0.230	0.096	0.095	0.513	0.050
22.67(L_1)	295.82	0.413	0.330	0.107	0.190	0.665	0.050
23.27(L_1)	296.42	0.422	0.346	0.109	0.190	0.684	0.050
23.46(L_1)	295.61	0.405	0.314	0.105	0.190	0.646	0.050
25.97(L_1)	299.12	0.397	0.299	0.103	0.190	0.627	0.050
26.68(L_1)	299.83	0.431	0.363	0.112	0.190	0.703	0.050
28.43(L_1)	301.58	0.389	0.284	0.101	0.190	0.608	0.050
31.96(L_1)	305.11	0.382	0.270	0.099	0.190	0.589	0.050
33.53(L_1)	306.68	0.441	0.381	0.114	0.190	0.722	0.050
35.87(L_1)	309.02	0.375	0.256	0.097	0.190	0.570	0.050
40.32(L_1)	313.47	0.368	0.243	0.095	0.190	0.551	0.050
44.35(L_1)	317.50	0.361	0.231	0.094	0.190	0.532	0.050
47.85(L_1)	321.00	0.355	0.218	0.092	0.190	0.513	0.050
52.00(L_1)	325.15	0.349	0.207	0.090	0.190	0.494	0.050
21.82(L_2)	294.97	0.639	0.191	0.083	0.380	0.499	0.050
22.83(L_2)	295.98	0.647	0.199	0.084	0.380	0.513	0.050
25.58(L_2)	298.73	0.632	0.183	0.082	0.380	0.485	0.050
27.23(L_2)	300.38	0.655	0.207	0.085	0.380	0.527	0.050
31.98(L_2)	305.13	0.624	0.176	0.081	0.380	0.470	0.050
34.07(L_2)	307.22	0.663	0.215	0.086	0.380	0.542	0.050
36.02(L_3)	309.17	0.590	0.141	0.076	0.380	0.399	0.050
40.76(L_2)	313.91	0.617	0.169	0.080	0.380	0.456	0.050
42.33(L_3)	315.48	0.596	0.148	0.077	0.380	0.413	0.050
53.35(L_4)	326.50	0.603	0.155	0.078	0.380	0.428	0.050
10.48(L_1)	283.63	0.208	0.362	0.227	0.090	0.688	0.100
10.72(L_2)	283.87	0.169	0.207	0.184	0.090	0.486	0.100
11.45(L_2)	284.60	0.172	0.220	0.188	0.090	0.506	0.100
11.57(L_1)	284.72	0.203	0.343	0.222	0.090	0.668	0.100
11.98(L_2)	285.13	0.175	0.234	0.191	0.090	0.527	0.100
12.04(L_1)	285.19	0.198	0.326	0.217	0.090	0.648	0.100
12.27(L_1)	285.42	0.194	0.309	0.212	0.090	0.628	0.100
12.27(L_2)	285.42	0.179	0.247	0.195	0.090	0.547	0.100
12.41(L_1)	285.56	0.190	0.292	0.208	0.090	0.607	0.100
12.44(L_2)	285.59	0.182	0.262	0.199	0.090	0.567	0.100
12.53[a]	285.68	0.185	0.277	0.203	0.090	0.587	0.100
22.11(L_1)	295.26	0.363	0.281	0.198	0.180	0.612	0.100
22.28(L_1)	295.43	0.369	0.295	0.202	0.180	0.630	0.100
23.87(L_1)	297.02	0.376	0.309	0.206	0.180	0.648	0.100
25.23(L_1)	298.38	0.356	0.268	0.195	0.180	0.594	0.100
26.13(L_1)	299.28	0.384	0.323	0.210	0.180	0.666	0.100
27.75(L_2)	300.90	0.350	0.256	0.191	0.180	0.576	0.100

31.53(L_1)	304.68	0.344	0.243	0.188	0.180	0.558	0.100	45.55(L_1)	318.70	0.475	0.130	0.292	0.320	0.384	0.200
34.32(L_1)	307.47	0.338	0.231	0.185	0.180	0.540	0.100	51.30(L_1)	324.45	0.458	0.110	0.282	0.320	0.336	0.200
37.97(L_1)	311.12	0.333	0.220	0.182	0.180	0.522	0.100	54.25(L_1)	327.40	0.463	0.115	0.284	0.320	0.348	0.200
39.38(L_1)	312.53	0.327	0.209	0.179	0.180	0.504	0.100	56.40(L_1)	329.55	0.471	0.125	0.289	0.320	0.372	0.200
43.75(L_1)	316.90	0.322	0.198	0.176	0.180	0.486	0.100	60.10(L_1)	333.25	0.466	0.120	0.287	0.320	0.360	0.200
47.90(L_1)	321.05	0.317	0.188	0.173	0.180	0.468	0.100	70.5(L_1)	343.7	0.455	0.105	0.279	0.320	0.324	0.200
49.85(L_1)	323.00	0.312	0.178	0.170	0.180	0.450	0.100	23.21(L_1)	296.36	0.325	0.151	0.456	0.210	0.429	0.300
54.30(L_1)	327.45	0.307	0.168	0.168	0.180	0.432	0.100	24.68(L_1)	297.83	0.321	0.145	0.452	0.210	0.416	0.300
21.92(L_2)	295.07	0.598	0.189	0.164	0.360	0.499	0.100	24.95(L_1)	298.10	0.328	0.157	0.460	0.210	0.441	0.300
22.23(L_2)	295.38	0.585	0.175	0.160	0.360	0.472	0.100	27.35(L_1)	300.50	0.318	0.140	0.447	0.210	0.404	0.300
23.16(L_2)	296.31	0.592	0.182	0.162	0.360	0.486	0.100	30.24(L_1)	303.39	0.316	0.134	0.443	0.210	0.392	0.300
26.47(L_2)	299.62	0.579	0.168	0.158	0.360	0.459	0.100	31.86(L_1)	305.01	0.334	0.169	0.469	0.210	0.466	0.300
35.37(L_2)	308.52	0.573	0.162	0.156	0.360	0.446	0.100	33.42(L_1)	306.57	0.313	0.129	0.439	0.210	0.380	0.300
42.90(L_4)	316.05	0.567	0.155	0.155	0.360	0.432	0.100	35.97(L_1)	309.12	0.310	0.124	0.435	0.210	0.368	0.300
49.35(L_3)	322.50	0.544	0.130	0.149	0.360	0.378	0.100	36.30(L_1)	309.45	0.251	0.013	0.353	0.210	0.049	0.300
52.25(L_4)	325.40	0.561	0.149	0.153	0.360	0.419	0.100	36.35(L_1)	309.50	0.259	0.028	0.363	0.210	0.098	0.300
52.95(L_3)	326.10	0.549	0.136	0.150	0.360	0.391	0.100	36.72(L_1)	309.87	0.267	0.042	0.375	0.210	0.147	0.300
61.20[a](L_4)	334.35	0.555	0.142	0.152	0.360	0.405	0.100	36.94(L_1)	310.09	0.275	0.059	0.387	0.210	0.196	0.300
14.10(L_4)	287.25	0.091	0.366	0.449	0.040	0.703	0.200	37.20(L_1)	310.35	0.307	0.118	0.432	0.210	0.355	0.300
15.75(L_4)	288.90	0.089	0.348	0.439	0.040	0.684	0.200	37.84(L_1)	310.99	0.284	0.076	0.399	0.210	0.245	0.300
16.10(L_2)	289.25	0.074	0.207	0.363	0.040	0.494	0.200	38.10(L_1)	311.25	0.304	0.113	0.428	0.210	0.343	0.300
17.03(L_4)	290.18	0.087	0.332	0.430	0.040	0.665	0.200	39.27(L_1)	312.42	0.299	0.104	0.420	0.210	0.319	0.300
17.05(L_2)	290.20	0.075	0.220	0.369	0.040	0.513	0.200	39.91(L_1)	313.06	0.294	0.094	0.413	0.210	0.294	0.300
17.40(L_2)	290.55	0.076	0.232	0.376	0.040	0.532	0.200	23.62(L_1)	296.77	0.402	0.120	0.423	0.280	0.367	0.300
17.81(L_4)	290.96	0.086	0.316	0.421	0.040	0.646	0.200	28.14(L_1)	301.29	0.399	0.115	0.420	0.280	0.357	0.300
17.95(L_2)	291.10	0.078	0.244	0.383	0.040	0.551	0.200	34.68(L_1)	307.83	0.396	0.112	0.417	0.280	0.347	0.300
18.50(L_2)	291.65	0.081	0.271	0.397	0.040	0.589	0.200	36.70(L_1)	309.85	0.411	0.134	0.433	0.280	0.399	0.300
18.55(L_2)	291.70	0.079	0.258	0.390	0.040	0.570	0.200	39.66(L_3)	312.81	0.334	0.023	0.352	0.280	0.084	0.300
18.55(L_4)	291.70	0.084	0.300	0.413	0.040	0.627	0.200	39.80(L_3)	312.95	0.326	0.011	0.344	0.280	0.042	0.300
18.62[a]	291.77	0.082	0.286	0.405	0.040	0.608	0.200	41.18(L_1)	314.33	0.343	0.035	0.361	0.280	0.126	0.300
11.60(L_1)	284.75	0.165	0.296	0.405	0.080	0.630	0.200	41.20(L_1)	314.35	0.393	0.107	0.414	0.280	0.336	0.300
11.86(L_2)	285.01	0.141	0.188	0.348	0.080	0.468	0.200	41.65(L_1)	314.80	0.352	0.048	0.371	0.280	0.168	0.300
12.30(L_2)	285.45	0.143	0.199	0.353	0.080	0.486	0.200	42.70(L_1)	315.85	0.361	0.062	0.381	0.280	0.210	0.300
12.42(L_1)	285.57	0.162	0.282	0.398	0.080	0.612	0.200	44.80(L_1)	317.95	0.371	0.076	0.391	0.280	0.252	0.300
12.75(L_2)	285.90	0.146	0.209	0.359	0.080	0.504	0.200	45.75(L_1)	318.90	0.390	0.103	0.411	0.280	0.325	0.300
12.91(L_2)	286.06	0.148	0.221	0.365	0.080	0.522	0.200	46.25(L_1)	319.40	0.376	0.084	0.397	0.280	0.273	0.300
12.97(L_1)	296.12	0.159	0.269	0.391	0.080	0.594	0.200	48.15(L_1)	321.30	0.382	0.091	0.402	0.280	0.294	0.300
13.05(L_2)	286.20	0.151	0.232	0.371	0.080	0.540	0.200	48.40(L_1)	321.55	0.387	0.099	0.408	0.280	0.315	0.300
13.15(L_2)	286.30	0.154	0.244	0.377	0.080	0.558	0.200	49.25(L_1)	322.40	0.385	0.095	0.405	0.280	0.304	0.300
13.23[a]	286.38	0.156	0.256	0.384	0.080	0.576	0.200	13.13(L_2)	286.28	0.088	0.108	0.575	0.060	0.324	0.400
19.20(L_1)	292.35	0.295	0.235	0.363	0.160	0.560	0.200	14.62(L_1)	287.77	0.099	0.184	0.652	0.060	0.486	0.400
19.65(L_1)	292.80	0.291	0.225	0.357	0.160	0.544	0.200	15.67(L_2)	288.82	0.090	0.119	0.587	0.060	0.351	0.400
21.22(L_1)	294.37	0.299	0.246	0.368	0.160	0.576	0.200	17.09(L_1)	290.24	0.098	0.177	0.645	0.060	0.473	0.400
23.10(L_1)	296.25	0.283	0.206	0.347	0.160	0.512	0.200	17.27(L_2)	290.42	0.091	0.131	0.599	0.060	0.378	0.400
25.61(L_1)	298.76	0.279	0.197	0.342	0.160	0.496	0.200	17.83(L_2)	290.98	0.092	0.137	0.605	0.060	0.391	0.400
26.60(L_1)	299.75	0.275	0.188	0.338	0.160	0.480	0.200	18.17(L_2)	291.32	0.093	0.144	0.611	0.060	0.405	0.400
26.85(L_1)	300.00	0.271	0.179	0.333	0.160	0.464	0.200	18.17(L_1)	291.32	0.097	0.170	0.638	0.060	0.459	0.400
27.80(L_1)	300.95	0.267	0.171	0.329	0.160	0.448	0.200	18.32(L_1)	291.47	0.096	0.163	0.631	0.060	0.446	0.400
28.02(L_1)	301.17	0.309	0.267	0.379	0.160	0.608	0.200	18.35(L_2)	291.50	0.094	0.150	0.618	0.060	0.419	0.400
32.81(L_1)	305.96	0.264	0.162	0.325	0.160	0.432	0.200	18.35[a]	291.50	0.095	0.156	0.625	0.060	0.432	0.400
34.71(L_1)	307.86	0.261	0.154	0.320	0.160	0.416	0.200	10.21(L_1)	283.36	0.184	0.147	0.603	0.120	0.420	0.400
22.50(L_2)	295.65	0.492	0.151	0.303	0.320	0.432	0.200	11.18(L_2)	284.33	0.170	0.101	0.557	0.120	0.312	0.400
23.71(L_2)	296.86	0.488	0.146	0.300	0.320	0.420	0.200	11.71(L_1)	284.86	0.182	0.141	0.597	0.120	0.408	0.400
26.90(L_2)	300.05	0.483	0.141	0.297	0.320	0.408	0.200	11.78(L_2)	284.93	0.171	0.105	0.562	0.120	0.324	0.400
31.12(L_2)	304.27	0.497	0.157	0.305	0.320	0.444	0.200	12.16(L_2)	285.31	0.173	0.110	0.567	0.120	0.336	0.400
35.00(L_2)	308.15	0.479	0.135	0.295	0.320	0.396	0.200	12.30(L_1)	285.45	0.180	0.136	0.592	0.120	0.396	0.400
35.50(L_2)	308.65	0.502	0.163	0.308	0.320	0.456	0.200	12.32(L_2)	285.47	0.176	0.120	0.576	0.120	0.360	0.400

12.39(L_2)	285.54	0.174	0.115	0.572	0.120	0.348	0.400
12.51[a](L_2)	285.66	0.179	0.130	0.587	0.120	0.384	0.400
12.52[a](L_2)	285.67	0.177	0.125	0.582	0.120	0.372	0.400
23.89[a](L_1)	297.04	0.325	0.097	0.533	0.240	0.315	0.400
23.98[a](L_1)	297.13	0.327	0.101	0.536	0.240	0.324	0.400
27.01(L_1)	300.16	0.323	0.094	0.530	0.240	0.306	0.400
28.21(L_1)	301.36	0.329	0.104	0.540	0.240	0.333	0.400
31.55(L_1)	304.70	0.321	0.091	0.527	0.240	0.297	0.400
35.65(L_1)	308.80	0.319	0.087	0.524	0.240	0.288	0.400
37.72(L_1)	310.87	0.318	0.084	0.520	0.240	0.279	0.400
39.10(L_1)	312.25	0.316	0.081	0.517	0.240	0.270	0.400
39.45(L_2)	312.60	0.314	0.078	0.514	0.240	0.261	0.400
47.00(L_2)	320.15	0.312	0.075	0.511	0.240	0.252	0.400
15.49(L_2)	288.64	0.069	0.088	0.675	0.050	0.281	0.500
16.86(L_2)	290.01	0.069	0.092	0.681	0.050	0.292	0.500
18.09(L_1)	291.24	0.075	0.138	0.738	0.050	0.405	0.500
18.19(L_2)	291.34	0.070	0.097	0.686	0.050	0.304	0.500
18.99(L_2)	292.14	0.070	0.101	0.691	0.050	0.315	0.500
19.10(L_2)	292.25	0.071	0.105	0.697	0.050	0.326	0.500
19.10(L_1)	292.25	0.074	0.134	0.731	0.050	0.394	0.500
20.46(L_2)	293.61	0.071	0.110	0.702	0.050	0.337	0.500
20.51(L_1)	293.66	0.074	0.129	0.725	0.050	0.383	0.500
20.56(L_2)	293.71	0.072	0.114	0.708	0.050	0.349	0.500
20.62[a](L_2)	293.77	0.072	0.119	0.714	0.050	0.360	0.500
20.82[a](L_2)	293.97	0.073	0.124	0.719	0.050	0.371	0.500
12.11(L_2)	285.26	0.133	0.079	0.653	0.100	0.260	0.500
13.11(L_2)	286.26	0.134	0.082	0.658	0.100	0.270	0.500
13.62(L_1)	286.77	0.141	0.113	0.695	0.100	0.350	0.500
13.86(L_2)	287.01	0.135	0.086	0.662	0.100	0.280	0.500
14.40(L_2)	287.55	0.135	0.090	0.667	0.100	0.290	0.500
14.58(L_1)	287.73	0.140	0.109	0.690	0.100	0.340	0.500
14.71(L_2)	287.86	0.137	0.093	0.671	0.100	0.300	0.500
14.79(L_2)	287.94	0.137	0.097	0.676	0.100	0.310	0.500
14.88[a](L_2)	288.03	0.138	0.101	0.681	0.100	0.320	0.500
14.91[a](L_1)	288.06	0.139	0.105	0.685	0.100	0.330	0.500
19.90(L_1)	293.05	0.257	0.077	0.631	0.200	0.263	0.500
20.51(L_1)	293.66	0.256	0.074	0.628	0.200	0.255	0.500
20.91(L_1)	294.06	0.254	0.072	0.625	0.200	0.247	0.500
21.15(L_1)	294.30	0.258	0.079	0.635	0.200	0.270	0.500
21.65(L_1)	294.80	0.259	0.082	0.638	0.200	0.277	0.500
24.21(L_1)	297.36	0.251	0.064	0.617	0.200	0.225	0.500
25.36(L_2)	298.51	0.249	0.062	0.614	0.200	0.217	0.500
25.52(L_2)	298.67	0.249	0.059	0.611	0.200	0.210	0.500
12.35[a]	285.50	0.147	0.335	0.113	0.064	0.642	0.050
12.51[a]	285.66	0.179	0.322	0.110	0.080	0.631	0.050
12.76[a]	285.91	0.130	0.342	0.114	0.056	0.648	0.050
13.93[a]	287.08	0.108	0.351	0.115	0.046	0.655	0.050
15.35	288.50	0.191	0.317	0.109	0.086	0.626	0.050
15.75	288.90	0.088	0.360	0.117	0.037	0.662	0.050
17.97	291.12	0.068	0.368	0.119	0.028	0.668	0.050
19.22	292.37	0.208	0.310	0.108	0.095	0.620	0.050
20.63	293.78	0.049	0.376	0.120	0.020	0.674	0.050
23.51	296.66	0.027	0.386	0.122	0.011	0.681	0.050
26.28	299.43	0.245	0.294	0.105	0.115	0.605	0.050
12.33[a]	285.48	0.145	0.292	0.209	0.068	0.603	0.100
12.47[a]	285.62	0.173	0.282	0.205	0.083	0.592	0.100
12.53[a]	285.68	0.186	0.277	0.203	0.090	0.587	0.100
14.81[a]	287.96	0.099	0.310	0.216	0.045	0.620	0.100
15.09	288.24	0.220	0.264	0.198	0.109	0.574	0.100
19.88	293.03	0.054	0.327	0.223	0.024	0.635	0.100
22.67	295.82	0.264	0.247	0.192	0.135	0.555	0.100
11.95[a]	285.10	0.131	0.226	0.369	0.070	0.529	0.200
12.26[a]	285.41	0.116	0.232	0.373	0.061	0.536	0.200
12.45[a]	285.60	0.147	0.221	0.365	0.079	0.523	0.200
12.47[a]	285.62	0.150	0.220	0.364	0.081	0.521	0.200
13.09[a]	286.24	0.114	0.232	0.374	0.060	0.536	0.200
14.21	287.36	0.096	0.239	0.378	0.050	0.544	0.200
17.15	290.30	0.072	0.246	0.384	0.037	0.553	0.200
21.67	294.82	0.038	0.258	0.393	0.019	0.566	0.200
23.92	297.07	0.178	0.211	0.357	0.098	0.509	0.200

[a]Critical opalescence.

TABLE 3. Solubility temperatures of the two liquid phases

t/°C	T/K (compilers)	x_1 (compilers)	x_2 (compilers)	x_3 (compilers)	w_1	w_2	w_3
116.1	389.3	0.236	0.411	0.122	0.095	0.727	0.050
116.4	389.6	0.256	0.486	0.133	0.095	0.791	0.050
119.5	392.7	0.242	0.435	0.125	0.095	0.748	0.050
120.8	394.0	0.249	0.460	0.129	0.095	0.770	0.050
127.5	400.7	0.230	0.389	0.119	0.095	0.706	0.050
127.5	400.7	0.224	0.368	0.116	0.095	0.684	0.050
128.8	402.0	0.219	0.347	0.113	0.095	0.662	0.050
132.7	405.9	0.213	0.328	0.110	0.095	0.641	0.050
135.2	408.4	0.208	0.310	0.108	0.095	0.620	0.050
140.4	413.6	0.204	0.292	0.105	0.095	0.598	0.050
72.7	345.9	0.441	0.381	0.114	0.190	0.722	0.050
76.2	349.4	0.431	0.363	0.112	0.190	0.703	0.050
78.8	352.0	0.422	0.346	0.109	0.190	0.684	0.050
81.3	354.5	0.413	0.330	0.107	0.190	0.665	0.050
81.5	354.7	0.405	0.314	0.105	0.190	0.646	0.050
82.4	355.6	0.397	0.299	0.103	0.190	0.627	0.050
85.7	358.9	0.389	0.284	0.101	0.190	0.608	0.050
88.8	362.0	0.382	0.270	0.099	0.190	0.589	0.050
91.5	364.7	0.375	0.256	0.097	0.190	0.570	0.050
93.8	367.0	0.368	0.243	0.095	0.190	0.551	0.050
98.3	371.5	0.361	0.231	0.094	0.190	0.532	0.050
105.2	378.4	0.355	0.218	0.092	0.190	0.513	0.050
110.9	384.1	0.349	0.207	0.090	0.190	0.494	0.050
34.07	307.22	0.663	0.210	0.086	0.380	0.541	0.050
35.02	308.17	0.655	0.207	0.085	0.380	0.527	0.050
36.53	309.68	0.647	0.199	0.084	0.380	0.513	0.050
38.07	311.22	0.639	0.191	0.083	0.380	0.499	0.050
40.45	313.60	0.632	0.184	0.082	0.380	0.485	0.050
43.60	316.75	0.617	0.169	0.080	0.380	0.456	0.050
47.50	320.65	0.624	0.176	0.081	0.380	0.470	0.050
47.85	321.00	0.610	0.162	0.079	0.380	0.442	0.050
55.00	328.15	0.603	0.155	0.078	0.380	0.428	0.050
57.70	330.85	0.596	0.148	0.077	0.380	0.413	0.050
60.80	333.95	0.590	0.141	0.076	0.380	0.399	0.050
92.3	365.5	0.384	0.323	0.210	0.180	0.666	0.100
95.2	368.4	0.376	0.309	0.206	0.180	0.648	0.100
98.1	371.3	0.369	0.295	0.202	0.180	0.630	0.100

105.2	378.4	0.356	0.268	0.195	0.180	0.594	0.100
109.1	382.3	0.363	0.281	0.198	0.180	0.612	0.100
109.2	382.4	0.350	0.255	0.191	0.180	0.576	0.100
112.8	386.0	0.344	0.243	0.188	0.180	0.558	0.100
117.5	390.7	0.338	0.231	0.185	0.180	0.540	0.100
121.7	394.9	0.333	0.220	0.182	0.180	0.522	0.100
124.5	397.7	0.327	0.209	0.179	0.180	0.504	0.100
128.8	402.0	0.322	0.198	0.176	0.180	0.486	0.100
135.2	408.4	0.317	0.188	0.173	0.180	0.468	0.100
136.5	409.7	0.312	0.178	0.170	0.180	0.450	0.100
143.4	416.6	0.307	0.168	0.168	0.180	0.432	0.100
44.30	317.45	0.598	0.189	0.164	0.360	0.499	0.100
48.80	321.95	0.592	0.182	0.162	0.360	0.486	0.100
51.95	325.10	0.585	0.175	0.160	0.360	0.472	0.100
52.85	326.00	0.579	0.168	0.158	0.360	0.459	0.100
54.65	327.80	0.573	0.162	0.156	0.360	0.446	0.100
56.65	329.80	0.567	0.155	0.155	0.360	0.432	0.100
58.40	331.55	0.561	0.149	0.153	0.360	0.419	0.100
62.65	335.80	0.555	0.142	0.152	0.360	0.405	0.100
67.50	340.65	0.549	0.136	0.150	0.360	0.391	0.100
72.5	345.7	0.544	0.130	0.149	0.360	0.378	0.100
57.85	331.00	0.502	0.163	0.308	0.320	0.456	0.200
60.45[a]	333.60	0.492	0.151	0.303	0.320	0.432	0.200
63.60[a]	336.75	0.488	0.146	0.300	0.320	0.420	0.200
66.40[a]	339.55	0.497	0.157	0.305	0.320	0.444	0.200
66.90[a]	340.05	0.483	0.140	0.297	0.320	0.408	0.200
71.1[a]	344.3	0.475	0.130	0.292	0.320	0.384	0.200
72.0[a]	345.2	0.479	0.135	0.295	0.320	0.396	0.200
74.5[a]	347.7	0.471	0.125	0.289	0.320	0.372	0.200
88.5	361.7	0.466	0.120	0.287	0.320	0.360	0.200
95.9	369.1	0.463	0.115	0.284	0.320	0.348	0.200
99.8	373.0	0.458	0.110	0.282	0.320	0.336	0.200
106.3	379.5	0.455	0.105	0.279	0.320	0.324	0.200
112.2	385.4	0.451	0.100	0.277	0.320	0.312	0.200
65.6	338.8	0.312	0.075	0.511	0.240	0.252	0.400
82.1	355.3	0.329	0.104	0.540	0.240	0.333	0.400
86.7	359.9	0.327	0.101	0.536	0.240	0.324	0.400
91.4	364.6	0.325	0.097	0.533	0.240	0.315	0.400
100.4	373.6	0.323	0.094	0.530	0.240	0.306	0.400
102.2	375.4	0.319	0.087	0.524	0.240	0.288	0.400
105.3	378.5	0.318	0.084	0.520	0.240	0.279	0.400
131.8	405.0	0.314	0.078	0.514	0.240	0.261	0.400
109.4	382.6	0.249	0.059	0.611	0.200	0.210	0.500
115.6	388.8	0.250	0.062	0.614	0.200	0.217	0.500
126.9	400.1	0.258	0.079	0.635	0.200	0.270	0.500
127.6	400.8	0.253	0.069	0.623	0.200	0.240	0.500
134.3	407.5	0.252	0.067	0.619	0.200	0.232	0.500
138.8	412.0	0.259	0.082	0.638	0.200	0.277	0.500

[a]Critical opalescence.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method was used. Temperatures of phase transitions were determined both on heating and cooling of the mixtures, and the average temperature value obtained was taken. Measurements were carried out in a thermostat containing silicone oil at temperatures above 80 °C.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled in glass packed column.
(2) Source not specified; analytical purity; dried and twice distilled in presence of zinc dust under vacuum.
(3) Analytical purity; dried and twice distilled under vacuum; 0.03 mass % water by the Karl Fischer analysis.
(4) Source not specified; dried and fractionated.

Estimated Error:

Temperature: ±0.01 K (283–313 K); ±0.05 K (313–343 K); ±0.1 K (above 343 K).

8.2. +Tetrachloroethene+1,2-Ethanediol+Heptane

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) Tetrachloroethene; C_2Cl_4; [127-18-4]
(3) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(4) Heptane; C_7H_{16}; [142-82-5]

Original Measurements:

V. P. Sazonov and M. F. Chernysheva, Zh. Obshch. Khim. **57**, 46–54 (1987).

Variables:

T/K = 309–362

Prepared By:

V. P. Sazonov

Experimental Data

The temperatures of phase transitions were determined in quaternary mixtures with a constant mass relationship of (1), (2), and (3), and also in quaternary mixtures with a constant mass content of (4), respectively, 0.45, 0.50, 0.56, and 0.62 mass %. L_1 nitromethane-rich phase; L_2 tetrachloroethene-rich phase; L_3 ethanediol-rich phase. The phase which is being dissolved is indicated in the table.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C (compiler)	T/K	x_1 (compiler)	x_2 (compiler)	x_3 (compiler)	w_1	w_2	w_3
56.6	329.8(L_2)	0.5540	0.1844	0.2590	0.4189	0.3787	0.1991
59.8	333.0(L_2)	0.5534	0.1842	0.2588	0.4183	0.3782	0.1989
60.2	333.4(L_2)	0.5529	0.1841	0.2589	0.4179	0.3781	0.1990
61.4	334.6(L_3)	0.5507	0.1834	0.2579	0.4158	0.3762	0.1980
62.7	335.9(L_1)	0.5507	0.1834	0.2586	0.4160	0.3764	0.1986
63.2	336.4(L_1)	0.5519	0.1837	0.2580	0.4169	0.3769	0.1982
63.8	337.0(L_1)	0.5504	0.1848	0.2587	0.4153	0.3787	0.1985
64.9	338.1(L_1)	0.5518	0.1839	0.2584	0.4168	0.3774	0.1985
65.0	338.2(L_1)	0.5520	0.1838	0.2586	0.4171	0.3773	0.1987
65.5	338.7(L_1)	0.5523	0.1839	0.2586	0.4173	0.3775	0.1987
65.6	338.8(L_1)	0.5517	0.1837	0.2595	0.4170	0.3772	0.1995
65.6	338.8(L_1)	0.5524	0.1840	0.2587	0.4174	0.3777	0.1988
66.2	339.4(L_1)	0.5524	0.1839	0.2587	0.4174	0.3776	0.1988
57.8	331.0(L_2)	0.5666	0.1741	0.2557	0.4340	0.3623	0.1992
59.5	332.7(L_2)	0.5666	0.1743	0.2551	0.4338	0.3626	0.1986
62.8	336.0(L_2)	0.5658	0.1741	0.2559	0.4333	0.3621	0.1993
63.5	336.7(L_2)	0.5658	0.1741	0.2559	0.4333	0.3621	0.1993
63.8	337.0(L_3)	0.5662	0.1740	0.2546	0.4334	0.3619	0.1982
64.2	337.4(L_1)	0.5664	0.1738	0.2550	0.4338	0.3616	0.1986
64.5	337.8(L_2)	0.5666	0.1743	0.2551	0.4338	0.3626	0.1986
64.7	337.9(L_1)	0.5662	0.1740	0.2553	0.4336	0.3619	0.1988
65.7	338.9(L_1)	0.5658	0.1741	0.2559	0.4333	0.3621	0.1993
66.1	339.3(L_1)	0.5666	0.1743	0.2551	0.4338	0.3626	0.1986
57.1	330.3(L_2)	0.5700	0.1717	0.2546	0.4380	0.3584	0.1989
58.1	331.3(L_2)	0.5702	0.1713	0.2545	0.4383	0.3578	0.1989
58.5	331.7(L_2)	0.5703	0.1714	0.2542	0.4383	0.3578	0.1987
62.2	335.4(L_3)	0.5678	0.1710	0.2553	0.4362	0.3569	0.1995
63.4	336.6(L_3)	0.5688	0.1710	0.2549	0.4371	0.3570	0.1992
63.6	336.8(L_3)	0.5686	0.1713	0.2551	0.4369	0.3575	0.1993
64.2	337.4(L_2)	0.5703	0.1714	0.2542	0.4383	0.3578	0.1987
64.5	337.7(L_1)	0.5694	0.1715	0.2546	0.4375	0.3580	0.1989
64.7	337.9(L_1)	0.5695	0.1716	0.2546	0.4375	0.3581	0.1989
65.0	338.2(L_2)	0.5702	0.1713	0.2545	0.4383	0.3578	0.1989
65.6	338.8(L_1)	0.5703	0.1714	0.2542	0.4383	0.3578	0.1987
66.0	339.2(L_1)	0.5702	0.1713	0.2545	0.4383	0.3578	0.1989
57.3	330.5(L_2)	0.5725	0.1757	0.2478	0.4376	0.3648	0.1926
58.1	331.3(L_2)	0.5689	0.1750	0.2521	0.4352	0.3637	0.1961
59.4	332.6(L_2)	0.5666	0.1743	0.2551	0.4338	0.3626	0.1986
64.1	337.3(L_2)	0.5577	0.1713	0.2670	0.4286	0.3577	0.2087
64.5	337.7(L_2)	0.5666	0.1743	0.2551	0.4338	0.3626	0.1986
65.7	338.9(L_2)	0.5689	0.1750	0.2521	0.4352	0.3637	0.1961
66.0	339.2(L_1)	0.5666	0.1743	0.2551	0.4338	0.3626	0.1986
66.6	339.8(L_1)	0.5689	0.1750	0.2521	0.4352	0.3637	0.1961
56.1	329.3(L_2)	0.5736	0.1726	0.2498	0.4402	0.3598	0.1950
56.4	329.6(L_2)	0.5717	0.1723	0.2520	0.4389	0.3594	0.1967
56.8	330.0(L_2)	0.5694	0.1715	0.2551	0.4376	0.3580	0.1994
57.6	330.8(L_2)	0.5678	0.1711	0.2571	0.4366	0.3574	0.2010
58.3	331.5(L_2)	0.5660	0.1706	0.2594	0.4355	0.3565	0.2030
59.7	332.9(L_1)	0.4609	0.1387	0.3966	0.3695	0.3022	0.3233
63.6	336.8(L_1)	0.5077	0.1527	0.3357	0.3997	0.3266	0.2687
64.9	338.1(L_2)	0.5428	0.1634	0.2899	0.4215	0.3446	0.2289
65.0	338.2(L_2)	0.5660	0.1706	0.2594	0.4355	0.3565	0.2030
65.4	338.6(L_2)	0.5678	0.1711	0.2571	0.4366	0.3574	0.2010
65.8	339.0(L_2)	0.5694	0.1715	0.2551	0.4376	0.3580	0.1994
65.9	339.1(L_1)	0.5660	0.1706	0.2594	0.4355	0.3565	0.2030
66.1	339.3(L_2)	0.5717	0.1723	0.2520	0.4389	0.3594	0.1967
66.1	339.3(L_1)	0.5678	0.1711	0.2571	0.4366	0.3574	0.2010
66.2	339.4(L_1)	0.5694	0.1715	0.2551	0.4376	0.3580	0.1994
66.4	339.6(L_1)	0.5717	0.1723	0.2520	0.4389	0.3594	0.1967
59.3	332.5(L_1)	0.4496	0.1498	0.3967	0.3551	0.3213	0.3186
59.6	332.8(L_2)	0.5700	0.1903	0.2356	0.4275	0.3878	0.1797
60.1	333.3(L_2)	0.5651	0.1887	0.2421	0.4247	0.3853	0.1850
60.6	333.8(L_2)	0.5608	0.1871	0.2481	0.4223	0.3827	0.1900
61.6	334.8(L_2)	0.5532	0.1843	0.2585	0.4180	0.3784	0.1986
61.8	335.0(L_2)	0.5562	0.1856	0.2542	0.4196	0.3804	0.1950
62.8	336.0(L_1)	0.4918	0.1637	0.3406	0.3814	0.3450	0.2686
62.7	336.9[a](L_2)	0.5259	0.1752	0.2949	0.4020	0.3638	0.2292
56.7	329.9(L_2)	0.5703	0.1731	0.2526	0.4373	0.3607	0.1970
57.1	330.3(L_2)	0.5704	0.1725	0.2531	0.4378	0.3597	0.1975
57.3	330.5(L_2)	0.5696	0.1736	0.2528	0.4365	0.3615	0.1970
57.6	330.8(L_2)	0.5732	0.1712	0.2516	0.4407	0.3576	0.1967
58.1	331.3(L_2)	0.5679	0.1747	0.2534	0.4346	0.3632	0.1972
58.2	331.4(L_2)	0.5689	0.1741	0.2530	0.4357	0.3623	0.1970
64.5	337.7(L_2)	0.5732	0.1712	0.2516	0.4407	0.3576	0.1967
65.1	338.3(L_2)	0.5689	0.1741	0.2530	0.4357	0.3623	0.1970
65.3	338.5(L_1)	0.5732	0.1712	0.2516	0.4407	0.3576	0.1967
65.6	338.8(L_2)	0.5704	0.1725	0.2531	0.4378	0.3597	0.1975
65.9	339.1(L_2)	0.5679	0.1747	0.2534	0.4346	0.3632	0.1972
66.1	339.3(L_2)	0.5703	0.1731	0.2526	0.4373	0.3607	0.1970
66.1	339.3(L_1)	0.5704	0.1725	0.2531	0.4378	0.3597	0.1975
66.2	339.4(L_2)	0.5696	0.1736	0.2528	0.4365	0.3615	0.1970
66.3	339.5(L_1)	0.5689	0.1741	0.2530	0.4357	0.3623	0.1970
66.4	339.6(L_1)	0.5679	0.1747	0.2534	0.4346	0.3632	0.1972
66.6	339.8(L_1)	0.5696	0.1736	0.2528	0.4365	0.3615	0.1970
66.6	339.8(L_1)	0.5703	0.1731	0.2526	0.4373	0.3607	0.1970
35.9	309.1(L_2)	0.4983	0.0750	0.4232	0.4378	0.1791	0.3781
40.0	313.2(L_2)	0.5053	0.0846	0.4066	0.4378	0.1990	0.3582
41.9	315.1(L_2)	0.5092	0.0894	0.3978	0.4380	0.2090	0.3480
49.0	322.2(L_3)	0.6356	0.2605	0.0995	0.4378	0.4875	0.0697
50.5	323.7(L_2)	0.5277	0.1148	0.3538	0.4378	0.2587	0.2985
54.2	327.4(L_2)	0.5441	0.1365	0.3156	0.4381	0.2985	0.2584
56.5	329.7(L_2)	0.5752	0.1790	0.2418	0.4378	0.3701	0.1871
56.5	329.7(L_2)	0.5563	0.1537	0.2861	0.4376	0.3285	0.2289
56.6	329.8(L_2)	0.5766	0.1809	0.2385	0.4378	0.3731	0.1841
56.6	329.8(L_2)	0.5742	0.1778	0.2440	0.4377	0.3682	0.1891

56.6	329.8(L_2)	0.5092	0.0894	0.3978	0.4380	0.2090	0.3480
56.7	329.9(L_2)	0.5840	0.1905	0.2215	0.4380	0.3881	0.1689
56.7	329.9(L_2)	0.5053	0.0846	0.4066	0.4378	0.1990	0.3582
56.9	330.1(L_2)	0.6135	0.2311	0.1511	0.4376	0.4478	0.1096
56.9	330.1(L_2)	0.5934	0.2035	0.1990	0.4378	0.4079	0.1493
56.9	330.1(L_2)	0.5786	0.1841	0.2333	0.4375	0.3781	0.1794
56.9	330.1(L_2)	0.5737	0.1766	0.2457	0.4380	0.3663	0.1907
57.0	330.2(L_2)	0.5715	0.1740	0.2505	0.4378	0.3621	0.1951
57.0	330.2(L_2)	0.5705	0.1728	0.2527	0.4377	0.3601	0.1972
57.1	330.3(L_2)	0.5696	0.1717	0.2547	0.4376	0.3584	0.1990
57.2	330.4(L_2)	0.5725	0.1752	0.2483	0.4378	0.3641	0.1931
57.3	330.5(L_1)	0.5053	0.0846	0.4066	0.4378	0.1990	0.3582
57.6	330.8(L_2)	0.5277	0.1148	0.3538	0.4378	0.2587	0.2985
57.9	331.1(L_1)	0.5092	0.0894	0.3978	0.4380	0.2090	0.3480
60.3	333.5(L_2)	0.5441	0.1365	0.3156	0.4381	0.2985	0.2584
61.4	334.6(L_1)	0.5277	0.1148	0.3538	0.4378	0.2587	0.2985
62.3	335.5(L_2)	0.5563	0.1537	0.2861	0.4376	0.3285	0.2289
63.4	336.6(L_1)	0.5441	0.1365	0.3156	0.4381	0.2985	0.2584
64.7	337.9(L_1)	0.5563	0.1537	0.2861	0.4376	0.3285	0.2289
65.2	338.4(L_2)	0.5654	0.1655	0.2651	0.4379	0.3483	0.2088
65.4	338.6(L_2)	0.5696	0.1717	0.2527	0.4376	0.3584	0.1990
66.0	339.2(L_2)	0.5705	0.1728	0.2527	0.4377	0.3601	0.1972
66.1	339.3(L_1)	0.5654	0.1655	0.2651	0.4379	0.3483	0.2088
66.2	339.4(L_1)	0.5696	0.1717	0.2527	0.4376	0.3584	0.1990
66.4	339.6(L_2)	0.5725	0.1752	0.2483	0.4378	0.3641	0.1931
66.4	339.6(L_2)	0.5715	0.1740	0.2505	0.4378	0.3621	0.1951
66.5	339.7(L_1)	0.5705	0.1728	0.2527	0.4377	0.3601	0.1972
66.6	339.8(L_1)	0.5725	0.1752	0.2483	0.4378	0.3641	0.1931
66.6	339.8(L_1)	0.5715	0.1740	0.2505	0.4378	0.3621	0.1951
56.5	329.7(L_1)	0.4594	0.0845	0.4526	0.3978	0.1987	0.3985
58.7	331.9(L_2)	0.5997	0.2924	0.1033	0.3980	0.5273	0.697
59.0	332.2(L_1)	0.4731	0.1045	0.4188	0.3980	0.2388	0.3582
60.9	334.1(L_2)	0.5728	0.2531	0.1697	0.3977	0.4775	0.1198
62.2	335.4(L_2)	0.5536	0.2242	0.2180	0.3979	0.4378	0.1593
63.4	336.6(L_2)	0.5355	0.1971	0.2633	0.3980	0.3980	0.1990
63.4	336.6(L_1)	0.5024	0.1480	0.3458	0.3980	0.3184	0.2786
64.5	337.7(L_1)	0.5185	0.1717	0.3058	0.3981	0.3581	0.2388
57.1	330.3(L_1)	0.4299	0.1313	0.4350	0.3481	0.2888	0.3581
58.8	332.0(L_1)	0.4431	0.1539	0.3991	0.3480	0.3283	0.3187
59.2	332.4[a](L_2)	0.5508	0.3358	0.1086	0.3483	0.5769	0.698
59.8	333.0[a](L_2)	0.5258	0.2928	0.1768	0.3485	0.5273	0.1192
60.4	333.6[a](L_2)	0.5067	0.2611	0.2278	0.3483	0.4875	0.1592
60.7	333.9(L_1)	0.4582	0.1780	0.3598	0.3486	0.3680	0.2784
60.9	334.1[a](L_1)	0.4893	0.2315	0.2749	0.3483	0.4477	0.1990
61.7	334.9[a](L_1)	0.4730	0.2039	0.3189	0.3483	0.4079	0.2388
38.4	311.6(L_2)	0.5055	0.0846	0.4068	0.4380	0.1991	0.3584
50.1	323.3(L_2)	0.5274	0.1150	0.3543	0.4375	0.2591	0.2988
53.3	326.5(L_2)	0.5441	0.1367	0.3158	0.4380	0.2989	0.2585
53.8	327.0(L_2)	0.5651	0.1655	0.2659	0.4378	0.3482	0.2095
54.1	327.3(L_2)	0.5523	0.1478	0.2965	0.4380	0.3184	0.2391
54.3	327.5(L_2)	0.5570	0.1537	0.2858	0.4383	0.3285	0.2287
55.0	328.2(L_2)	0.5608	0.1596	0.2761	0.4378	0.3385	0.2192
55.5	328.7(L_2)	0.5700	0.1717	0.2548	0.4380	0.3584	0.1991
55.7	328.9(L_2)	0.5746	0.1778	0.2440	0.4380	0.3683	0.1891
56.0	329.2(L_2)	0.5840	0.1905	0.2218	0.4380	0.3882	0.1692
58.9	332.1(L_2)	0.5274	0.1150	0.3543	0.4375	0.2591	0.2988
61.7	334.9(L_1)	0.5274	0.1150	0.3543	0.4375	0.2591	0.2988
62.2	335.4(L_2)	0.5441	0.1367	0.3158	0.4380	0.2989	0.2585
64.1	337.3(L_1)	0.5441	0.1367	0.3158	0.4380	0.2989	0.2585
64.2	337.4(L_2)	0.5523	0.1478	0.2965	0.4380	0.3184	0.2391
65.3	338.5(L_2)	0.5570	0.1537	0.2858	0.4383	0.3285	0.2287
65.3	338.5(L_1)	0.5523	0.1478	0.2965	0.4380	0.3184	0.2391
66.0	339.2(L_1)	0.5570	0.1537	0.2858	0.4383	0.3285	0.2287
42.9	316.1(L_2)	0.5051	0.0845	0.4065	0.4375	0.1989	0.3580
54.8	328.0(L_2)	0.5051	0.0845	0.4065	0.4375	0.1989	0.3580
56.9	330.1(L_1)	0.5051	0.0845	0.4065	0.4375	0.1989	0.3580
58.4	331.6(L_2)	0.6134	0.2308	0.1510	0.4376	0.4473	0.1095
59.3	332.5(L_2)	0.5741	0.1777	0.2437	0.4375	0.3679	0.1889
59.4	332.6(L_2)	0.5882	0.1969	0.2103	0.4375	0.3978	0.1591
59.4	332.6(L_2)	0.5834	0.1904	0.2216	0.4375	0.3878	0.1691
59.5	332.7(L_2)	0.5787	0.1840	0.2328	0.4375	0.3779	0.1790
59.5	332.7(L_2)	0.5776	0.1808	0.2371	0.4385	0.3729	0.1830
59.8	333.0(L_2)	0.5717	0.1746	0.2492	0.4375	0.3630	0.1939
60.3	333.5(L_1)	0.5265	0.1146	0.3548	0.4368	0.2582	0.2993
62.0	335.2(L_1)	0.5446	0.1361	0.3151	0.4385	0.2978	0.2580
63.3	336.5(L_2)	0.5717	0.1746	0.2492	0.4375	0.3630	0.1939
63.5	336.7(L_1)	0.5562	0.1536	0.2859	0.4375	0.3282	0.2287
64.4	337.6(L_1)	0.5647	0.165	0.2655	0.4373	0.3479	0.2091
64.4	337.6(L_2)	0.5741	0.1777	0.2437	0.4375	0.3679	0.1889
64.8	338.0(L_1)	0.5693	0.1717	0.2546	0.4373	0.3582	0.1989
65.0	338.2(L_2)	0.5776	0.1808	0.2371	0.4385	0.3729	0.1830
65.1	338.3[a](L_1)	0.5717	0.1746	0.2492	0.4375	0.3630	0.1939
65.3	338.5[a](L_3)	0.5741	0.1777	0.2437	0.4375	0.3679	0.1889
65.7	338.9[a](L_3)	0.5776	0.1808	0.2371	0.4385	0.3729	0.1830
58.2	331.4(L_2)	0.5757	0.1729	0.2470	0.4415	0.3603	0.1926
59.1	332.3(L_2)	0.5722	0.1723	0.2510	0.4392	0.3593	0.1959
60.9	334.1(L_2)	0.5709	0.1723	0.2523	0.4382	0.3593	0.1969
61.5	334.7(L_2)	0.5709	0.1723	0.2523	0.4382	0.3593	0.1969
63.3	336.5(L_2)	0.5722	0.1723	0.2510	0.4392	0.3593	0.1959
63.4	336.6(L_1)	0.5248	0.1581	0.3128	0.4102	0.3358	0.2484
63.9	337.1(L_2)	0.5757	0.1729	0.2470	0.4415	0.3603	0.1926
64.3	337.5(L_1)	0.5601	0.1690	0.2664	0.4317	0.3539	0.2088
64.7	337.9(L_1)	0.5697	0.1717	0.2541	0.4376	0.3583	0.1985
64.8	338.0(L_1)	0.5709	0.1723	0.2523	0.4382	0.3593	0.1969
64.9	338.1[a](L_1)	0.5757	0.1729	0.2470	0.4415	0.3603	0.1926
65.0	338.2(L_1)	0.5722	0.1723	0.2510	0.4392	0.3593	0.1959
66.3	339.5(L_1)	0.5700	0.1898	0.2352	0.4276	0.3868	0.1794
66.3	339.5(L_1)	0.5524	0.1839	0.2587	0.4174	0.3776	0.1988
66.3	339.5(L_1)	0.5656	0.1883	0.2410	0.4251	0.3845	0.1842
66.4	339.6(L_1)	0.5608	0.1867	0.2474	0.4223	0.3820	0.1894
66.8	340.0(L_1)	0.5589	0.1862	0.2499	0.4212	0.3811	0.1915
66.8	340.0(L_1)	0.5568	0.1854	0.2528	0.4200	0.3799	0.1939
66.8	340.0(L_1)	0.5548	0.1848	0.2554	0.4188	0.3789	0.1961
66.9	340.1(L_1)	0.5476	0.1824	0.2650	0.4146	0.3752	0.2040
53.0	326.2(L_2)	0.5933	0.1582	0.2437	0.4640	0.3360	0.1938
57.2	330.4(L_2)	0.5870	0.1629	0.2452	0.4562	0.3438	0.1938
61.4	334.6(L_2)	0.5870	0.1629	0.2452	0.4562	0.3438	0.1938
62.4	335.6(L_3)	0.5870	0.1629	0.2452	0.4562	0.3438	0.1938
63.3	336.5(L_3)	0.5805	0.1678	0.2468	0.4481	0.3520	0.1937
66.2	339.4[a](L_2)	0.5539	0.1882	0.2529	0.4163	0.3842	0.1933
66.4	339.6(L_1)	0.5670	0.1777	0.2503	0.4320	0.3679	0.1939
66.7	339.9(L_1)	0.5567	0.1855	0.2528	0.4199	0.3800	0.1939

[a]Critical opalescence.

TABLE 2. Solubility temperatures of the two liquid phases

t/°C (compiler)	T/K	x_1 (compiler)	x_2 (compiler)	x_3 (compiler)	w_1	w_2	w_3
73.7	346.9	0.5540	0.1844	0.2590	0.4189	0.3787	0.1991
75.0	348.2	0.5529	0.1841	0.2589	0.4179	0.3781	0.1990
75.3	348.5	0.5534	0.1842	0.2588	0.4183	0.3782	0.1989
76.8	350.0	0.5524	0.1840	0.2587	0.4174	0.3777	0.1988
77.0	350.2	0.5524	0.1839	0.2587	0.4174	0.3776	0.1988
77.2	350.4	0.5517	0.1837	0.2595	0.4170	0.3772	0.1995
77.3	350.5	0.5523	0.1839	0.2586	0.4173	0.3775	0.1987
77.9	351.1	0.5504	0.1849	0.2587	0.4153	0.3787	0.1985
78.5	351.7	0.5520	0.1838	0.2586	0.4171	0.3773	0.1987
78.5	351.7	0.5518	0.1839	0.2584	0.4168	0.3774	0.1985
78.6	351.8	0.5519	0.1837	0.2580	0.4169	0.3769	0.1982
80.4	353.7	0.5507	0.1834	0.2579	0.4158	0.3762	0.1980
68.8	342.0	0.5666	0.1741	0.2557	0.4340	0.3623	0.1992
69.4	342.6	0.5666	0.1743	0.2551	0.4338	0.3626	0.1986
69.9	343.1	0.5658	0.1741	0.2559	0.4332	0.3621	0.1993
70.2	343.4	0.5662	0.1740	0.2553	0.4336	0.3619	0.1988
70.3	343.5	0.5664	0.1738	0.2550	0.4338	0.3616	0.1986
71.2	344.4	0.5662	0.1740	0.2546	0.4334	0.3619	0.1982
67.2	340.4	0.5700	0.1717	0.2546	0.4380	0.3584	0.1989
67.7	340.9	0.5702	0.1713	0.2546	0.4383	0.3578	0.1989
68.0	341.2	0.5703	0.1714	0.2542	0.4387	0.3578	0.1987
68.6	341.8	0.5694	0.1715	0.2546	0.4375	0.3580	0.1989
69.7	342.9	0.5686	0.1713	0.2551	0.4369	0.3575	0.1993
69.9	343.1	0.5688	0.1710	0.2549	0.4371	0.3570	0.1992
71.3	344.5	0.5678	0.1710	0.2553	0.4362	0.3569	0.1995
66.9	340.1	0.5725	0.1757	0.2478	0.4376	0.3648	0.1926
68.3	341.5	0.5689	0.1750	0.2521	0.4352	0.3637	0.1961
69.3	342.5	0.5666	0.1743	0.2551	0.4338	0.3626	0.1986
72.2	345.4	0.5577	0.1713	0.2670	0.4286	0.3577	0.2087
65.7	338.9	0.5736	0.1726	0.2498	0.4402	0.3598	0.1950
66.6	339.8	0.5717	0.1723	0.2520	0.4389	0.3594	0.1967
67.5	340.7	0.5694	0.1715	0.2551	0.4376	0.3580	0.1994
68.3	341.5[a]	0.5678	0.1711	0.2571	0.4366	0.3574	0.2010
69.0	342.2[a]	0.5660	0.1706	0.2594	0.4355	0.3565	0.2030
76.5	349.7	0.5428	0.1634	0.2899	0.4215	0.3446	0.2289
69.5	342.7	0.5700	0.1903	0.2356	0.4275	0.3878	0.1797
71.2	344.4	0.5651	0.1887	0.2421	0.4247	0.3853	0.1850
72.9	346.1	0.5608	0.1871	0.2481	0.4223	0.3827	0.1900
74.5	347.7	0.5562	0.1856	0.2542	0.4196	0.3804	0.1950
75.7	348.9	0.5532	0.1843	0.2585	0.4180	0.3784	0.1986
84.5	357.7	0.5259	0.1752	0.2949	0.4020	0.3638	0.2292
66.9	340.1	0.5732	0.1712	0.2516	0.4407	0.3576	0.1967
67.3	340.5	0.5703	0.1731	0.2526	0.4373	0.3607	0.1970
67.5	340.7	0.5704	0.1725	0.2531	0.4378	0.3597	0.1975
67.9	341.1	0.5696	0.1736	0.2528	0.4365	0.3615	0.1970
68.4	341.6	0.5689	0.1741	0.2530	0.4357	0.3623	0.1970
68.8	342.0	0.5679	0.1747	0.2534	0.4346	0.3632	0.1972
54.5	327.7	0.4983	0.0750	0.4232	0.4378	0.1791	0.3781
54.6	327.7	0.6356	0.2605	0.0995	0.4378	0.4875	0.0697
59.1	332.3	0.5053	0.0846	0.4066	0.4378	0.1990	0.3582
60.9	334.1	0.6135	0.2311	0.1511	0.4376	0.4478	0.1096
61.4	334.6	0.5092	0.0894	0.3978	0.4380	0.2090	0.3480
64.7	337.9	0.5934	0.2035	0.1990	0.4378	0.4079	0.1493
65.8	339.0[a]	0.5786	0.1841	0.2333	0.4375	0.3781	0.1794
66.0	339.2[a]	0.5766	0.1809	0.2385	0.4378	0.3731	0.1841
66.0	339.2[a]	0.5752	0.1790	0.2418	0.4378	0.3701	0.1871
66.3	339.5[a]	0.5737	0.1766	0.2457	0.4380	0.3663	0.1907
66.4	339.6[a]	0.5742	0.1778	0.2440	0.4377	0.3682	0.1891
67.0	340.2	0.5725	0.1752	0.2483	0.4378	0.3641	0.1931
67.2	340.4	0.5715	0.1740	0.2505	0.4378	0.3621	0.1951
67.4	340.6	0.5705	0.1728	0.2527	0.4377	0.3601	0.1972
67.9	341.1	0.5696	0.1717	0.2547	0.4376	0.3584	0.1990
68.1	341.3	0.5277	0.1148	0.3538	0.4378	0.2587	0.2985
68.6	341.8	0.5654	0.1655	0.2651	0.4379	0.3483	0.2088
69.7	342.9	0.5563	0.1537	0.2861	0.4376	0.3285	0.2289
70.0	343.2	0.5441	0.1365	0.3156	0.4381	0.2985	0.2584
59.2	332.4	0.5997	0.2924	0.1033	0.3980	0.5273	0.0697
70.6	343.8[a]	0.5728	0.2531	0.1697	0.3977	0.4775	0.1198
76.7	349.9	0.4594	0.0845	0.4526	0.3978	0.1987	0.3585
77.7	350.9[a]	0.5536	0.2242	0.2180	0.3979	0.4378	0.1593
83.2	356.4	0.5355	0.1971	0.2633	0.3980	0.3980	0.1990
83.6	356.8	0.4731	0.1045	0.4188	0.3980	0.2388	0.3582
87.3	360.5	0.5185	0.1717	0.3058	0.3981	0.3581	0.2388
88.4	361.6	0.5024	0.1480	0.3458	0.3980	0.3184	0.2786
70.4	343.6	0.5508	0.3358	0.1086	0.3483	0.5769	0.0698
86.5	359.7	0.5258	0.2928	0.1768	0.3485	0.5273	0.1192
57.2	330.4	0.5055	0.0846	0.4068	0.4380	0.1991	0.3584
65.2	338.4	0.5840	0.1905	0.2218	0.4380	0.3882	0.1692
65.9	339.1	0.5746	0.1778	0.2440	0.4380	0.3683	0.1891
66.5	339.7	0.5700	0.1717	0.2548	0.4380	0.3584	0.1991
67.1	340.3	0.5651	0.1655	0.2659	0.4378	0.3482	0.2095
68.0	341.2	0.5274	0.1150	0.3543	0.4375	0.2591	0.2988
68.8	342.0	0.5608	0.1596	0.2761	0.4378	0.3385	0.2192
69.2	342.4	0.5441	0.1367	0.3158	0.4380	0.2989	0.2585
69.3	342.5	0.5523	0.1478	0.2965	0.4380	0.3184	0.2391
69.6	342.8	0.5570	0.1537	0.2858	0.4383	0.3285	0.2287
60.9	334.1	0.6134	0.2308	0.1510	0.4376	0.4473	0.1095
61.3	334.5	0.5051	0.0845	0.4065	0.4375	0.1989	0.3580
65.0	338.2	0.5882	0.1969	0.2103	0.4375	0.3978	0.1591
65.4	338.6	0.5834	0.1904	0.2216	0.4375	0.3878	0.1690
66.1	339.3	0.5787	0.1840	0.2328	0.4375	0.3779	0.1790
66.7	339.7	0.5776	0.1808	0.2371	0.4385	0.3729	0.1830
66.8	340.0	0.5741	0.1777	0.2437	0.4375	0.3679	0.1889
68.0	341.2	0.5717	0.1746	0.2492	0.4375	0.3630	0.1939
69.0	342.2	0.5693	0.1717	0.2546	0.4373	0.3582	0.1989
69.5	342.7	0.5647	0.1654	0.2655	0.4373	0.3479	0.2091
69.9	343.1	0.5265	0.1146	0.3548	0.4368	0.2582	0.2993
70.6	343.8	0.5562	0.1536	0.2859	0.4375	0.3282	0.2287
71.2	344.4	0.5446	0.1361	0.3151	0.4385	0.2978	0.2580
66.5	339.7	0.5757	0.1729	0.2470	0.4415	0.3603	0.1926
67.3	340.5	0.5722	0.1723	0.2510	0.4392	0.3593	0.1959
67.8	341.0	0.5709	0.1723	0.2523	0.4382	0.3593	0.1969
68.5	341.7	0.5697	0.1717	0.2541	0.4376	0.3583	0.1985
72.0	345.2	0.5601	0.1690	0.2664	0.4317	0.3539	0.2088
82.6	355.8	0.5248	0.1581	0.3128	0.4102	0.3356	0.2486
71.5	344.7	0.5700	0.1898	0.2352	0.4276	0.3868	0.1794
72.4	345.6	0.5656	0.1883	0.2410	0.4251	0.3845	0.1842
74.8	348.0	0.5608	0.1867	0.2474	0.4223	0.3820	0.1894

75.1	348.3	0.5589	0.1862	0.2499	0.4212	0.3811	0.1915
75.1	348.3	0.5568	0.1854	0.2528	0.4200	0.3799	0.1939
76.0	349.2	0.5548	0.1848	0.2554	0.4188	0.3789	0.1961
77.0	350.2	0.5524	0.1839	0.2587	0.4174	0.3776	0.1988
61.4	334.6	0.5933	0.1582	0.2437	0.4640	0.3360	0.1938
63.0	336.2	0.5870	0.1629	0.2452	0.4562	0.3438	0.1938
65.3	338.5	0.5805	0.1678	0.2478	0.4481	0.3520	0.1937
71.2	344.4	0.5670	0.1777	0.2503	0.4320	0.3679	0.1939
75.1	348.3	0.5567	0.1855	0.2528	0.4199	0.3800	0.1939
76.8	350.0	0.5539	0.1882	0.2529	0.4163	0.3842	0.1933

[a]Critical opalescence.

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method[1] was used. Heterogeneous mixtures (about 8 g) were placed in glass sealed ampoules. These were mounted in pairs in a special holder, placed in a round glass bath containing 18 L of water, and the temperature was measured with thermometers with 0.01 or 0.02 °C divisions.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled in glass packed column.
(2) Source not specified; pure grade reagent; dried and distilled in glass packed column.
(3) Analytical purity; dried and twice distilled under vacuum; 0.03 mass % water by the Karl Fischer analysis.
(4) Source not specified; reagent for chromatography; not purified.

Estimated Error:

Not reported.

References:

[1]V. F. Alekseev, Zh. Russ. Fiz.-Khim. Ova **8**, 249 (1876).

8.3. +1,2-Ethanediol+Heptane+1-Dodecanol

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 1,2-Ethanediol; $C_2H_6O_2$; [107-21-1]
(3) Heptane; C_7H_{16}; [142-82-5]
(4) 1-Dodecanol; $C_{12}H_{26}O$; [112-53-8]

Original Measurements:

L. V. Gudkina, dissertation, Novosibirsk Institute of Inorganic Chemistry, 1975.

Variables:

T/K≈304–313

Prepared By:

V. P. Sazonov

Experimental Data

Solubility temperatures of the liquid phases were determined in quaternary mixtures with a constant mass content of (4) and a constant mass relationship of (1) and (2), respectively, 65.0:35.0 ratio.

TABLE 1. Solubility temperatures of the three liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	x_3 (compiler)	w_1	w_2	w_3
39.57	312.72	0.643	0.340	0.013	0.630	0.339	0.021
39.72	312.87	0.642	0.340	0.015	0.628	0.338	0.024
36.77	309.92	0.643	0.341	0.009	0.627	0.338	0.015
37.23	310.38	0.642	0.340	0.011	0.625	0.337	0.018
37.27	310.42	0.640	0.340	0.013	0.623	0.336	0.021
37.51	310.66	0.639	0.339	0.015	0.621	0.335	0.024
34.78	307.93	0.641	0.339	0.009	0.621	0.334	0.015
35.27	308.42	0.640	0.339	0.011	0.619	0.333	0.017
35.49	308.64	0.639	0.338	0.013	0.618	0.332	0.020
35.92	309.07	0.638	0.337	0.015	0.616	0.331	0.023
32.68	305.83	0.640	0.339	0.007	0.617	0.332	0.011
32.91	306.06	0.639	0.338	0.009	0.615	0.331	0.014
33.28	306.43	0.638	0.338	0.011	0.613	0.330	0.017
30.66	303.81	0.640	0.339	0.004	0.614	0.330	0.006
30.87	304.02	0.639	0.338	0.006	0.612	0.329	0.009
31.32	304.47	0.638	0.338	0.007	0.610	0.329	0.011
31.83	304.98	0.636	0.338	0.009	0.608	0.328	0.014
32.28	305.43	0.635	0.337	0.011	0.606	0.327	0.017

TABLE 2. Solubility temperatures of the two liquid phases

t/°C	T/K (compiler)	x_1 (compiler)	x_2 (compiler)	x_3 (compiler)	w_1	w_2	w_3
37.58	310.73	0.651	0.344	0.002	0.642	0.345	0.003
38.21	311.36	0.650	0.343	0.004	0.640	0.344	0.006
38.37	311.52	0.648	0.343	0.006	0.638	0.343	0.009
39.09	312.24	0.646	0.342	0.009	0.634	0.341	0.015
39.32	312.47	0.645	0.341	0.011	0.632	0.340	0.018
36.11	309.26	0.648	0.343	0.002	0.635	0.342	0.003
36.28	309.43	0.647	0.343	0.004	0.633	0.341	0.006
36.41	309.56	0.646	0.342	0.006	0.631	0.340	0.009
36.62	309.77	0.644	0.341	0.008	0.629	0.339	0.012
34.09	307.24	0.646	0.342	0.002	0.629	0.338	0.003
34.22	307.37	0.645	0.341	0.004	0.627	0.337	0.006
34.42	307.57	0.644	0.340	0.006	0.625	0.336	0.009
34.72	307.87	0.643	0.340	0.007	0.623	0.335	0.012
32.03	305.18	0.644	0.341	0.002	0.622	0.335	0.003
32.12	305.27	0.642	0.340	0.004	0.620	0.334	0.006
32.17	305.32	0.641	0.340	0.006	0.618	0.333	0.009
30.58	303.73	0.642	0.339	0.002	0.616	0.331	0.003

Auxiliary Information

Method/Apparatus/Procedure:

The synthetic method was used. Solubility temperatures of the liquid phases were determined both on heating and cooling of the mixtures, and the average temperature value obtained was taken. Measurements were carried out in a water thermostat.

Source and Purity of Materials:

(1) Source not specified; pure grade reagent; dried and twice distilled in glass packed column.
(2) Analytical purity; dried and twice distilled under vacuum; 0.03 mass % water by the Karl Fischer analysis.
(3) Source not specified; pure grade reagent; dried and twice distilled in glass packed column.
(4) Source not specified; pure grade reagent; dried and repeatedly distilled under vacuum.

Estimated Error:

Temperature: ±0.01 K.

8.4. +2-Furancarboxaldehyde+Toluene+Methylcyclohexane

Components:

(1) Nitromethane; CH_3NO_2; [75-52-5]
(2) 2-Furancarboxaldehyde; $C_5H_4O_2$; [98-01-1]
(3) Toluene; C_7H_8; [108-88-3]
(4) Methylcyclohexane; C_7H_{14}; [108-87-2]

Original Measurements:

D. S. Lafyatis, L. S. Scott, D. M. Trampe, and C. A. Eckert, Ind. Eng. Chem. Res. **28**, 585–90 (1989).

Variables:

T/K = 323

Prepared By:

V. P. Sazonov

Experimental Data

Compositions of the two liquid phases at equilibrium for the quaternary system

t/°C	T/K (compiler)	Nitromethane-rich phase x_1'	x_2'	x_3'	Hydrocarbon-rich phase x_1''	x_2''	x_3''
50.00	323.15	0.523	0.377	0.012	0.071	0.060	0.024
		0.520	0.363	0.024	0.074	0.060	0.046
		0.500	0.350	0.045	0.097	0.075	0.080
		0.476	0.334	0.067	0.118	0.093	0.111
		0.465	0.320	0.081	0.132	0.105	0.130
		0.448	0.306	0.094	0.161	0.120	0.142
		0.786	0.148	0.006	0.082	0.021	0.016
		0.780	0.142	0.018	0.096	0.025	0.044
		0.753	0.142	0.032	0.121	0.029	0.073
		0.737	0.137	0.045	0.139	0.033	0.097
		0.708	0.131	0.067	0.182	0.040	0.133
		0.654	0.127	0.097	0.248	0.053	0.163
		0.563	0.110	0.137	0.373	0.074	0.173
		0.477	0.094	0.162	0.477	0.094	0.162
		0.270	0.590	0.022	0.045	0.107	0.037
		0.260	0.544	0.054	0.068	0.151	0.083
		0.232	0.481	0.087	0.086	0.198	0.121

The same data are presented below in mass fractions

		Nitromethane-rich phase (compiler)			Hydrocarbon-rich phase (compiler)		
t/°C	T/K	w'_1	w'_2	w'_3	w''_1	w''_2	w''_3
50.00	323.15	0.410	0.466	0.014	0.046	0.060	0.023
		0.408	0.448	0.028	0.047	0.061	0.045
		0.388	0.428	0.053	0.063	0.077	0.078
		0.365	0.405	0.078	0.078	0.096	0.110
		0.356	0.385	0.094	0.087	0.109	0.130
		0.341	0.366	0.108	0.108	0.126	0.144
		0.699	0.207	0.008	0.053	0.021	0.016
		0.692	0.198	0.024	0.062	0.026	0.043
		0.659	0.196	0.042	0.079	0.030	0.072
		0.640	0.187	0.059	0.092	0.034	0.097
		0.607	0.177	0.087	0.123	0.042	0.135
		0.547	0.167	0.123	0.172	0.058	0.171
		0.450	0.139	0.165	0.274	0.086	0.192
		0.367	0.114	0.188	0.367	0.114	0.188
		0.190	0.653	0.023	0.029	0.107	0.035
		0.182	0.600	0.057	0.044	0.153	0.080
		0.161	0.525	0.091	0.061	0.132	0.129

Auxiliary Information

Method/Apparatus/Procedure:

The analytical method was used. The equilibrium cell consisted of a vertical glass cylinder with a volume of about 80 mL. A magnetic stir bar was used for mixing the sample, and the cell was thermostated. The two partially miscible components were charged to the equilibrium cell in approximately equal volumes, and the mixture was stirred for a minimum of 15 min. Next, the third component, which distributes itself between the two phases, was added to the equilibrium cell, stirred, and allowed to equilibrate before sampling. Samples of each phase were taken and analyzed by gas chromatography

Source and Purity of Materials:

(1) Source not specified; purity greater than 99.9 mole %; not purified.
(2) Source not specified, purity greater than 99.9 mole %; not purified.
(3) Source not specified, purity greater than 99.9 mole %; not purified.
(4) Source not specified, purity greater than 99.9 mole %; not purified.

Estimated Error:

Temperature: control to ± 0.01 K;
Composition: discrepancy of two determinations always less than 0.005 mole fraction.

Page numbers preceded by E refer to evaluation text whereas those not preceded by E refer to compiled tables.

Nitromethane +	Acetic acid +	Water	E1468–E1469, 1470–1471
	Alkanes +	Water	E1509–E1510, 1530
	Argon +	Water	1457
	Benzene +	Cyclohexane	E1598–E1599, 1600, 1601
	Benzene +	Heptane	E1601–E1602, 1602–1603
	Butanoic acid +	Water	E1484–E1485, 1485–1486
	1-Butanol +	Water	E1491–E1493, 1493–1497
	Cadmium iodide +	Water	1457
	Cyclohexane +	Castor oil methyl esters	1603–1604
	Cyclohexanol +	Water	1502
	1-Decanol +	Water	E1525, 1526–1527, 1527–1529
	1-Dodecanol +	Water	1529–1530
	Dibromomethane +	1,2-Ethanediol	1532
	1,2-Dichlorobenzene +	Heptane	1597
	1,4-Dichlorobenzene +	Heptane	1597
	1,2-Dichloroethane+	1,2-Ethanediol	1543
	Dichloromethane +	1,2-Ethanediol	1533
	N, N-Diethylethanamine +	Water	1508–1509
	Diiodomethane +	Cyclohexane	1535–1536
	Diiodomethane +	1,2-Ethanediol	1533–1535
	Diiodomethane +	1,2-Ethanediol+Cyclohexane	1625–1629
	1,2-Ethanediol +	Cyclohexane	1545–1547
	1,2-Ethanediol +	1-Decanol	1553–1554
	1,2-Ethanediol +	N, N-Diethylethanamine	1547
	1,2-Ethanediol +	1-Dodecanol	E1554–E1555, 1555–1557, 1557–1561
	1,2-Ethanediol +	Heptane	1548–1549
	1,2-Ethanediol +	Heptane+1-Dodecanol	1633–1634
	1,2-Ethanediol +	1-Heptanol	1549–1550
	1,2-Ethanediol +	1-Hexanedinitrile	1565
	1,2-Ethanediol +	Hexanedinitrile	1545
	1,2-Ethanediol +	2-Methoxy-2-methylpropane	1544
	1,2-Ethanediol +	2-Methoxy-2-methylpropane + Water	1617
	1,2-Ethanediol +	1-Nonanol	1551–1553
	1,2-Ethanediol +	1-Octanol	1550–1551
	1,2-Ethanediol +	1-Pentadecanol	1562–1564
	1,2-Ethanediol +	1-Tridecanol	1561–1562
	1,2-Ethanediol +	Water	1476
	Ethanol +	Water	E1472–E1473, 1474–1475
	N-Ethylethanamine +	Water	1498
	Formic acid +	Water	E1462, 1463–1464
	2-Furancarboxoaldehyde +	Methylcyclohexane	1596
	2-Furancarboxoaldehyde +	Toluene+Methylcyclohexane	1634–1635
	Helium +	Water	1458
	Heptane +	1,2-Dimethylbenzene	1608
	Heptane +	1,3-Dimethylbenzene	1609
	Heptane +	1,4-Dimethylbenzene	1609
	Heptane +	Water	E1509–E1510, 1510–1512
	1-Heptanol +	Water	1513–1514
	Hexane +	Castor oil methyl esters	1605
	1-Hexanol +	Water	E1503–E1504, 1504–1505, 1506–1508
	Hydrogen peroxide +	Water	1458
	2,2′-Iminobisethanol +	N, N-Diethylethanamine	1582–1583
	2,2′-Iminobisethanol +	1-Decanol	1587
	2,2′-Iminobisethanol +	1-Dodecanol	1589–1590
	2,2′-Iminobisethanol +	1-Heptanol	1583–1584
	2,2′-Iminobisethanol +	1-Hexadecanol	1595
	2,2′-Iminobisethanol +	Octane	1584–1585
	2,2′-Iminobisethanol +	1-Octanol	1586
	2,2′-Iminobisethanol +	1-Pentadecanol	1592–1594
	2,2′-Iminobisethanol +	1-Tridecanol	1590–1591
	2,2′-Iminobisethanol +	1-Undecanol	1588
	Iodomethane +	1,2-Ethanediol	1537
	Methanol +	Water	E1464–E1465, 1466–1467
	2-Methoxy-2-methylpropane	Water	1498
	2-Methyl-1,3-butadiene +	2-Methyl-2-butene	1596
	3-Methyl-1-butanol +	Water	1499–1500
	2-Methyl-1-propanol +	Water	1486–1488

2-Methyl-2-propanol +	Water	E1488–E1489, 1489–1490
2-Methylnaphthalene +	Hexadecane	1616
Naphthalene +	Water	E1522, 1523–1524
Nitric acid +	Water	1459
Nitroethane +	Heptane	1544
1-Nonanol +	1-Decanol	1614–1615
1-Nonanol +	1-Decanol+Water	1623–1625
1-Nonanol +	Naphthalene	E1610, 1611–1613, 1613–1614
1-Nonanol +	Naphthalene+Water	E1625, 1620–1623
1-Nonanol +	Water	E1518–E1519, 1519–1520, 1521
Octanoic acid +	Water	1515–1516
1-Octanol +	Water	1517–1518
1-Pentanol +	Water	1500–1501
1,2,3-Propanetriol +	1-Decanol	1577–1578
1,2,3-Propanetriol +	N, N-Diethylethanamine	1571
1,2,3-Propanetriol +	1-Dodecanol	1579–1580
1,2,3-Propanetriol +	1-Heptanol	1572–1573
1,2,3-Propanetriol +	1-Hexanol	1568–1570
1,2,3-Propanetriol +	Octanoic acid	1574–1575
1,2,3-Propanetriol +	1-Octanol	1575–1577
1,2,3-Propanetriol +	1-Pentanol	1567–1568
1,2,3-Propanetriol +	1-Tridecanol	1580–1581
1,2,3-Propanetriol +	1-Undecanol	1578–1579
Propanoic acid +	Water	E1477, 1478–1479
1-Propanol +	1-Nonanol	1566
1-Propanol +	1-Nonanol+Water	1617–1619
1-Propanol +	Water	E1479–E1480, 1480–1482
2-Propanol +	Water	E1482–E1483, 1517, E1518
2-Propenamide+	Water	1476
Propylene carbonate +	N, N-Diethylethanamine	1518–1582
Sulfur hexafluoride +	Water	1459
Tetrachloroethene +	1,2-Ethanediol	E1537–E1538, 1538–1540, 1540–1541
Tetrachloroethene +	1,2-Ethanediol+Heptane	1630–1633
Tetrachloroethene +	1-Hexanol	1542–1543
Tetrachloroethene +	Water	1468
Tetrachloromethane +	1,2-Ethanediol	1531
Tetrachloromethane +	Hydrocyanic acid	1461
Thorium nitrate tetrahydrate +	Water	1460
Toluene+	Heptane	1608
Toluene+	Methylcyclohexane	E1605–E1606, 1606–1607, 1607
Tribromomethane +	1,2-Ethanediol	1531
Trichloromethane +	1,2-Ethanediol	1532
2,6,6-Trimethylbicyclo[3.1.1] hept-2-ene +	3,7,7-Trimethylbicyclo[4.1.0] hept-3-ene	1615
Uranyl nitrate hexahydrate +	Water	1460–1461

10. Registry Number Index

Page numbers preceded by E refer to evaluation text whereas those not preceded by E refer to compiled tables.

[56-23-5]	CCl_4	Tetrachloromethane	1531
[56-81-5]	$C_3H_8O_3$	1,2,3-Propanetriol	1567–1581
[64-17-5]	C_2H_6O	Ethanol	E1472–E1473, 1474–1475
[64-18-6]	CH_2O_2	Formic acid	E1462, 1463–1464
[64-19-7]	$C_2H_4O_2$	Acetic acid	E1468–E1469, 1470–1471
[67-56-1]	CH_4O	Methanol	E1464–E1465, 1466–1467
[67-63-0]	C_3H_8O	2-Propanol	E1482–E1483, 1483–1484
[67-66-3]	$CHCl_3$	Trichloromethane	1532
[71-23-8]	C_3H_8O	1-Propanol	E1479–E1480, 1480–1482, 1566, 1617–1619
[71-36-3]	$C_4H_{10}O$	1-Butanol	E1491–E1493, 1493–1497
[71-41-0]	$C_5H_{12}O$	1-Pentanol	1500–1501, 1567–1568
[71-43-2]	C_6H_6	Benzene	E1598–E1599, 1600–1601, E1601–E1602, 1602–1603
[74-88-4]	CH_3I	Iodomethane	1537
[74-90-8]	CHN	Hydrocyanic acid	1461
[74-95-3]	CH_2Br_2	Dibromomethane	1532
[75-09-2]	CH_2Cl_2	Dichloromethane	1533
[75-11-6]	CH_2I_2	Diiodomethane	1533–1536, 1625–1629

[75-25-2]	$CHBr_3$	Tribromomethane	1531
[75-52-5]	CH_3NO_2	Nitromethane	1457–1635
[75-65-0]	$C_4H_{10}O$	2-Methyl-2-propanol	E1488–E1489, 1489–1490
[78-79-5]	C_5H_8	2-Methyl-1,3-butadiene	1596
[78-83-1]	$C_4H_{10}O$	2-Methyl-1-propanol	1486–1488
[79-06-1]	C_3H_5NO	2-Propenamide	1476
[79-09-4]	$C_3H_6O_2$	Propanoic acid	E1477, 1478–1479
[79-24-3]	$C_2H_5NO_2$	Nitroethane	1544
[91-20-3]	$C_{10}H_8$	Naphthalene	E1522, 1523–1524, E1610, 1611–1614, E1619, 1620–1623
[91-57-6]	$C_{11}H_{10}$	2-Methylnaphthalene	1616
[95-47-6]	C_8H_{10}	1,2-Dimethylbenzene	1608
[95-50-1]	$C_6H_4Cl_2$	1,2-Dichlorobenzene	1597
[98-01-1]	$C_5H_4O_2$	2-Furancarboxaldehyde	1596, 1634–1635
[106-42-3]	C_8H_{10}	1,4-Dimethylbenzene	1609
[106-46-7]	$C_6H_4Cl_2$	1,4-Dichlorobenzene	1597
[107-06-2]	$C_2H_4Cl_2$	1,2-Dichloroethane	1543
[107-21-1]	$C_2H_6O_2$	1,2-Ethanediol	1476, 1531–1535, 1537, E1537–E1538, 1538–1541, 1543, 1544–1554, E1554–E1555, 1555–1565, 1616–1617, 1625–1634
[107-92-6]	$C_4H_8O_2$	Butanoic acid	E1484–E1485, 1485–1486
[108-32-7]	$C_4H_6O_3$	Propylene carbonate	1581–1582
[108-38-3]	C_8H_{10}	1,3-Dimethylbenzene	1609
[108-87-2]	C_7H_{14}	Methylcyclohexane	1596, E1605–E1606, 1060–1607, 1634–1635
[108-88-3]	C_7H_8	Toluene	E1605–E1606, 1606–1608, 1634–1635
[108-93-0]	$C_6H_{12}O$	Cyclohexanol	1502
[109-89-7]	$C_4H_{11}N$	N-Ethylethanamine	1498
[110-54-3]	C_6H_{14}	Hexane	1605
[110-82-7]	C_6H_{12}	Cyclohexane	1535–1536, 1545–1547, E1598–E1599, 1600–1601, 1603–1604, 1625–1629
[111-27-3]	$C_6H_{14}O$	1-Hexanol	E1503–E1504, 1504–1508, 1568–1570
[111-42-2]	$C_4H_{11}NO_2$	2,2′-Iminobisethanol	1582–1595
[111-65-9]	C_8H_{18}	Octane	1530, 1584–1585
[111-69-3]	$C_6H_8N_2$	Hexanedinitrile	1545
[111-70-6]	$C_7H_{16}O$	1-Heptanol	1513–1514, 1549–1550, 1572–1573, 1583–1584
[111-87-5]	$C_8H_{18}O$	1-Octanol	1517–1518, 1550–1561, 1575–1577, 1586
[112-30-1]	$C_{10}H_{22}O$	1-Decanol	E1525, 1526–1529, 1553–1554, 1577–1578, 1587, 1614–1615, 1623–1625
[112-40-3]	$C_{12}H_{26}$	Dodecane	1530
[112-42-5]	$C_{11}H_{24}O$	1-Undecanol	1578–1579, 1588
[112-53-8]	$C_{12}H_{26}O$	1-Dodecanol	1529–1530, E1554–E1555, 1555–1561, 1579–1580, 1589–1590, 1633–1634
[112-70-9]	$C_{13}H_{28}O$	1-Tridecanol	1561–1563, 1580–1581, 1590–1591
[121-44-8]	$C_6H_{15}N$	N,N-Diethylethanamine	1508–1509, 1547, 1571, 1581–1583
[123-51-3]	$C_5H_{12}O$	3-Methyl-1-butanol	1499
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[127-18-4]	C_2Cl_4	Tetrachloroethene	1465, E1537–E1538, 1538–1543, 1630–1633
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