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**Attention: Thermometry Labs!!!
Thermometry Group Leads International Efforts to Refine
Temperature Scales**

At its 23rd meeting, the Consultative Committee for Thermometry, the highest international authority on scientific issues of thermometry, approved two recommendations that will improve the scientific basis of the unit of temperature, the kelvin, and will provide for more effective dissemination of accurate and well-defined temperature measurements. The kelvin is defined as $1/273.16$ of the absolute temperature of the triple point of water, but recent research has shown that the isotopic composition of the water affects the triple-point temperature significantly.

NIST's Thermometry Group led an international task group that drafted both a scientific report on this effect and Recommendation T1, which specifies a definite isotopic composition and thereby removes an ambiguity in the kelvin. Although it is possible to construct a temperature scale based on the definition of the kelvin and a thermodynamically based primary thermometer, direct realizations of thermodynamic temperature are generally very difficult.

The present temperature scale adopted for worldwide use, the International Temperature Scale of 1990 (ITS-90), provides a recipe for a practical temperature scale that is readily disseminated to users through calibration services at NIST and elsewhere. As a result of recent research, a number of scientific imperfections have been identified in the ITS-90. To address this situation, Recommendation T3, drafted by NIST staff, recommends the creation of a formal Practical Method (often referred to by the equivalent French phrase *mise en pratique*) of the definition of the kelvin. Adoption of a Practical Method has a number of advantages. In particular, the document will:

- provide a highly visible and internationally accepted medium for presenting results on the differences and uncertainties of the ITS-90 relative to thermodynamic temperature, largely determined from the results of NIST research,
- include a technical annex that contains isotopic compositions of fixed-point materials and other essential information needed for a clear and unambiguous realization of the ITS-90, and
- in time, support and provide guidance for calibrations performed directly on the thermodynamic temperature scale, as envisioned in the near future by the NIST Optical Technology Division.

Use of a Practical Method enables rapid scientific progress in the refinement of temperature scales without excessive and expensive revision of the practical scales commonly used in industry. A Practical Method also supports the best possible implementations of the existing practical scale. Recommendations T1 and T3 will be

considered by the International Committee for Weights and Measures in October 2005, at its 94th meeting.

If you have any questions regarding the two recommendations, contact Dean Ripple at 301-975-4801 or at dean.ripple@nist.gov.