

July 2015

Inside:

New SRMs/RMs

SRM 1721 Southern Oceanic Air (Nominal Amount-of-Substance Fraction: Carbon Dioxide, Methane, Nitrous Oxide)

SRM 4358 Ocean Shellfish Radionuclide Standard

RM 8398 Human DNA for Whole-Genome Variant Assessment (Daughter of Utah/European Ancestry)

Renewal SRMs

SRM 956d Electrolytes in Frozen Human Serum

SRM 2453a Hydrogen in Titanium Alloy (Nominal Mass Fraction 125 mg/kg H)

Revisions

SRM 2391c PCR-Based DNA Profiling Standard

NIST SRM Exhibits

The identification of any commercial product or trade name does not imply endorsement or recommendation by the National Institute of Standards and Technology.

Editor:
Regina R. Montgomery

**NIST SRM 1721 Southern Oceanic Air
(Nominal Amount-of-Substance Fraction – Ambient Nominal Amount-of-Substance Fraction: Carbon Dioxide, Methane, Nitrous Oxide)**

Carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) are all greenhouse gases (GHGs) that make important contributions to climate change. A recent analysis from the Global Atmosphere Watch (GAW) Observations Program of the World Meteorological Organization (WMO) shows that the globally averaged molar fractions of GHGs reached new highs in 2013.

These maxima include $(396.0 \pm 0.1) \mu\text{mol mol}^{-1}$ for CO₂, $(1824 \pm 2) \text{nmol mol}^{-1}$ for CH₄, and $(325.9 \pm 0.1) \text{nmol mol}^{-1}$ for N₂O. Compared to pre-industrial levels (prior to 1750), these are relative changes in concentration of 140 %, 250 %, and 120% respectively. A recent update by the National Oceanic and Atmospheric Administration (NOAA) reports the preliminary global CO₂ level at $400.83 \mu\text{mol mol}^{-1}$ as of March 2015. All three species are long-lived greenhouse gases (LLGHGs), which absorb electromagnetic radiation and which affect the budget of tropospheric and stratospheric ozone (O₃). Thus, these LLGHGs contribute significantly to atmospheric radiative forcing and have an important role in atmospheric chemistry. In order to accurately establish trends in gas concentration, assess the role of LLGHGs in atmospheric chemistry, and relate measurement records from many laboratories and researchers, it is essential to have a stable, accurate, and internationally recognized source of calibration standards or scales.

In 2009, the United States Congress tasked NIST to support climate change research. As part of this effort, NIST's Gas Sensing Metrology Group (GSMG) began developing gas standards required for accurate measurements of GHGs for ground-based and ambient atmosphere applications. As part of this initiative, the GSMG has completed development of SRM 1721 Southern Oceanic Air. The SRM candidate mixtures were prepared from southern oceanic air at the NIWA research station at Baring Head, New Zealand. The prime conditions for pristine oceanic air occur during the months of March and April when the prevailing winds originate from Antarctica and subsequently traverse the southern Pacific Ocean to New Zealand. The GSMG has certified these SRM samples for ambient levels of CO₂, CH₄ and N₂O.

Technical Contact: George Rhoderick
Email: George.rhoderic@nist.gov



NIST SRM 4358 Ocean Shellfish Radionuclide Standard

SRM 4358 consists of approximately 150 grams dried powder shellfish and is a mixture of Irish Sea mussel, White Sea mussel, and Japan Sea oyster (0.1 %, 12 %, and 87.9 % mass fraction, respectively). The raw material was dried, blade milled, and pulverized. The SRM was “V-cone” blended to optimize homogeneity and bottled in polyethylene bottles. The final bottled SRM was sterilized with > 50 kGy of ⁶⁰Co radiation to satisfy export regulations and to increase shelf life. This SRM has been developed in cooperation with member laboratories of the International Committee for Radionuclide Metrology and other experienced metrology laboratories through an international intercomparison project.



The SRM is intended for use in validation of radiochemical methods, quality control, and calibration of measuring devices. This material can be considered as a food reference material and as a bioaccumulator of radionuclides associated with ocean nuclear waste dumping programs. The radionuclides determined include radium-226, thorium-228, thorium-230, thorium-232, uranium-234, uranium-235, uranium-238, plutonium-238, plutonium-239+240, americium-241, lead-210, cesium-137, and potassium-40.

Technical Contact: Lizbeth Laureano Pérez
Email: lizbeth.laureano-perez@nist.gov

NIST RM 8398 Human DNA for Whole-Genome Variant Assessment (Daughter of Utah/European Ancestry)



Broad clinical application of next-generation sequencing is emerging. Clinical sequencing is becoming the standard of care for medically actionable diagnoses of rare childhood diseases and certain classes of cancers. Anticipating this, and working with our colleagues at FDA, NIST initiated the public-private-academic Genome in a Bottle Consortium to develop the reference materials, data, and methods to permit confidence in next-generation sequencing results. These products support reproducible research and enable FDA to perform science-based regulatory oversight. The most prominent initial product from the consortium is the recently released RM 8398, the pilot human genome reference material.

RM 8398 Human DNA for Whole-Genome Variant Assessment (Daughter of Utah/European Ancestry) was released in May 2015. This RM is sold as 10 µg units of DNA extracted from a large batch of cells (GM12878 from Coriell Institute for Medical Research). It has been characterized for homogeneity and stability. Data from five sequencing technologies were integrated to generate high-confidence small variant and homozygous reference genotypes for approximately 77 % of the genome. These data are useful to find true positives, false positives, and false negatives for any sequencing and bioinformatics methods used to analyze the DNA sequence of this RM.

Technical Contact: Marc Salit
Email: marc.salit@nist.gov

Renewal SRMs/RMs

NIST SRM 956d Electrolytes in Frozen Human Serum

SRM 956d Electrolytes in Frozen Human Serum is a three-level renewal SRM intended for use as a primary calibrant for Ion-Selective Electrode (ISE) measurements of Na, K, Ca, Li, Mg, Cl, PO₄, and ionized Ca in human serum. Electrolytes constitute one of the most commonly employed testing panels in routine clinical assessments and point-of-care screening. The accurate assignment of electrochemical calibrators for these electrolytes requires a well-matched primary calibration standard, and the SRM 956 series has served this need extremely well for over 25 years. This material is listed in the database of the Joint Committee for Traceability in Laboratory Medicine (JCTLM) as a higher-order material appropriate for demonstrating traceability of medical devices in support of the EU's In Vitro Diagnostic Device (IVD) Directive. The implementation of the IVD regulations in Europe in December 2003 has dramatically influenced sales of this SRM, which have been steadily increasing every year. More customers are also opting to use this SRM for electrolyte measurements as it offers more convenience than a lyophilized material.

A new addition to the SRM 956d renewal material is a reference value for phosphate. Clinical measurements of phosphate are important for diagnostics and managed treatment of renal and bone disease as well as parathyroid dysfunction.

Technical Contact: Stephen Long
Email: stephen.long@nist.gov



NIST SRM 2453a Hydrogen in Titanium Alloy (Nominal Mass Fraction 125 mg/kg H)



Manufacturers of aerospace equipment, power generation equipment, and other critical machinery have set specifications for the maximum allowable mass fraction of total hydrogen in titanium alloys. Some key upper limits for various application ranges are from 60 mg/kg to 200 mg/kg total H. Manufacturers of titanium alloys perform numerous analyses of total hydrogen using the inert gas fusion approach in compliance with ASTM E1447-09 Standard Test Method for Determination of Hydrogen in Titanium and Titanium Alloys by the Inert Gas Fusion Thermal Conductivity/Infrared Detection Method. Because their laboratories maintain accredited quality systems, titanium producers must demonstrate the validity of their results by using a certified reference material. SRM 2453a Hydrogen in Titanium fills this need to help ensure that titanium in aircraft, turbines, weapons systems, and much more will not fail prematurely due to embrittlement of the metal caused by hydrogen.

SRM 2453a was designed to be easy to use and of highly homogeneous. The material was produced in pin form to give it high uniformity of mass and dimensions per piece, making it easy to measure using E1447. Heterogeneity of hydrogen content is kept low by degassing the pins before dosing them with pure hydrogen gas. The material was made using a commercialized process originally developed at NIST to degas titanium, dose it with a known quantity of hydrogen, and convert all hydrogen to stable hydride forms. In the commercialization of the process, steps were added to make the pins less susceptible to damage that could cause an increase in moisture and hydrocarbon uptake during storage and use. As a result of all this effort, SRM 2453a has a nominal value of 125 mg/kg total H with a low uncertainty expressed as a 95 % coverage interval of 4 % relative. Determinations for certification were performed using method E1447 with gas dosing calibration and using prompt gamma-ray activation analysis at the NIST Center for Neutron Research. These values and their traceability to pure hydrogen make SRM 2453a nearly ideal for use in value assignment of additional reference materials by reference material producers.

*Technical Contact: John R. Sieber
Email: john.sieber@nist.gov*

- SRM 1679c** Carbon Monoxide in Nitrogen (Nominal Amount-of-Substance 100 $\mu\text{mol/mol}$) Lot #3-K-XX
- SRM 1693a** Sulfur Dioxide in Nitrogen (Nominal Amount-of-Substance Fraction 50 $\mu\text{mol/mol}$) Lot #96-M-XX
- SRM 3131a** Magnesium (Mg) Standard Solution Lot #140110
- SRM 3141a** Potassium (K) Standard Solution Lot #140813

Certificate Revisions

This is a list of our most recent certificate revisions. NIST updates certificates for a variety of reasons, such as to extend the expiration date or to include additional information gained from stability testing. Users of NIST Standard Reference Materials should ensure that they have the current certificates. You can print or view a copy of the current certificate at our website at <http://www.nist.gov/srm> or contact the Office of Reference Materials at **phone** 301-975-2200, **fax** 301-926-4751, or **email** srminfo@nist.gov

NIST SRM 2391c PCR-Based DNA Profiling Standard

Standard Reference Material 2391c PCR-Based DNA Profiling Standard represents the third renewal of this SRM material first released in 1995. SRM 2391c comprises six components, including genomic DNA and DNA to be extracted from cells that have been spotted onto 903 paper and FTA paper substrates. Five samples are single-source and one is a mixed sample to represent challenging samples commonly encountered in the forensic community. The availability of this SRM is critical for the forensic DNA human identification testing laboratories that adhere to the FBI-issued Quality Assurance Standards of Forensic DNA testing (2008) Section 9.5.5. “The laboratory shall check its DNA procedures annually or whenever substantial changes are made to a procedure against an appropriate and available NIST standard reference material or standard traceable to a NIST standard.”



Recently, an update was made to certified properties of SRM 2391c. New short tandem repeat (STR) multiplex kits with additional markers beyond what are certified in SRM 2391c have been released to the forensic community, including Y-STR, X-STR, and insertion and deletion (indel) markers. In addition, autosomal STR multiplex kits containing additional core markers have been released to accommodate the growing U.S. National DNA Database and the new genetic loci within the kits have been included in SRM 2391c certification. Finally, the certificate includes information on the sequence structure of 25 autosomal STR and 29 Y-STR markers.

Technical Contact: Becky Steffen
Email: becky.steffen@nist.gov

SRM 57b Silicon Metal

Revised values for B, Co, and V based on re-evaluation of original results combined with results from new analytical methods; changed reference value for B to a certified value; changed information values for Co and V to reference values; added information value for H.
Editorial changes

SRM 350b Benzoic Acid (Acidimetric) C₆H₅COOH

New expiration date: 01 April 2024
Editorial changes

SRM 634a Portland Cement

Revised reference value for Loss on Ignition (LOI) Total at 950 °C; added reference values for LOI at additional temperatures; added Appendix A.
Editorial changes

Revisions (continued)

SRM 640e Line Position and Line Shape Standard for Powder Diffraction (Silicon Powder)

Editorial changes

SRM 660c Line Position and Line Shape Standard for Powder Diffraction (Lanthanum Hexaboride Powder)

Editorial changes

SRM 971 Hormones in Frozen Human Serum

New expiration date: 01 January 2020

Editorial changes

SRM 1663a Sulfur Dioxide in Nitrogen (Nominal Amount-of-Substance Fraction 1500 $\mu\text{mol/mol}$)**Lot #95-G-XX**

New expiration date: 30 December 2022

Editorial changes

SRM 1669b Propane in Air (Nominal Amount-of-Substance Fraction 500 $\mu\text{mol/mol}$)**Lot #81-I-XX**

Editorial changes

SRM 1694a Sulfur Dioxide in Nitrogen (Nominal Amount-of-Substance Fraction 100 $\mu\text{mol/mol}$)**Lot # 95-J-XX**

Changed certified value for Sulfur Dioxide.

New expiration date: 05 January 2019

Editorial changes

SRM 1762a Low Alloy Steel

Editorial changes

SRM 1849a Infant/Adult Nutritional Formula

Editorial changes

SRM 1953 Organic Contaminants in Non-Fortified Human Milk

New expiration date: 31 August 2025

Editorial changes

SRM 1954 Organic Contaminants in Fortified Human Milk

New expiration date: 31 August 2025

Editorial changes

SRM 2234 Gallium for Thermal Analysis

New expiration date: 01 August 2018

Editorial changes

Revisions (continued)

SRM 2614a Carbon Monoxide in Air (Nominal Amount-of-Substance Fraction 45 $\mu\text{mol/mol}$)**Lot # 21-G-XX**

New expiration date: 06 January 2023

Editorial changes

SRM 2731 Hydrogen Sulfide in Nitrogen (Nominal Amount-of-Substance Fraction 20 $\mu\text{mol/mol}$)**Lot # 66-E-xx**

New expiration date: 15 January 2019

Editorial changes

SRM 2735 Nitric Oxide in Nitrogen (Nominal Amount-of-Substance Fraction 800 $\mu\text{mol/mol}$)**Lot # 141-C-XX**

Updated certified values of nitric oxide and total oxides of nitrogen.

New expiration date: 09 January 2019

Editorial changes

SRM 2900 Ethanol-Water Solution (Nominal Mass Fraction 95.6 %)

New expiration date: 31 December 2030

Editorial changes

SRM 2960 Respirable Cristobalite on Filter Media (Nominal Mass of Cristobalite, 5 μg – 250 μg)

New expiration date: 30 June 2022

Editorial changes

RM 8096 CMOS MEMS 5-in-1 Test Chip

Editorial changes

RM 8097 MEMS 5-in-1 Test Chip Lot #95

Editorial changes

RM 8546 NBS28 (Silicon and Oxygen Isotopes in Silica Sand)

Updated RM to be valid indefinitely.

Editorial changes

NIST SRM 2015 Exhibit Schedule

IFT – Food Expo

July 12-14, 2015

Booth #2180

McCormick Place South

Chicago, IL

AACC Clinical Lab Expo

July 26-30, 2015

Booth #4227

Atlanta Convention Center

Atlanta, GA

American Chemical Society Fall Meeting

August 16-20, 2015

Booth #543

Boston Convention Center

Boston, MA

AOAC INTERNATIONAL

September 27-30, 2015

Booth #512

Westin Bonaventure Hotel

Los Angeles, CA

MS&T 15 Materials Science & Technology Conference and Exhibition

October 4-8, 2015

Booth #537-636

Greater Columbus Convention Center

Columbus, OH

BERM 2015

October 11-15, 2015

Gaylord National Convention Center

National Harbor, MD

AVS 62nd International Symposium & Exhibition

October 18-23, 2015

San Jose Convention Center

San Jose, CA

Material Research Society Fall Meeting

November 29 – December 4, 2015

Hynes Convention Center

Boston, MA



NIST Measurement Services Websites of Interest

Standard Reference Materials



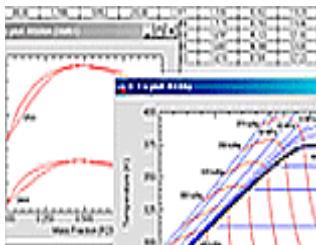
Standard Reference Materials

<http://www.nist.gov/srm>

Historical Archived Certificates/Reports of Investigation

<https://www-s.nist.gov/srmors/certArchive.cfm>

Standard Reference Data



NIST Scientific and Technical Databases

<http://www.nist.gov/srd>

NIST Data Gateway

<http://srdata.nist.gov/gateway>

Calibrations



Calibrations Services

<http://www.nist.gov/calibrations>

ORDER NIST SRMs ONLINE

You can order NIST SRMs through our online request system, which is continually updated. This system is efficient, user-friendly, and secure. Our improved search function finds keywords on SRM detail pages as well as words in titles. **PLEASE NOTE:** Purchase orders and credit cards may be used when ordering an SRM online. Also note that we are placing many historical archive certificates online for your convenience.

<https://www-s.nist.gov/srmors>

Please Register Your SRM Online!

Registering will ensure that you will be notified of technical updates or developments.

http://www.nist.gov/srm_reg

NIST SRM Special Publication Series

Publications in the NIST SRM Special Publication Series (SP 260-xxx) are posted on our web site.

Check out SP 260-181

The ABCs of Using Standard Reference Materials
in the Analysis of Foods and Dietary Supplements: A Practical Guide
and other publications about NIST SRMs at
<http://www.nist.gov/srm/publications.cfm>

If you would like to receive a copy of the SRM Spotlight via email when it is released,
visit our web site <http://www.nist.gov/srm>
and click on “Sign Up for the SRM Spotlight”

SRM Spotlight

March 2015

[Previous Issues](#)

[Sign Up for the SRM Spotlight](#)

NIST Related Links

[NIST Scientific and Technical Databases](#)

SRM/RM Number:

- [SRM Frequently Asked Questions](#)
- [Rate our Products and Services](#)
- [SRM MOBILE - Access our website on your mobile devices!](#)

SRMs by Technical Category: [click here](#)

[Contact us](#)

Please take the time to rate our products and services:

http://www.nist.gov/srm_reg

Access our website on your mobile devices

<https://www-s.nist.gov/m-srmors>

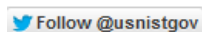
Please visit the NIST Facebook page

<http://www.facebook.com/usnistgov>



Follow NIST on Twitter

<http://twitter.com/usnistgov>



Visit us on YouTube

<http://www.youtube.com/usnistgov>



We appreciate your feedback!