Intergovernmental Oceanographic Commission

Manuals and Guides 21

STANDARD AND REFERENCE MATERIALS FOR MARINE SCIENCE

U.S. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

INTERNATIONAL ATOMIC ENERGY AGENCY

UNITED NATIONS ENVIRONMENT PROGRAMME

1990 Unesco

Intergovernmental
Oceanographic
Commission

Manuals and Guides

21

STANDARD AND REFERENCE MATERIALS FOR MARINE SCIENCE

1990 Unesco

Information on new or modified reference materials should be addressed to Dr. A. Cantillo at the following address:

National Ocean Service
National Oceanic and Atmospheric Administration
US Department of Commerce
6001 Executive Blvd., Room 323
Rockville, MD 20852
USA

NOTICE

This report has been reviewed by the National Ocean Service of the National Oceanic and Atmospheric Administration (NOAA) and approved for publication. Such approval does not signify that the contents of this report necessarily represent the official position of NOAA or of the Government of the United States, nor does mention of trade names or commercial products constitute endorsement or recommendation for their use.

INTRODUCTION

The present document is the reprint of the second edition of the Catalogue on Standards and Reference Materials for Marine Science, published by the National Oceanic and Atmospheric Administration (US-NOAA) in 1989, following a recommendation by the First Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials (GESREM) (Paris, 9-12 February 1987).

At the Second Session of GESREM (Halifax, Nova Scotia, Canada, 22-25 January 1990) the sponsoring Agencies of the Group (IOC, IAEA and UNEP) offered to reprint the Catalogue's Second Edition in IOC's Manuals and Guides Series.

This reprint is expected to meet the growing demand for the catalogue by laboratories involved in regional marine pollution monitoring programmes and other international or national marine geoscience or environmental programmes. The wide dissemination of the catalogue should contribute to the easier access to and proper use of standards and reference materials in marine science.

The catalogue lists more than 900 reference materials from thirteen producers; it provides information on sources, description, use, availability and analyte concentrations.

A more complete description of the catalogue is given in the Abstract by Dr. A. Cantillo of NOAA, who has compiled the Second Edition and whose effort in this respect is acknowledged and appreciated by the co-sponsors of GESREM.

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TEXT

Standard and Reference Materials for Marine Science

Adriana Y. Cantillo*

Abstract

This is the second edition of the catalog of reference materials suited for use in marine science, originally compiled in 1986 for NOAA, IOC and UNEP. The catalog lists more than 900 reference materials from thirteen producers and contains information about their proper use, sources, availability, and analyte concentrations. Indices are included for elements, isotopes and organic compounds, as are cross references to CAS registry numbers, and alternate names and chemical structures of organic compounds.

Introduction

The Thirteenth Session of the Assembly of the Intergovernmental Oceanographic Commission (IOC), which met 12-28 March 1985, recognized that the availability and adequacy of standards and certified reference materials are key components in the conduct of intercalibration exercises, regional contaminant assessments, and marine chemistry research in general. The Assembly instructed the Working Committee for the Global Investigation of Pollution in the Marine Environment (GIPME), through the IOC/UNEP (IOC/United Nations Environment Program Group of Experts on Methods, Standards, and Intercalibration (GEMSI) to conduct an in-depth study on the matter.

At the Sixth Session of GEMSI, in November 1985, an Ad Hoc Group on the Coordination of International Activities on the Preparation and Distribution of Reference Materials for Marine Chemistry was constituted. The first meeting of the Ad Hoc Group took place in Geneva at the UNEP- Oceans and Coastal Areas Programme Activity Centre, 3-4 June 1985. It was decided at that time to convene a meeting with representatives from a number of national and international agencies and institutions involved in the production of reference materials. This meeting took place in Washington, D.C., 28-30 October 1985. One of the recommendations arising from this meeting was the preparation and maintenance of a publication that assembles and updates all information available on reference materials for use in marine chemistry and marine pollution research and monitoring (IOC, 1985). In response to this recommendation, the Ocean Assessments Division of the National Oceanic and Atmospheric Administration (NOAA) undertook the project. This was gratefully accepted by IOC and UNEP, the co-sponsors of GEMSI. The Ad Hoc Group that met in Washington, D.C., subsequently was established at the IOC/UNEP Group of Experts on Standards and References Materials (GESREM). At its

* Home address: 6791 SW 2 St., Miami, FL 33144, USA.

first formal meeting (Paris, July 1987), GESREM noted the great value of the catalog and recommended that NOAA periodically update it.

This document is the second edition of the compendium of information published in 1986, on various types of reference materials. Included are reference materials of marine and/or estuarine origin, such as the marine mud (MAG-1) prepared by the US Geological Survey (USGS) and the seawater (NASS-2) prepared by the National Research Council of Canada (NRCC); materials used in special situations such as the sewage sludge reference materials (CRM 144, CRM 145 and CRM 146) prepared by the Community Bureau of Reference (BCR); "classic" reference materials such as the bovine liver (SRM 1577a) prepared by the National Institute of Standards and Technology (NIST); and instrument performance materials such as the NIST series of aqueous elemental solutions. The instrument performance materials are of special interest since they span a variety of analytical techniques from scanning electron microscopy to spectrophotometry. Ashes, gases and physical properties reference materials have been added to this edition. Also, important additions have been made in the original categories, such as the spectrometric standard solutions and gas mixtures from NIST, and new marine-derived materials from NRCC. Some materials listed in the previous edition are no longer available. Table 1 lists the reference materials included in the catalog that are of strictly marine or estuarine origin.

The second edition was prepared with editorial and production assistance from the NOAA National Ocean Service, Office of Oceanography and Marine Assessment. Additional support was provided by the IOC and the US National Science Foundation.

Reference Materials: Sources, Types, Use, Availability

Sources

Analytisk Sporelement Komité
Stokkabrautene 20A
N-4000 Stavanger
NORWAY

In 1968, Dr. O. H. J. Christie of the Analytisk Sporelement Komité organized an intercalibration exercise using three geological samples. Twenty-two chemical analysts from the Nordic countries participated in the exercise and the samples used are currently available through Referensmaterial AB.* Also available from Referensmaterial AB are other reference materials including alloys, glasses, ceramics and fuels. Referensmaterial AB maintains a database containing descriptions of more than 5,000 reference materials produced worldwide.

* Referensmaterial AB, Lobeliav. 6, S-523 00, Ulrichehamn, SWEDEN.

Table 1. Reference materials of marine origin

Material	Analyte type	Source	Matrix
OILS			
CRM 349	Organic compounds	BCR	PCBs in cod liver oil
CRM 350	Organic compounds	BCR	PCBs in mackerel oil
ROCKS			
Nod-A-1	Elements	USGS	Manganese nodule
Nod-P-1	Elements	USGS	Manganese nodule
SEDIMENTS			
BCSS-1	Elements	NRCC	Marine sediment
CS-1	Organic compounds	NRCC	Polychlorinated buphenyls in coastal sediments
HS-1	Organic compounds	NRCC	Polychlorinated buphenyls in coastal sediments
HS-2	Organic compounds	NRCC	Polychlorinated buphenyls in coastal sediments
HS-3	Organic compounds	NRCC	Polycyclic aromatic hydrocarbons in marine sediments
HS-4	Organic compounds	NRCC	Polycyclic aromatic hydrocarbons in marine sediments
HS-5	Organic compounds	NRCC	Polycyclic aromatic hydrocarbons in marine sediments
HS-6	Organic compounds	NRCC	Polycyclic aromatic hydrocarbons in marine sediments
MAG-1	Elements	USGS	Marine sediment
MESS-1	Elements	NRCC	Marine sediment
PACS-1	Elements	NRCC	Harbour sediment
SD-A-1	Isotopes	IAEA	Deep sea sediment
SD-M-1/OC	Organic compounds	IAEA	Marine sediment
SD-N-2	Isotopes	IAEA	Marine sediment
SES-1	Organic compounds	NRCC	Polycyclic aromatic hydrocarbons in marine sediments
SRM-1646	Elements	NIST	Estuarine sediment
TISSUES			
AG-B-1	Isotopes	IAEA	Marine alga
CRM 279	Elements	BCR	Sea lettuce
DOLT-1	Elements	NRCC	Dogfish liver
DORM-1	Elements	NRCC	Dogfish muscle
LUTS-1	Elements	NRCC	Non-defatted lobster hepatopancreas
MA-A-1/OC	Organic compounds	IAEA	Copepod homogenate
MA-A-1/TM	Elements	IAEA	Copepod homogenate
MA-A-2/TM	Elements	IAEA	Fish flesh homogenate

MA-A-3/OC	Elements	IAEA	Shrimp homogenate
MA-B-3/OC	Organic compounds	IAEA	Fish
MA-B-3/RN	Isotopes	IAEA	Fish
MA-B-3/TM	Elements	IAEA	Fish
MA-M-2/OC	Organic compounds	IAEA	Mussel tissue
RM-50	Elements, isotopes, organic compounds	NIST	Albacore tuna
SP-M-1/OC	Organic compounds	IAEA	Sea plant
SRM-1566	Elements	NIST	Oystor tissue
NIES No. 6	Elements	NIES	Mussel
NIES No. 9	Elements	NIES	Sargasso
NIES No. 11	Elements	NIES	
TORT-1	Elements	NRCC	Lobster hepatopancreas

WATERS

10L series	Other	OSI	Standard seawater for conductivity measurements
30L series	Other	OSI	Standard seawater for conductivity measurements
CASS-2	Elements	NRCC	Nearshore seawater
CSK-NO2	Other	SAGAMI	Nitrite
CSK-NO3	Other	SAGAMI	Nitrate
CSK-PO4	Other	SAGAMI	Phosphate
CSK-SiO4	Other	SAGAMI	Silicate
GP S1	Other	OSI	Standard seawater for conductivity measurements
NASS-2	Elements	NRCC	Open ocean seawater
P series	Other	OSI	Standard seawater for conductivity measurements
SLEW-1	Elements	NRCC	Estuarine water
V-SMOW	Isotopes	IAEA	Ocean water

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

An objective of the Community Bureau of Reference (BCR), a department of the Commission of the European Communities, is the general improvement of the quality of measurements and of the consistency of the results of these measurements throughout the Community (Community Bureau of Reference, 1985). The certified values of BCR reference materials are based on the results of measurements by expert laboratories of the member countries using different methods. The certified value is the mean of all the acceptable results. BCR also produces various types of reference materials including ores, fertilizers, and soils. The series of polynuclear aromatic hydrocarbons, sewage sludges, and particle size reference materials are described in this catalog.

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna, AUSTRIA

The International Atomic Energy Agency (IAEA) has established the Analytical Quality Control Service Program to enable laboratories engaged in the analysis of nuclear materials, radionuclides, and trace elements to check the quality of their work and maintain high standards of analytical performance. Elemental, organic and radioisotope concentrations are available for IAEA reference materials. Values are based on data acquired during intercalibration exercises by various laboratories. These exercises are accessible to all laboratories and are free of charge. As of this writing (Summer 1989), the IAEA exercises currently underway are SD-M-2/TM, Mediterranean deep sea sediments analyzed for trace metals; SD-M-2/OC, Mediterranean deep sea sediments analyzed for chlorinated hydrocarbons; IAEA 350, Mediterranean tuna tissue homogenate analyzed for trace metals; and IAEA 351, Mediterranean tuna tissue homogenate analyzed for chlorinated hydrocarbons and organomercury. For more information, contact Dr. L. Mee at IAEA Monaco $^{\Delta}$.

Instituto de Pesquisas Tecnológicas
Agrupamento de Materiais de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP- BRAZIL

The Instituto de Pesquisas Tecnológicas (IPT) is a non-profit corporation established in 1899 and owned by the São Paulo State Government. IPT areas of expertise include engineering, ship and ocean research, applied geology abd chemistry. The Agrupamento de Materiais de Referência (Reference Materials Group) makes available many certified reference materials including ores, steels, refractories and

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$^{\Delta}$ IAEA, International Laboratory of Marine Radioactivity, 2 Av. Prince Hereditaire Albert, MC 98000, Monaco.

minerals analyzed for major and trace elements. Of these, the clay and limestone reference materials are included in this catalog. All analyses are performed by IPT scientists.

Laboratory of the Government Chemist
Office of Reference Materials
Queen's Road
Teddington, Middlesex TW 11 OLY
UNITED KINGDOM

The Office of Reference Materials of the Laboratory of the Government Chemist (LGC) markets a variety of reference materials produced by LGC and operates REMAS (Reference Materials Advisory Service). LGC makes available pesticide samples of certified purity for use in the analysis of technical grade pesticides and formulations, and residue analysis. REMAS is an LGC service providing information on specifications, applications and availability of LGC reference materials as well as those produced in various countries of Europe and America. As part of this service, LGC makes use of the COMAR reference materials database developed by the Laboratoire National d'Essais in Paris. COMAR contains information on more than 4300 reference materials.

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

NIST, formerly NBS (National Bureau of Standards), has distributed reference materials for the last 80 years and now provides 50 broad categories of materials ranging from engineering mechanics to cement. The reference materials produced by NIST have certified values determined by at least two independent analytical methods or by one definitive method. All analyses are performed by NIST scientists. NIST also offers a variety of calibration services for such devices as thermometers (Simmons, 1989). Please contact NIST for further information.

National Institute for Environmental Studies
Yatabe-machi
Tsukuba, Ibaraki, 305
JAPAN

The National Institute for Environmental Studies (NIES) of Japan has produced a variety of reference materials certified for elemental composition over the past several years (Okamoto and Fuwa, 1985). Certification of reference materials is based on collaborative studies performed by 20-30 qualified participating laboratories. The resulting analytical data are subjected to statistical treatment, and certified values are provided for elements determined by at least three independent analytical techniques. NIES is currently conducting the certification process for NIES No. 9, sargasso. Please contact Dr. K. Okamoto at the address above for further information.

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, Ontario K1A OR9
CANADA

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Atlantic Research Laboratory
1411 Oxford Street
Halifax, Nova Scotia B3H 3Z1
CANADA

An important aspect of the National Research Council of Canada (NRCC) Marine Analytical Chemistry Standards Program (MACSP) is the development, production, and distribution of reference materials to support the analysis of marine materials. NRCC reference materials, like the NIST SRMs, have certified values determined by at least two independent analytical methods. All analyses are performed by NRCC scientists. NRCC currently offers the only natural water reference materials with certified trace metal content. The four available materials cover river (SLRS-1), estuarine (SLEW-1), coastal (CASS-2) and open ocean (NASS-2) conditions. The certified values for five trace elements of these four water CRMs are shown in Figure 1. Although these waters were collected at different times, the element concentration gradients follow the typical patterns associated with salinty gradients.

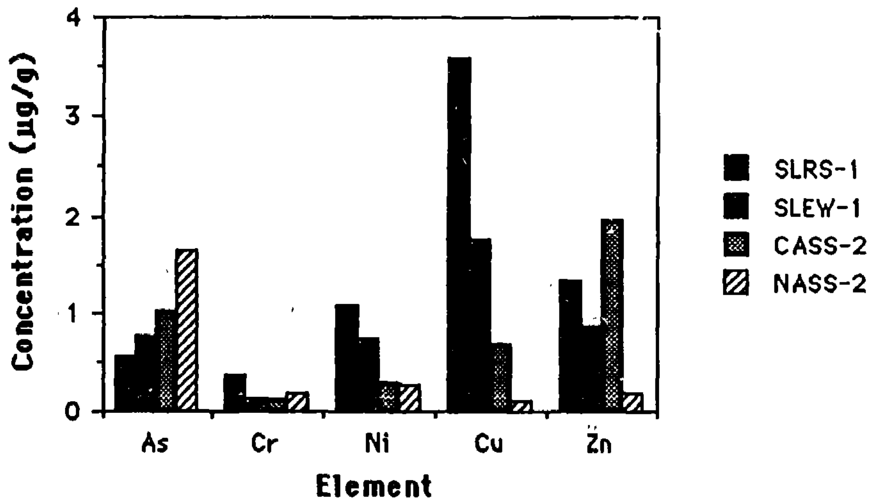

Figure 1. Certified concentrations of As, Cr, Ni, Cu and Zn in NRCC SLRS-1, SLEW-1, CASS-2 and NASS-2.

Ocean Scientific International Ltd.
Brook Road
Wormley, Godalming
Surrey GU8 5UB
UNITED KINGDOM

The International Association for Physical Sciences of the Ocean (IAPSO) has authorized the Ocean Scientific International Ltd. (OSI) to assume responsibility for the production of the Standard Seawater Service formerly provided by the Institute of Oceanographic Sciences (IOS) at Wormley. Ocean Scientific International Ltd. is on the site of IOS and continues to employ former IOS Standard Seawater Service staff. The calibrated standards produced by this organization are used worldwide for calibration of salinity determination instrumentation. The production of standard seawater operated from Copenhagen until 1975 when this service was assumed by the ISO at the request of IAPSO.

Sagami Chemical Research Center
Nishi-Ohnuma 4-4-1
Sagamihara-shi 229
JAPAN

The Sagami Chemical Research Center of Japan prepared standard solutions of nutrient elements in both saline and fresh water and potassium iodate solutions for dissolved oxygen analysis for use in the Cooperative Study of the Kuroshio and Adjacent Regions Program (CSK) and other international oceanographic programs. These reference materials are available through Wako Chemicals worldwide.◊ A range of nutrient concentrations is available.

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
Republic of South Africa

The South Africa Bureau of Standards (SABS) makes available various certified reference materials of geological origin. These include igneous, sedimentary and metamorphic rocks, minerals, ores, semi-processed ores, coals and uranium-containing materials.

US Environmental Protection Agency
Quality Assurance Branch
EMSL-Cincinnati
Cincinnati, OH 45268

◊ Wako Chamicals USA, 1600 Bellwood Rd., Richmond, VA 23237, USA; Wako Chemicals GmbH, Nissanstr. 2, 4040 Neuss 1. WEST GERMANY; Wako Pure Chemical Industries Ltd., 1-2, Doshomachi 3-Chome, Chuo-Ku, Osaka, JAPAN.

USA

The Environmental Monitoring and Support Laboratory in Cincinnati, Ohio, has the responsibility to provide quality assurance support materials to the US Environmental Protection Agency (EPA), its contractors/grantees, and state and local laboratories involved in water and wastewater regulations. The materials are prepared as quality control samples and calibration standards for use in supporting within-laboratory quality assurance programs. EPA also makes available the almost 300 chemicals that form the Repository of Toxic and Hazardous Materials.

US Geological Survey
Branch of Geochemistry
12201 Sunrise Valley Drive
Reston, VA 22092
USA

The US Geological Survey (USGS) has prepared a series of reference materials of geologic origin for inorganic analyses. These materials are composed of powdered rocks collected from various locations in the USA. Detailed mineralogical descriptions are available for these materials. No certified values are available for the USGS standard rocks as in the case of NIST or NRCC materials. "Accepted values" for these rocks are based on the results of various analysts and have been compiled in several publications.

Types

The reference materials are listed in this catalog by type: ashes (including air particulate materials), gases, instrument performance materials (including calibration standards and single element/compound solutions), oils, physical properties (including color and size reference materials), rocks, sediments, sludges, tissues and waters (natural and simulated). Table 2 lists, by type, all the materials described in the catalog. Many other RMs, including a wide variety of alloys, ores and minerals, are available from the producers described in this catalog. These may be useful to the marine scientist in specialized studies. Please contact the producing organizations for complete listings.

Source, description and preparation, analytes and values, cost, references, and comments are given for each reference material. Elements are listed in order of atomic number. Organic compounds are listed in alphabetical order. Confidence intervals listed are generally at the 95% significance level and are obtained from the producers' literature. The distribution by type, analyte, and producer of the reference materials described in this catalog are listed in Tables 3, 4 and 5.

Reference material users should use the analyte values listed by the producing organizations. These organizations can, at times, change accepted values or issue new ones as appropriate. The values listed in this catalog are to be used only as a reference.

Commonly used acronyms are listed in Appendix 1. Registry numbers and alternate names of elements and organic compounds in the catalog are listed in Appendix 2 and 3, and selected structures are shown in Appendix 4 .

Table 2. Reference materials listed by type

ASHES

CRM 038	Coal fly ash
CRM 176	City waste incineration ash
NIES No. 8	Vehicle eshaust particulates
SRM 1633a	Trace elements in coal fly ash
SRM 1648	Urban particulate matter
SRM 1649	Urban dust/organics
SRM 1650	Diesel particulate matter
SRM 2689	Coal fly ash
SRM 2690	Coal fly ash
SRM 2691	Coal fly ash

GASES

CRM 313	Carbon monoxide in nitrogen
CRM 314	Carbon monoxide in nitrogen
CRM 315	Carbon monoxide in nitrogen
CRM 316	Carbon monoxide in nitrogen
CRM 317	Nitrous oxide in nitrogen
CRM 366	Sulfur dioxide in air
CRM 367	Sulfur dioxide in air
SRM 1625	Sulfur dioxide permeation tube
SRM 1626	Sulfur dioxide permeation tube
SRM 1627	Sulfur dioxide permeation tube
SRM 1629a	Nitric oxide permeation tube
SRM 1658a	Methane in air
SRM 1659a	Methane in air
SRM 1660a	Methane and propane in air
SRM 1661a	Sulfur dioxide in nitrogen
SRM 1662a	Sulfur dioxide in nitrogen
SRM 1663a	Sulfur dioxide in nitrogen
SRM 1664a	Sulfur dioxide in nitrogen
SRM 1665b	Propane in air
SRM 1666b	Propane in air
SRM 1667b	Propane in air
SRM 1668b	Propane in air
SRM 1669b	Propane in air
SRM 1670	Carbon diooxide in air
SRM 1671	Carbon diooxide in air
SRM 1672	Carbon diooxide in air
SRM 1674b	Carbon diooxide in nitrogen
SRM 1675b	Carbon diooxide in nitrogen
SRM 1677c	Carbon monoxide in nitrogen
SRM 1678c	Carbon monoxide in nitrogen
SRM 1679c	Carbon monoxide in nitrogen
SRM 1680b	Carbon monoxide in nitrogen
SRM 1681b	Carbon monoxide in nitrogen
SRM 1683b	Nitric oxide in nitrogen
SRM 1684b	Nitric oxide in nitrogen
SRM 1685b	Nitric oxide in nitrogen
SRM 1686b	Nitric oxide in nitrogen
SRM 1687b	Nitric oxide in nitrogen
SRM 1693a	Sulfur dioxide in nitrogen
SRM 1694a	Sulfur dioxide in nitrogen
SRM 1696	Sulfur dioxide in nitrogen
SRM 1804	Volatile toxic organics in nitrogen
SRM 1805	Benzene in nitrogen
SRM 1806	Benzene in nitrogen
SRM 1808	Tetrachloroethylene in nitrogen
SRM 1809	Tetrachloroethylene in nitrogen
SRM 1811	Aromatic organic gases in nitrogen
SRM 1812	Aromatic organic gases in nitrogen
SRM 1813	Aliphatic organic gases in nitrogen
SRM 1814	Aliphatic organic gases in nitrogen
SRM 1911	Benzene permeation tube
SRM 1912	Tetrachloroethylene permeation tube
SRM 2607	Carbon dioxide and nitrous oxide in air
SRM 2608	Carbon dioxide and nitrous oxide in air
SRM 2609	Carbon dioxide and nitrous oxide in air
SRM 2610	Carbon dioxide and nitrous oxide in air
SRM 2612a	Carbon monoxide in air

SRM 2613a	Carbon monoxide in air
SRM 2614a	Carbon monoxide in air
SRM 2619a	Carbon dioxide in nitrogen
SRM 2620a	Carbon dioxide in nitrogen
SRM 2621a	Carbon dioxide in nitrogen
SRM 2622a	Carbon dioxide in nitrogen
SRM 2623a	Carbon dioxide in nitrogen
SRM 2624a	Carbon dioxide in nitrogen
SRM 2625a	Carbon dioxide in nitrogen
SRM 2626a	Carbon dioxide in nitrogen
SRM 2627a	Nitric oxide in nitrogen
SRM 2628a	Nitric oxide in nitrogen
SRM 2629a	Nitric oxide in nitrogen
SRM 2630	Nitric oxide in nitrogen
SRM 2631	Nitric oxide in nitrogen
SRM 2633	Carbon dioxide in nitrogen
SRM 2634	Carbon dioxide in nitrogen
SRM 2635a	Carbon monoxide in nitrogen
SRM 2636a	Carbon monoxide in nitrogen
SRM 2637a	Carbon monoxide in nitrogen
SRM 2638a	Carbon monoxide in nitrogen
SRM 2639a	Carbon monoxide in nitrogen
SRM 2640	Carbon monoxide in nitrogen
SRM 2641	Carbon monoxide in nitrogen
SRM 2642a	Carbon monoxide in nitrogen
SRM 2645a	Propane in nitrogen
SRM 2646a	Propane in nitrogen
SRM 2647a	Propane in nitrogen
SRM 2648a	Propane in nitrogen
SRM 2649	Propane in nitrogen
SRM 2650	Propane in nitrogen
SRM 2651	Propane and oxygen in nitrogen
SRM 2652	Propane and oxygen in nitrogen
SRM 2654	Nitrogen dioxide in air
SRM 2655	Nitrogen dioxide in air
SRM 2656	Nitrogen dioxide in air
SRM 2657a	Oxygen in nitrogen
SRM 2658a	Oxygen in nitrogen
SRM 2659a	Oxygen in nitrogen

INSTRUMENTAL PERFORMANCE

CLB-1	Individual chlorinated biphenyls (PCBs) in isooctane
CRM 034	Organic compounds for elemental analysis
CRM 035	Organic compounds for elemental analysis
CRM 036	Organic compounds for elemental analysis
CRM 046	Benzo[b]chrysene
CRM 047	Benzo[b]fluoranthene
CRM 048	Benzo[k]fluoranthene
CRM 049	Benzo[j]fluoranthene
CRM 050	Benzo[e]pyrene
CRM 051R	Benzo[a]pyrene
CRM 052	Benzo[ghi]perylene
CRM 053	Indeno[1,2,3-cd]pyrene
CRM 071	Organic compounds for elemental analysis
CRM 072	Organic compounds for elemental analysis
CRM 073	Organic compounds for elemental analysis
CRM 077	1-Methylchrysene
CRM 078	2-Methylchrysene
CRM 079	3-Methylchrysene
CRM 080	4-Methylchrysene
CRM 081R	5-Methylchrysene
CRM 082	6-Methylchrysene
CRM 091	Anthanthrene
CRM 092	10-Azabenzo[a]pyrene
CRM 093	1-Methylbenz[a]=anthracene
CRM 094	Dibenz[a,c]anthracene
CRM 095	Dibenz[a,j]anthracene
CRM 096	Dibenzo[a,l]pyrene
CRM 097	Benzo[a]fluoranthene
CRM 127	Organic compounds for elemental analysis
CRM 133	Dibenzo[a,e]pyrene
CRM 134	Benzo[c]phenanthrene
CRM 135	Benzo[b]naphtho[2,1-d]=thiophene
CRM 136	Benzo[b]naphtho[2,3-d]=thiophene
CRM 137	Benzo[b]naphtho[1,2-d]=thiophene
CRM 138	Dibenz[a,h]anthracene
CRM 139	Benzo[ghi]fluoranthene
CRM 140	Benzo[c]chrysene
CRM 152	Dibenz[a,l]acridine
CRM 153	Dibenz[a,h]acridine

CRM 154	Dibenz[a,j]acridine
CRM 155	Dibenz[a,c]acridine
CRM 156	Dibenz[c,h]acridine
CRM 157	Benz[a]acridine
CRM 158	Benz[c]acridine
CRM 159	Dibenzo[a,h]pyrene
CRM 160	Fluoranthene
CRM 168	1-Nitropyrene
CRM 177	Pyrene
CRM 183	Organic compounds for elemental analysis
CRM 265	Dibenzo[a,e]fluoranthene
CRM 266	7H-Dibenzo[c,g]=carbazole
CRM 267	Indeno[1,2,3-cd]fluo=ranthene
CRM 268	Dibenzo[a,i]pyrene
CRM 269	Chrysene
CRM 270	Triphenylene
CRM 271	Benz[a]anthracene
CRM 272	Coronene
CRM 289	2,4'-Dichlorobiphenyl
CRM 290	2,3,3'-Trichlorobiphenyl
CRM 291	2,4,4'-Trichlorobiphenyl
CRM 292	3,3',4-Trichlorobiphenyl
CRM 293	2,2',5,5',-Tetrachloro=biphenyl
CRM 294	2,2',4,5,5',-Penta=chlorobiphenyl
CRM 295	2,3',4,4',5-Penta=chlorobiphenyl
CRM 296	2,2',3,4,4',5-Hexa=chlorobiphenyl
CRM 297	2,2',4,4',5,5'-Hexa=chlorobiphenyl
CRM 298	2,2',3,4,4',5,5'-Hepta=chlorobiphenyl
CRM 305	1-Nitropyrene
CRM 306	1-Nitronaphthalene
CRM 307	2-Nitronaphthalene
CRM 308	9-Nitroanthracene
CRM 309	6-Nitrochrysene
CRM 310	3-Nitrofluoranthene
CRM 311	6-Nitrobenzo[a]pyrene
CRM 312	2-Nitro-7-methoxy=naphtho[2,1-b]furan
CRM 337	Dibenzo[b,d]furan
CRM 338	4H-Cyclopenta[def]=phenanthrene-4-one
CRM 339	Benzo[c,d]pyren-6-one
CRM 340	Benzo[b]naphto[1,2-=d]furan
CRM 341	Benzo[b]naphto[2,1-=d]furan
CRM 342	Benzo[a]fluorenone
CRM 343	3-Hydroxybenzo[a]=pyrene
CRM 362	1,2,3,4-TCDD
CRM 363	2,3,7,8-TCDD
CRM 364	1,2,3,7,8-PCDD
CRM 370	1,2,3,4,7,8-HCDD
CSK - KIO3	Potassium iodate
DACS-1	Domoic acid
E001	Acenaphthene
E002	Acrolein
E003	Acrylonitrile
E004	Benzene
E005	Benzidine
E006	Chlorobenzene
E007	1,2,4-Trichlorobenzene
E008	Hexachlorobenzene
E009	1,2-Dichloroethane
E010	1,1,1-Trichloroethane
E011	Hexachloroethane
E012	1,1-Dichloroethane
E013	1,1,2-Trichloroethane
E014	1,1,2,2-Tetrachloroethane
E015	Chloroethane
E016	bis(2-Chloroethyl)ether
E017	2-Chloroethyl vinyl ether
E018	2-Chloronaphthalene
E019	2,4,6-Trichlorophenol
E020	p-Chloro-m-cresol
E021	Chloroform
E022	2-Chlorophenol
E023	1,2-Dichlorobenzene
E025	1,4-Dichlorobenzene
E026	3,3'-Dichlorobenzidine
E027	1,1-Dichloroethylene
E028	trans-1,2-Dichloro=ethylene
E029	2,4-Dichlorophenol
E030	1,2-Dichloropropane
E033	2,4-Dinitrotoluene
E034	2,6-Dinitrotoluene
E036	Ethylbenzene
E037	Fluoranthene
E038	4-Chlorophenyl phenyl ether
E039	4-Bromophenyl phenyl ether
E040	bis(2-Chloroisopropyl) ether
E041	bis(2-Chloroethoxy) methane
E042	Methylene chloride
E043	Methyl chloride
E044	Methyl bromide

E046	Dichlorobromomethane
E047	Fluorotrichloromethane
E050	Hexachlorobutadiene
E051	Hexachlorocyclopentadiene
E052	Isophorone
E053	Naphthalene
E054	Nitrobenzene
E055	2-Nitrophenol
E056	4-Nitrophenol
E057	2,4-Dinitrophenol
E058	4,6-Dinitro-o-cresol
E059	N-Nitrosodimethylamine
E060	N-Nitrosodiphenylamine
E061	N-Nitrosodi-n-propyl= amine
E062	Pentachlorophenol
E063	Phenol
E064	bis(2-Ethyl hexyl) phthalate
E065	Butyl benzyl phthalate
E066	Di-n-butyl phthalate
E067	Di-n-octyl phthalate
E068	Diethyl phthalate
E069	Dimethyl phthalate
E070	Benzo[a]anthracene
E071	Benzo[a]pyrene
E072	Benzo[b]fluoranthene
E073	Benzo[k]fluoranthene
E074	Chrysene
E075	Acenaphthylene
E076	Anthracene
E077	Benzo[ghi]perylene
E078	Fluorene
E079	Phenanthrene
E081	Indeno[1,2,3-c,d]pyrene
E082	Pyrene
E083	Tetrachloroethylene
E084	Toluene
E085	Trichloroethylene
E088	Dieldrin
E089	Chlordane
E091	4,4'-DDE
E092	4,4'-DDD
E093	alpha-Endosulfan
E094	beta-Endosulfan
E095	Endosulfan sulfate
E096	Endrin
E097	Endrin aldehyde
E098	Heptachlor
E099	Heptachlor epoxide
E100	alpha-BHC
E101	beta-BHC
E102	gamma-BHC
E103	delta-BHC
E104	Aroclor 1242
E107	Aroclor 1232
E108	Aroclor 1248
E111	Toxaphene
E124	4,4'-DDT
E125	Aroclor 1016
E126	Aroclor 1221
E129	Aroclor 1260
E130	Aroclor 1262
E131	Aroclor 1268
E132	Aroclor 1242
E135	Aroclor 1254
E136	Bromochloromethane
E149	2,4-Dichlorotoluene
E150	2-Chlorotoluene
E151	3-Chlorotoluene
E152	4-Chlorotoluene
E153	4-Chlorobenzotrifluoride
E156	Pentachloronitrobenzene
E168	alpha,alpha,2,6-Tetra= chlorotoluene
E169	Benzyl chloride
E170	2,3-Dichloro-1-propene
E171	1,2-Dibromoethane
E173	cis-1,2-Dichloroethylene
E175	1,2,3-Trichlorobenzene
E176	1,3,5-Trichlorobenzene
E177	1,2,4,5-Tetrachloro= benzene
E179	2,4,5-Trichlorophenol
E180	2,4,6-Trichloroaniline
E182	3-Chlorophenol
E183	4-Chlorophenol
E188	Phenanthrene-d10
E189	Phenol-d5
E190	2,4-Dimethylphenol-= 3,5,6-d3
E191	Pentachlorophenol-13C6
E192	Dimethyl phthalate-d6
E193	2-Fluorophenol
E194	2-Fluorobiphenyl
E195	1-Fluoronaphthalene
E196	1,4-Dichlorobutane-d8
E197	2-Bromo-1-chloro= propane-d6
E198	Bromochloromethane-d2
E199	Benzo[ghi]perylene-= 13C12
E200	Chlorodibromomethane
E201	o-Xylene
E202	m-Xylene
E203	p-Xylene
E212	Bromoform
E214	1,3-Dichlorobenzene

E218	cis- and trans- 1,3-Di= chloropropylene
E219	Mirex
E220	Aldrin
E222	2,3,5-Trichlorophenol
E224	2,4-Dimethylphenol
E225	1,2,3,4-Tetrachloro= benzene
E231	Dibenzo[a,h]anthracene
E232	Fluorobenzene
E233	4-Bromofluorobenzene
E234	4,4-Dibromooctafluoro= biphenyl
E237	n-Undecane
E238	n-Dodecane
E239	n-Tridecane
E240	n-Tetradecane
E241	n-Pentadecane
E242	n-Heptadecane
E244	n-Nonadecane
E250	o-Cresol
E251	m-Cresol
E252	p-Cresol
E255	Dibutyl ether
E257	Styrene
E258	Epichlorohydrin
E260	Pentachlorobenzene
E261	Dibenzofuran
E262	Diphenyl ether
E263	Diphenylamine
E270	Acrylamine
E271	Pyridine
E275	p-Phenylenediamine
E282	Diisodecyl phthalate
E284	Acetone
E285	Diethyl ether
E286	1,2-Epoxybutane
E292	1-Acetyl-2-thiourea
E293	Phthalic anhydride
E294	Thiourea
E295	Phenacetin
E297	4-Aminopyridine
E298	N-Nitrosopyrrolidine
E299	2-Fluoroacetamide
E300	Pentachloroethane
E302	2,6-Dichlorophenol
E305	4-Chloroaniline
E306	Urethane
E311	Methyl ethyl ketone
E322	4,4'-Methylene bis (o-= chloroaniline)
E323	Hexachlorophene
E324	o-Nitroaniline
E325	m-Nitroaniline
E327	Vinyl acetate
E329	Ethylene thiourea
E330	2,4-Dichlorophenoxy= acetic acid
E334	N-Nitrosodiethylamine
E335	1,1,1,2-Tetrachloro= ethane
E337	Malononitrile
E338	Propionitrile
E342	p-Nitroaniline
E344	5-Nitro-o-toluidine
E345	Dimethoate
E346	Dichlorodifluoromethane
E349	4-Methyl-2-pentanone
E358	Ethylenediamine
E360	Carbon tetrachloride
E363	Carbon disulfide
E364	Hexachloropropylene
E366	Safrole
E368	1,2,3-Trichloropropane
E369	Saccharin
E370	2,4,5-T
E375	3-Chloropropionitrile
E378	Methyl thiouracil
E379	Thiram
E403	1,3-Propane sultone
E406	Bromobenzene
E411	Acetophenone
E419	1-Naphthylamine
E429	p-Dimethylaminoazo= benzene
E431	Methyl methanesulfonate
E439	Methyl methacrylate
E455	Dinoseb
E456	Ethyl methanesulfonate
E458	1-Nitrosopiperidine
E470	PCN Halowax 1099
E471	PCN Halowax 1001
E472	PCN Halowax 1000
E473	Acetonitrile
E475	Allyl alcohol
E476	Allyl chloride
E480	p-Dioxane
E485	N-Nitrosomorpholine
E499	Isosafrole
E503	o-Toluidine hydrochloride
E513	Thioacetamide
E519	Nicotine
E524	1,2-Propanediol
E527	1,3-Dinitrobenzene
E536	Vinyl chloride
E540	Diethylstilbestrol
E541	Benzoic acid
E542	Aniline

E543	Propargyl alcohol
E548	N,N-Dimethylformamide
E552	2,4,5-TP
E559	Reserpine
E560	Ethyl parathion
E565	2-Naphthylamine
E566	Chlorambucil
E567	7,12-Dimethylbenz[a]=anthracene
E572	Methyl parathion
E573	Kepone
E574	Chlorobenzilate
E577	1,2:3,4-Diepoxybutane
E615	2,4-Dithiobiuret
E623	Diallate
E654	Disulfoton
E657	1-Propanamine
E659	2-Methyl-1-propanol
E662	3-Nitrophenol
E669	1-Methyl ethyl benzene
E673	Propionic acid
E686	Methacrylonitrile
E687	Ethyl methacrylate
E688	2-Picoline
E700	Resorcinol
E701	Benzonitrile
E713	Picloram
E715	Carbofuran
E776	1,2-Dichlorobenzene-d4
E856	Isodrin
E862	2-Cyclohexyl-4,6-dinitro=phenol
E928	1,3-Dichloro-2-propanol
E932	2,4-Diaminotoluene
E952	p,p'-Methoxychlor
E954	Aldicarb
E974	N-Nitroso-N-methyl ethylamine
E993	1,2-Dibromo-3-chloro=propane
E995	Aldicarb sulfone
E996	Aldicarb sulfoxide
E1036	Endrin ketone
E1089	Alachlor
E1090	Atrazine
E1097	Dibromomethane
E1103	1,3,5-Trimethylbenzene
E1104	sec-Butylbenzene
E1105	n-Butylbenzene
E1106	t-Butylbenzene
E1107	1,2,4-Trimethylbenzene
E1108	4-Isopropyltoluene
E1109	1,3-Dichloropropane
E1112	n-Propylbenzene
E1166	1,1-Dichloro-1-=propylene
E1167	2,2-Dichloropropane
E1179	Chloral hydrate
E1181	1,1,1-Trichloroacetone
E1186	Bromochloroacetonitrile
EPA QC	TM WP I
EPA QC	TM WP II
EPA QC	TM WP III
EPA QC	EP metals
EPA QC	Elements in 5% nitric acid - I
EPA QC	Elements in 5% nitric acid - II
EPA QC	Trace metals in acetic acid
EPA QC	Nutrients in water
EPA QC	PCB congener solutions
EPA QC	n-Alkanes
EPA QC	Chlorinated hydrocarbons
EPA QC	Chlorinated hydrocarbon pesticides - WP I
EPA QC	Chlorinated hydrocarbon pesticides - WP II
EPA QC	Chlorinated hydrocarbon pesticides - WP III
EPA QC	EP pesticides and herbicides
EPA QC	GC/MS acid extractable compounds
EPA QC	GC/MS base extractable compounds - I
EPA QC	GC/MS base extractable compounds - II
EPA QC	GC/MS base extractable compounds - III
EPA QC	GC/MS pesticides - I
EPA QC	GC/MS pesticides - II
EPA QC	Haloethers
EPA QC	Nitroaromatics and iso-phorone
EPA QC	Phenols
EPA QC	Phthalate esters
EPA QC	PCBs (as Aroclors)
EPA QC	Polynuclear aromatics - I
EPA QC	Polynuclear aromatics - II
EPA QC	Herbicides
EPA QC	Chlorinated hydrocarbon pesticides - WS I
EPA QC	Chlorinated hydrocarbon pesticides - WS II
EPA QC	Trihalomethanes
EPA QC	Volatile organic contam-inants - I
EPA QC	Volatile organic contam-inants - II

EPA QC	Volatile organic contaminants - III	P13-15	Mecoprop (butoxyethyl ester)
EPA QC	Volatile organic contaminants - IV	P13-16	MCPA (butoxyethyl ester)
EPA QC	Volatile organic contaminants - V	P13-17	Dichlorprop (2-ethyl=hexyl ester)
EPA QC	Volatile organic contaminants - VI	P14-01	Chlorobromuron
EPA QC	Volatile organic contaminants - VII	P14-02	Chlorotoluron
P11-01	alpha-BHC	P14-03	Diuron
P11-02	beta-BHC	P14-04	Linuron
P11-03	delta-BHC	P14-05	Monuron
P11-04	gamma-BHC	P15-02	Methyl mercury chloride
P11-06	Chlorbenside	P16-01	Anthraquinone
P11-08	Chlordane	P16-02	Asulam
P11-09	o,p'-DDE	P16-03	Atrazine
P11-10	p,p'-DDE	P16-04	Azobenzene
P11-11	o,p'-DDT	P16-05	Bentranil
P11-12	p,p'-DDT	P16-06	Biphenyl
P11-13	Dichlobenil	P16-07	2,2'-Bipyridyl
P11-14	Dichlone	P16-08	4,4'-Bipyridyl
P11-15	p-Dichlorobenzene	P16-09	Bromoxynil
P11-16	Dicloran	P16-10	Bromoxynil octanoate
P11-19	alpha-Endosulfan	P16-11	Carbaryl
P11-20	beta-Endosulfan	P16-12	DEET
P11-21	Endrin	P16-13	Dinobuton
P11-22	Dieldrin	P16-14	Dinoseb
P11-23	Aldrin	P16-15	Dinoterb
P11-25	Quintozene	P16-16	Dinoterb acetate
P11-26	o,p'-TDE	P16-17	Diphenyl sulphone
P11-27	p,p'-TDE	P16-18	Diquat dibromide
P11-29	p,p'-TDE (olefin)	P16-19	DNOC
P11-30	Tecnazene	P16-20	Ioxynil
P11-31	Hexachlorobenzene	P16-21	Ioxynil octanoate
P12-04	Dimethoate	P16-22	Paraquat chloride
P12-05	Malathion	P16-23	Pentachlorophenol
P12-06	Mecarbam	P16-24	2-Phenylphenol
P12-07	Methidathion	P16-25	Piperonyl butoxide
P13-01	4-CPA	P16-26	Pirimicarb
P13-02	2,4-D (acid)	P16-27	Prometryn
P13-03	2,4-D (methyl ester)	P16-28	Propoxur
P13-04	2,4-DB	P16-29	Simazine
P13-05	2,4-Dichlorobenzoic acid	P16-30	Terbutryn
P13-06	Fenoprop	P16-31	Trietazine
P13-07	MCPA (acid)	P16-32	Desmetryn
P13-08	MCPB (acid)	P16-33	Dimethirimol
P13-09	Mecoprop (MCPP)	P16-34	Ethirimol
P13-10	2,4,5-T (acid)	P16-35	Cyanazine
P13-11	2,4,5-T (methyl ester)	P16-36	Bupirimate
P13-12	2,4,6-TBA (acid)	P17-01	cis-Permethrin
P13-13	Dichlorprop	P17-02	trans-Permethrin
P13-14	MCPA (2-ethylhexyl ester)	SRM 141c	Acetanilide
		SRM 142	Anisic acid
		SRM 143c	Cystine
		SRM 148	Nicotinic acid

SRM 185f	Potassium hydrogen phthalate
SRM 186d	Potassium dihydrogen and disodium hydrogen phosphates
SRM 610	Trace elements in glass matrix
SRM 611	Trace elements in glass matrix
SRM 612	Trace elements in glass matrix
SRM 613	Trace elements in glass matrix
SRM 614	Trace elements in glass matrix
SRM 615	Trace elements in glass matrix
SRM 616	Trace elements in glass matrix
SRM 617	Trace elements in glass matrix
SRM 640b	Silicon powder standard for x-ray diffraction
SRM 674a	X-ray powder diffraction intensity set
SRM 675	Standard for X-ray powder diffraction
SRM 930D	Glass filters
SRM 931d	Liquid filters
SRM 935	Potassium dichromate
SRM 936	Quinine sulfate dihydrate
SRM 1543	GC/MS system reference standard
SRM 1583	Chlorinated pesticides in 2,2,4-trimethylpentane
SRM 1584	Priority pollutant phenols in methanol
SRM 1586	Isotopically labeled and unlabeled priority pollutants in methanol
SRM 1587	Nitrated polycyclic aromatic hydrocarbons in methanol
SRM 1614	Dioxin
SRM 1639	Halocarbons for water analysis
SRM 1641b	Mercury in water
SRM 1642b	Mercury in water
SRM 1643b	Trace elements in water
SRM 1644	Generator columns for polynuclear aromatic hydrocarbons
SRM 1647a	Priority pollutant polynuclear aromatic hydrocarbons
SRM 1871	Pb-Si glasses for microanalysis
SRM 1872	Pb-Ge glasses for microanalysis
SRM 1873	Ba-Zn-Si glasses for microanalysis
SRM 1874	Li-Al-B glasses for microanalysis
SRM 1875	Al-Mg-P glasses for microanalysis
SRM 2009a	Dydinium glass filter
SRM 2032	Potassium iodide
SRM 2033	Potassium iodide with attenuator
SRM 2034	Holmium oxide solution wavelength standard
SRM 2069a	SEM performance standard
SRM 2141	Urea
SRM 2142	o-Bromobenzoic acid
SRM 2143	p-Fluorobenzoic acid
SRM 2144	m-Chlorobenzoic acid
SRM 2185	Potassium hydrogen phthalate
SRM 2186	Phosphates
SRM 2191a	Sodium bicarbonate
SRM 2192a	Sodium carbonate
SRM 2201	Sodium chloride
SRM 2202	Potassium chloride
SRM 2203	Potassium fluoride
SRM 3101	Spectrometric soln. - Al
SRM 3102	Spectrometric soln. - Sb
SRM 3103	Spectrometric soln. - As
SRM 3104	Spectrometric soln. - Ba
SRM 3105	Spectrometric soln. - Be
SRM 3106	Spectrometric soln. - Bi
SRM 3107	Spectrometric soln. - B
SRM 3108	Spectrometric soln. - Cd
SRM 3109	Spectrometric soln. - Ca
SRM 3110	Spectrometric soln. - Ce
SRM 3111	Spectrometric soln. - Cs
SRM 3112	Spectrometric soln. - Cr
SRM 3113	Spectrometric soln. - Co
SRM 3114	Spectrometric soln. - Cu
SRM 3115	Spectrometric soln. - Dy
SRM 3116	Spectrometric soln. - Er
SRM 3117	Spectrometric soln. - Eu
SRM 3118	Spectrometric soln. - Gd
SRM 3119	Spectrometric soln. - Ga
SRM 3120	Spectrometric soln. - Ge
SRM 3121	Spectrometric soln. - Au
SRM 3122	Spectrometric soln. - Hf

SRM 3123	Spectrometric soln. - Ho
SRM 3124	Spectrometric soln. - In
SRM 3126	Spectrometric soln. - Fe
SRM 3127	Spectrometric soln. - La
SRM 3128	Spectrometric soln. - Pb
SRM 3129	Spectrometric soln. - Li
SRM 3130	Spectrometric soln. - Lu
SRM 3131	Spectrometric soln. - Mg
SRM 3132	Spectrometric soln. - Mn
SRM 3133	Spectrometric soln. - Hg
SRM 3134	Spectrometric soln. - Mo
SRM 3135	Spectrometric soln. - Nd
SRM 3136	Spectrometric soln. - Ni
SRM 3137	Spectrometric soln. - Nb
SRM 3138	Spectrometric soln. - Pd
SRM 3139	Spectrometric soln. - P
SRM 3140	Spectrometric soln. - Pt
SRM 3141	Spectrometric soln. - K
SRM 3142	Spectrometric soln. - Pr
SRM 3143	Spectrometric soln. - Re
SRM 3145	Spectrometric soln. - Rb
SRM 3147	Spectrometric soln. - Sm
SRM 3148	Spectrometric soln. - Sc
SRM 3149	Spectrometric soln. - Se
SRM 3150	Spectrometric soln. - Si
SRM 3151	Spectrometric soln. - Ag
SRM 3152	Spectrometric soln. - Na
SRM 3153	Spectrometric soln. - Sr
SRM 3154	Spectrometric soln. - S
SRM 3155	Spectrometric soln. - Ta
SRM 3156	Spectrometric soln. - Te
SRM 3157	Spectrometric soln. - Tb
SRM 3158	Spectrometric soln. - Tl
SRM 3159	Spectrometric soln. - Th
SRM 3160	Spectrometric soln. - Tm
SRM 3161	Spectrometric soln. - Sn
SRM 3162	Spectrometric soln. - Tl
SRM 3163	Spectrometric soln. - W
SRM 3165	Spectrometric soln. - V
SRM 3167	Spectrometric soln. - Y
SRM 3168	Spectrometric soln. - Zn
SRM 3169	Spectrometric soln. - Zr
SRM 3171	Multielement spectrometric soln.
SRM 3172	Multielement spectrometric soln.
SRM 3173	Multielement spectrometric soln.
SRM 3174	Multielement spectrometric soln.
SRM 3175	Multielement spectrometric soln.
SRM 3176	Multielement spectrometric soln.
SRM 3181	Anion standard soln. - sulfate
SRM 3182	Anion standard soln. - chloride
SRM 3183	Anion standard soln. - fluoride
SRM 4226B	Radioactivity - Ni-63
SRM 4233B	Radioactivity - Ce-137
SRM 4251B	Radioactivity - Ba-133
SRM 4276C	Radioactivity - Sb-125, Eu-154, Eu-155
SRM 4288	Radioactivity - Tc-99
SRM 4321	Radioactivity - U-238
SRM 4322	Radioactivity - Am-241
SRM 4323	Radioactivity - Pu-238
SRM 4324	Radioactivity - U-232
SRM 4327	Radioactivity - Po-208
SRM 4328	Radioactivity - Th-229
SRM 4329	Radioactivity - Cm-243
SRM 4332B	Radioactivity - Am-243
SRM 4334C	Radioactivity - Pu-242
SRM 4338	Radioactivity - Pu-240
SRM 4361B	Radioactivity - H-3
SRM 4370C	Radioactivity - Eu-152
SRM 4915D	Radioactivity - Co-60
SRM 4919F	Radioactivity - Sr-90
SRM 4926C	Radioactivity - H-3
SRM 4927D	Radioactivity - H-3
SRM 4929D	Radioactivity - Fe-55
SRM 4940C	Radioactivity - Pm-147
SRM 4943	Radioactivity - Cl-36
SRM 4947C	Radioactivity - H-3
SRM 4949B	Radioactivity - I-129

OILS

CRM 349	PCBs in cod liver oil
CRM 350	PCBs in mackerel oil
EPA QC	PCBs in oils
EPA QC	EPA/API standard reference oils
EPA QC	Oil and grease
SRM 1581	Polychlorinated biphenyls in oil
SRM 1582	Petroleum crude oil
SRM 1634b	Trace elements in fuel oil
SRM 8505	Vanadium in crude oil

PHYSICAL PROPERTIES

CRM 066	Quartz powder

CRM 067	Quartz powder
CRM 068	Quartz sand
CRM 069	Quartz powder
CRM 070	Quartz powder
CRM 130	Quartz powder
CRM 131	Quartz powder
CRM 132	Quartz gravel
CRM 165	Latex spheres of certified size
CRM 166	Latex spheres of certified size
CRM 167	Latex spheres of certified size
CRM 169	Alpha alumina
CRM 170	Alpha alumina
CRM 171	Alumina
CRM 172	Quartz
CRM 173	Rutile titania
CRM 175	Tungsten
SRM 475	Linewidth measurement
SRM 476	Linewidth measurement
SRM 484e	Scanning electron microscope magnification standard
SRM 1003a	Glass spheres and beads
SRM 1004	Glass spheres and beads
SRM 1017a	Glass spheres and beads
SRM 1018a	Glass spheres and beads
SRM 1019a	Glass spheres and beads
SRM 1690	Polystyrene spheres
SRM 1691	Polystyrene spheres
SRM 1960	Polystyrene spheres
SRM 1961	Polystyrene spheres
SRM 1965	Polystyrene spheres
SRM 2106	Color
SRM 2135b	Depth profiling

ROCKS

AGV-1	Andesite
ASK-2	Schist
BHVO-1	Basalt
BIR-1	Icelandic basalt
DNC-1	Dolerite
G-2	Granite
IPT 28	Clay
IPT 32	Plastic clay
IPT 35	Calcitic limestone
IPT 42	Clay
IPT 44	Limestone
IPT 48	Dolomitic limestone
Nod-A-1	Manganese nodule
Nod-P-1	Manganese nodule
QLO-1	Quartz latite
RGM-1	Rhyolite
SCo-1	Cody shale
SDC-1	Mica schist
SGR-1	Green River shale
SRM 88b	Dolomitic limestone
SRM 97b	Flint clay
SRM 98b	Plastic clay
SRM 278	Obsidian rock
SRM 688	Basalt rock
STM-1	Nepheline syenite
W-2	Diabase

SEDIMENTS

BCSS-1	Marine sediment
CS-1	Polychlorinated biphenyls in coastal sediment
EPA QC	EPA QC - Sediments
HS-1	Polychlorinated biphenyls in coastal sediment
HS-2	Polychlorinated biphenyls in coastal sediment
HS-3	Polycyclic aromatic hydrocarbons in marine sediments
HS-4	Polycyclic aromatic hydrocarbons in marine sediments
HS-5	Polycyclic aromatic hydrocarbons in marine sediments
HS-6	Polycyclic aromatic hydrocarbons in marine sediments
MAG-1	Marine sediment
MESS-1	Marine sediment
NIES No. 2	Pond sediment
PACS-1	Harbour sediment
SARM 46	Stream sediments
SARM 51	Stream sediments
SARM 52	Stream sediments
SD-A-1	Deep sea sediment
SD-M-1/OC	Marine sediment
SD-N-2	Marine sediment
SES-1	Polycyclic aromatic hydrocarbons in estaurine sediment
SL-1	Lake sediment
SL-2	Lake sediment
SL-3	Lake sediment

SRM 1646	Estuarine sediment

SLUDGES

CRM 144	Sewage sludge
CRM 145	Sewage sludge
CRM 146	Sewage sludge

TISSUES

AG-B-1	Marine alga
CRM 279	Sea lettuce
DOLT-1	Dogfish liver
DORM-1	Dogfish muscle
EPA QC	Fish
LUTS-1	Non-defatted lobster hepatopancreas
MA-A-1/OC	Copepod homogenate
MA-A-1/TM	Copepod homogenate
MA-A-2/TM	Fish flesh homogenate
MA-A-3/OC	Shrimp homogenate
MA-B-3/OC	Fish
MA-B-3/RN	Fish
MA-B-3/TM	Fish
MA-M-2/OC	Mussel tissue
NIES No. 11	Fish tissue
NIES No. 6	Mussel
NIES No. 9	Sargasso seaweed
RM50	Albacore tuna
SP-M-1/OC	Sea plant
SRM 1566a	Oyster tissue
SRM 1572	Citrus leaves
SRM 1577a	Bovine liver
TORT-1	Lobster hepatopancreas

WATERS

10L series	Standard seawater for conductivity measurements
30L series	Standard seawater for conductivity measurements
CASS-2	Nearshore seawater
CSK - NO2	Nitrite
CSK - NO3	Nitrate
CSK - PO4	Phosphate
CSK - SIO4	Silicate
GP S1	Standard seawater for conductivity measurements
NASS-2	Open ocean seawater
P-series	Standard seawater for conductivity measurements
SLEW-1	Estuarine water
SLRS-1	River water
SRM 2694	Simulated rainwater
V-SMOW	Ocean water

Table 3. Distribution of reference materials by source and matrix

	Matrix										
Source	Ashes	Gases	Instrumental performance	Oils	Physical properties	Rocks	Sediments	Sludges	Tissues	Waters	Total
ASK	0	0	0	0	0	1	0	0	0	0	1
BCR	2	7	85	2	17	0	0	3	1	0	117
EPA	0	0	336	3	0	0	1	0	1	0	341
IAEA	0	0	0	0	0	0	6	0	10	1	17
IPT	0	0	0	0	0	6	0	0	0	0	6
LGC	0	0	90	0	0	0	0	0	0	0	90
NIES	1	0	0	0	0	0	11	0	3	0	5
NIST	8	91	154	4	15	5	1	0	6	1	287
NRCC	0	0	2	0	0	0	0	0	4	4	21
OSI	0	0	0	0	0	0	1	0	0	4	4
SABS	0	0	0	0	0	0	1	0	0	0	3
SAGAMI	0	0	1	0	0	0	3	0	0	4	5
USGS	0	0	0	0	0	14	1	0	0	0	15
Total	11	98	668	9	32	26	24	3	25	14	910

NOTE: SRM 1649, SRM 2651 and SRM 2652 are counted twice, and RM50 thrice, as for each of these RMs, more than one type of analyte is reported.

Table 4. Distribution of reference materials by source and analyte

Source	Analyte					
	Elements	Isotopes	Inorganic compounds	Organic compounds	Others	Total
ASK	1	0	0	0	0	1
BCR	14	0	7	79	17	117
EPA	7	0	1	333	0	341
IAEA	5	6	0	6	0	17
IPT	6	0	0	0	0	6
LGC	0	0	0	90	0	90
NIES	5	0	0	0	0	5
NIST	113	27	68	41	36	285
NRCC	11	0	0	10	0	21
OSI	0	0	0	0	4	4
SABS	3	0	0	0	0	3
SAGAMI	0	0	5	0	0	5
USGS	15	0	0	0	0	15
Total	179	33	81	559	57	910

NOTE: SRM 1649, SRM 2651 and SRM 2652 are counted twice, and RM50 thrice, as for each of these RMs, more than one type of analyte is reported.

Table 5. Distribution of reference materials by matrix and analyte

	Analyte					
Matrix	Elements	Isotopes	Inorganic compounds	Organic compounds	Others	Total
Ashes	9	0	0	2	0	11
Gases	0	0	71	27	0	98
Instrumental performance	110	26	5	506	21	668
Oils	2	0	0	7	0	9
Physical properties	0	0	0	0	32	32
Rocks	26	0	0	0	0	26
Sediments	11	3	0	10	0	24
Sludges	3	0	0	0	0	3
Tissues	15	3	0	7	0	25
Waters	4	1	5	0	4	14
Total	180	33	81	559	57	910

NOTE: SRM 1649, SRM 2651 and SRM 2652 are counted twice, and RM50 thrice, as for each of these RMs, more than one type of analyte is reported.

An index has been prepared which should facilitate the search for a particular matrix and analyte within those listed in the catalog. This index was generated using a spreadsheet/data base program. The data base and the catalog are resident in Microsoft EXCEL and WORD in an Apple Macintosh computer, located in Rockville, Maryland, at the Office of Oceanography and Marine Assesment.

Use

Until recently, only a few reference materials of marine origin existed, and their use by the marine science community was limited. The use of reference materials is part of good quality assurance practices that include evaluation of instrument performance independent of the methodology used. An excellent discussion of various aspects of quality assurance and of the use of reference materials can be found in Taylor (1985).

When using reference materials, it is important to follow certain guidelines:

- The matrix of the reference material should be as similar as possible to that of the samples. If such reference materials are not available, the user should be aware of possible matrix effects.

- Reference materials should not be used as primary standards. Rather, they should be analyzed as part of the sample set.

- The results of analyses should not be corrected based on recovery results from reference materials. Rather, the results of both samples and reference materials should be reported as part of the data set along with any corrections based on percent recoveries. Such reference material results are invaluable when comparing data sets generated using different analytical methods as they provide a common reference point.

- Sample homogeneity as described by the reference material producer should be taken into account in determining minimum sample size of the reference material.

- Reference materials should be used on a regular basis so changes in the analytical procedure over time can be noted and documented.

- There is a lack of reference materials with low and high concentrations of any given analyte in a matrix. Methodology, therefore, can only be tested at one concentration level, and possible problems at low or high concentrations cannot be documented.

- The concentrations of analytes in a reference material are not necessarily representative of the concentrations of those analytes as they existed at the time of collection. Rather, the analyte levels in the reference materials are representative of the final concentrations after any changes in the original concentrations due to sample processing (i.e., contamination during handling).

- The elemental concentrations listed for the USGS rock standards are based on the analyses of various laboratories over a period of years. The quality of the data varies and the user of such "best" or "consensus" values should be aware of the methodology used in their determination, and, most importantly, the number of individual analytical results used.

Acknowledgements

We wish to thank the organizations that provided the necessary information in the compilation of this catalog. We would especially like to acknowledge the assistance of B. Griepink of BCR, L. Mee of IAEA, S. Moro of IPT, A. Jones of LGC, K. Okamoto of NIES, S. Rasberry and C. Beck of NIST, S. Berman and W. Jamieson of NRCC, N. Andersen of NSF, M. Alfredsson of Referensmaterial AB, P. Ridout of OSI, A. J. Viljoen of SABS, M. Ambe of Sagami, H. Koide and J. Longbottom of USEPA, J. Kane of USGS, T. Oda of Wako Chemicals USA, and J. Calder and P. Rubin of NOAA. We also wish to thank K. Rios for her library assistance and proof reading and the NOAA Library Staff for their assistance in obtaining some of the publications used in this work.

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APPENDICES

Appendix A

Acronyms

ASK	Analytisk Sporelement Komité (Norway)
BCR	Community Bureau of Reference (Belgium)
CAS	Chemical Abstracts Service
CRM	Certified reference material
CSK	Cooperative Study of the Kuroshio and Adjacent Regions Program
GEMSI	Group of Experts on Methods, Standards and Intercalibration
GIPME	Global Investigation of Pollution in the Marine Environment
IAPSO	International Association for Physical Sciences of the Ocean
IAEA	International Atomic Energy Agency
ICES	International Council for the Exploration of the Sea
IOS	Institute of Oceanographic Sciences (UK)
IOC	Intergovernmental Oceanographic Commission
IPT	Instituto de Pesquisas Tecnológicas (Brazil)
LGC	Laboratory of the Government Chemist (UK)
MACSP	Marine Analytical Chemistry Standards Program (Canada)
NBS	National Bureau of Standards (USA)
NIES	National Institute for Environmental Studies (Japan)
NIST	National Institute of Standards and Technology (formerly NBS, US)
NRCC	National Research Council of Canada (Canada)
OSI	Ocean Scientific International Ltd. (UK)
RM	Reference material
SABS	South Africa Bureau of Standards
SRM	Standard reference material
USEPA	US Environmental Protection Agency (USA)
USGS	United States Geological Survey (USA)

Appendix B

Name, Symbol, Atomic Number and Chemical Abstracts Service (CAS) Registry Numbers of Elements

Actinium	Ac	89	7440-34-8
Aluminum	Al	13	7429-90-5
Americium	Am	95	7440-35-9
Antimony	Sb	51	7440-36-0
Argon	Ar	18	7440-37-1
Arsenic	As	33	7440-38-2
Astatine	At	85	7440-76-1
Barium	Ba	56	7440-39-3
Berkelium	Bk	97	7440-40-6
Beryllium	Be	4	7440-41-7
Bismuth	Bi	83	7440-69-9
Boron	B	5	7440-42-8
Cadmium	Cd	48	7440-43-9
Calcium	Ca	20	7440-70-2
Californium	Cf	98	7440-71-3
Carbon	C	6	7440-44-0
Cerium	Ce	58	7440-45-1
Cesium	Cs	55	7440-46-2
Chlorine	Cl	17	7782-50-5
Chromium	Cr	24	7440-47-3
Cobalt	Co	27	7440-48-8
Curium	Cm	96	7440-51-9
Dysprosium	Dy	66	7429-91-6
Einsteinium	Es	99	7429-92-7
Erbium	Er	68	7440-52-0
Europium	Eu	63	7440-53-1
Fluorine	F	9	7782-41-4
Francium	Fr	87	7440-73-5
Gadolinium	Gd	64	7440-54-2
Gallium	Ga	31	7440-55-3
Germanium	Ge	32	7440-56-4
Gold	Au	79	7440-57-5
Hafnium	Hf	72	7440-58-6
Helium	He	2	7440-59-7
Holmium	Ho	67	7440-60-0
Hydrogen	H	1	1333-74-0
Indium	In	49	7440-74-6
Iodine	I	53	7553-56-2
Krypton	Kr	36	7439-90-9
Lanthanum	La	57	7439-91-0
Lead	Pb	82	7439-92-1
Lithium	Li	3	7439-93-2
Lutetium	Lu	71	7439-94-3
Magnesium	Mg	12	7439-95-4
Manganese	Mn	25	7439-96-55
Mercury	Hg	80	7439-97-6
Molybdenum	Mo	42	7439-98-7
Neodymium	Nd	60	7440-00-8
Neon	Ne	10	7440-01-9
Neptunium	Np	93	7439-99-8
Nickel	Ni	28	7440-02-0
Niobium	Nb	41	7440-03-1
Nitrogen	N	7	7727-37-9
Osmium	Os	76	7440-04-02
Oxygen	O	8	7782-44-7
Palladium	Pd	46	7440-05-3
Phosphorus	P	15	7723-14-0
Platinum	Pt	78	7440-06-4
Plutonium	Pu	94	7440-07-5
Polonium	Po	84	7440-08-6
Potassium	K	19	7440-09-7
Praseodymium	Pr	59	7440-10-0

Promethium	Pm	61	7440-12-2
Protactinium	Pa	91	7440-13-3
Radium	Ra	88	7440-14-4
Radon	Rn	86	10043-92-2
Rhenium	Re	75	7440-15-5
Rhodium	Rh	45	7440-16-6
Rubidium	Rb	37	7440-17-7
Ruthenium	Ru	44	7440-18-8
Samarium	Sm	62	7440-19-9
Scandium	Sc	21	7440-20-2
Selenium	Se	34	7782-49-2
Silicon	Si	14	7440-21-3
Silver	Ag	47	7440-22-4
Sodium	Na	11	7440-23-5
Strontium	Sr	38	7440-24-66
Sulfur	S	16	7704-34-9
Tantalum	Ta	73	7440-25-7
Technetium	Tc	43	7440-26-8
Tellurium	Te	52	13494-80-9
Terbium	Tb	65	7440-27-9
Thallium	Tl	81	7440-28-0
Thorium	Th	90	7440-29-1
Thulium	Tm	69	7440-30-4
Tin	Sn	50	7440-31-5
Titanium	Ti	22	7440-32-6
Tungsten	W	74	7440-33-7
Uranium	U	92	7440-61-1
Vanadium	V	23	7440-62-2
Xenon	Xe	54	7440-63-3
Ytterbium	Yb	70	7440-64-4
Yttrium	Y	39	7440-65-5
Zinc	Zn	30	7440-66-6
Zirconium	Zr	40	7440-67-7

Appendix C

Alternate Names and Chemical Abstracts Service (CAS) Registry Numbers of Organic Compounds

Name	Registry number ◊	Alternate name
1,1,1,2-Tetrachloroethane	630-20-6	---
1,1,1-Trichloroacetone	918-00-3	---
1,1,1-Trichloroethane	71-55-6	Methylchloroform
1,1,2,2-Tetrachloroethane	79-34-5	---
1,1,2-Trichloroethane	---	see Trichloroethylene
1,1,2-Trichloroethylene	---	see Trichloroethylene
1,1-Dichloro-1-propylene	---	see 1,1-Dichloropropene
1,1-Dichloroethane	75-34-3	Ethylidene chloride
1,1-Dichloroethylene	75-35-4	Vinylidene chloride
1,1-Dichloropropene	563-58-6	1,1-Dichloro-1-propene
1,2,3,4,7,8-HCDD	39227-28-6	1,2,3,4,7,8-Hexachloro-dibenzo[b,e][1,4]dioxin
1,2,3,4-TCDD	30746-58-8	1,2,3,4-Tetrachloro-dibenzo[b,e][1,4]dioxin
1,2,3,4-Tetrachlorobenzene	634-66-2	---
1,2,3,7,8-PCDD	40321-76-4	1,2,3,7,8-Pentachloro-dibenzo[b,e][1,4]dioxin
1,2,3-Trichlorobenzene	87-61-6	---
1,2,3-Trichloropropane	96-18-4	Allyl trichloride
1,2,4,5-Tetrachlorobenzene	95-94-3	Benzene tetrachloride
1,2,4-Trichlorobenzene	120-82-1	---
1,2,4-Trimethylbenzene	95-63-6	Pseudocumene
1,2-Benzanthracene	---	see Benzo[a]anthracene
1,2-Dibromo-3-chloropropane	96-12-8	---
1,2-Dibromoethane	106-93-4	Ethylene dibromide
1,2-Dichlorobenzene	95-50-1	---
1,2-Dichlorobenzene-d4	•	Deuterated dichlorobenzene
1,2-Dichloroethane	107-06-2	Ethylene chloride
1,2-Dichloropropane	78-87-5	Propylene chloride

◊. Solid dot (•) indicates structure is shown in Appendix 4.

1,2-Epoxybutane	106-88-7	1-Butylene oxide
1,2-Propanediol	57-55-6	Propylene glycol
1,2:3,4-Diepoxybutane	298-18-0	1,3-Butadiene diepoxide
1,3,5-Trichlorobenzene	108-70-3	---
1,3,5-Trimethylbenzene	108-67-8	Mesitylene
1,3-Butadiene	106-99-0	---
1,3-Dichloro-2-propanol	96-23-1	---
1,3-Dichlorobenzene	541-73-1	---
1,3-Dichloropropane	142-28-9	---
1,3-Dinitrobenzene	99-65-0	---
1,3-Propane sultone	1120-71-4	2,2-Dioxide-1,2-oxathiolane
1,4-Dichlorobenzene	106-46-7	---
1,4-Dichlorobutane-d8	83547-96-0	Deuterated 1,4-dichloro-butane
1-Acetyl-2-thiourea	591-08-2	---
1-Fluoronaphthalene	321-38-0	---
1-Methyl ethyl benzene	98-82-8	Cumene
1-Methylbenz[a]anthracene	43178-22-9	---
1-Methylchrysene	3351-28-8	---
1-Naphthylamine	134-32-7	---
1-Nitronaphthalene	86-57-7	---
1-Nitropyrene	5522-43-0	---
1-Nitrosopiperidine	100-75-4	---
1-Propanamine	107-10-8	---
10-Azobenzo[a]pyrene	189-92-4	Phenaleno[1,9-gh]quinoline
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl	---	see PCB 209
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl	---	see PCB 206
2,2',3,3',4,4',5,6-Octachlorobiphenyl	---	see PCB 195
2,2',3,3',4,4',5-Heptachlorobiphenyl	---	see PCB 170
2,2',3,3',4,4'-Hexachlorobiphenyl	---	see PCB 128
2,2',3,4,4',5'-Hexachlorobiphenyl	---	see PCB 138
2,2',3,4,4',5,5'-Heptachlorobiphenyl	---	see PCB 180
2,2',3,4,4',5-Hexachlorobiphenyl	---	see PCB 137
2,2',3,5'-Tetrachlorobiphenyl	---	see PCB 44
2,2',4,4',5,5'-Hexachlorobiphenyl	---	see PCB 153
2,2',4,5,5'-Pentachlorobiphenyl	---	see PCB 101
2,2',5,5'-Tetrachlorobiphenyl	---	see PCB 52
2,2',5-Trichlorobiphenyl	---	see PCB 18
2,2'-Bipyridyl	366-18-7	2,2'-Dipyridyl
2,2-Dichloropropane	594-20-7	---

2,3',4,4',5-Pentachlorobiphenyl		---	see PCB 118
2,3',4,4'-Tetrachlorobiphenyl		---	see PCB 66
2,3,3',4,4'-Pentachlorobiphenyl		---	see PCB 105
2,3,3'-Trichlorobiphenyl		---	see PCB 20
2,3,5-Trichlorophenol		933-78-8	Pyrenoline
2,3,7,8-TCDD	•	1746-01-6	2,3,7,8-Tetrachloro-dibenzo[b,e][1,4]dioxin
2,3,7,8-TCDD-13C12		76523-40-5	Labeled 2,3,7,8-Tetrachloro-dibenzo[b,e][1,4]dioxin
2,3-Dichloro-1-propene		78-88-6	---
2,4'-Dichlorobiphenyl		---	see PCB 8
2,4,4'-Trichlorobiphenyl		---	see PCB 28
2,4,5-T	•	93-76-5	(2,4,5-Trichlorophenoxy) acetic acid
2,4,5-T (acid)		---	see 2,4,5-T
2,4,5-T (methyl ester)		*	---
2,4,5-TP	•	93-72-1	2-(2,4,5-Trichlorophenoxy)propionic acid
2,4,5-Trichlorophenol		95-95-4	---
2,4,6-TBA (acid)		*	2,4,6-Trichlorobenzoic acid
2,4,6-Trichloroaniline		634-93-5	---
2,4,6-Trichlorophenol		88-06-2	---
2,4-D (acid)	•	94-75-7	see 2,4-D
2,4-D (methyl ester)		*	---
2,4-DB	•	94-28-6	4-(2,4-Dichlorophenoxy)butyric acid
2,4-Diaminotoluene		95-80-7	2,4-Diamino-1-methylbenzene
2,4-Dichlorobenzoic acid		50-84-0	---
2,4-Dichlorobiphenyl		---	see PCB 7
2,4-Dichlorophenol		120-83-2	---
2,4-Dichlorophenol-d3		*	Deuterated 2,4-dichlorophenol
2,4-Dichlorophenoxyacetic acid		---	see 2,4-D
2,4-Dichlorotoluene		95-73-8	1,3-Dichloro-4-methylbenzene
2,4-Dimethylphenol		105-67-9	m-Xylenol
2,4-Dimethylphenol-3,5,6-d3		*	Deuterated 2,4-dimethylphenol
2,4-Dinitrophenol		51-28-5	---
2,4-Dinitrotoluene		121-14-2	---
2,4-Dithiobiuret		*	---
2,6-Di-t-butyl-p-cresol		128-37-0	2,6-bis(1,1-Dimethylethyl)-4-methyl phenol
2,6-Dichlorophenol		87-65-0	---
2,6-Dinitrotoluene		606-20-2	---
2-4-D		---	see 2,4-D
2-Bromo-1-chloropropane-d6		*	Deuterated 2-bromo-1-chloropropene
2-Chloroethyl ethyl ether		*	

2-Chloroethyl vinyl ether	110-75-8	(2-Chloroethoxy)ethene
2-Chloronaphthalene	91-58-7	---
2-Chlorophenol	95-57-8	o-Chlorophenol
2-Chlorotoluene	95-49-8	---
2-Cyclohexyl-4,6-dinitrophenol	131-89-5	Dinex
2-Fluoroacetamide	640-19-7	Fluoroacetamide
2-Fluorobiphenyl	321-60-8	2-Fluoro-1,11-biphenyl
2-Fluorophenol	367-12-4	---
2-Methyl-1-propanol	78-83-1	Isobutyl alcohol
2-Methylchrysene	3351-32-4	---
2-Naphthylamine	91-59-8	2-Aminonaphthalene
2-Nitro-7-methoxynaphtho[2,1-b]furan	92882-94-5	---
2-Nitrofluoranthene	13177-29-2	---
2-Nitrofluorene	607-57-8	2-Nitro-9H-fluorene
2-Nitronaphthalene	581-89-5	---
2-Nitrophenol	88-75-5	o-Nitrophenol
2-Nitrophenol-d4	*	Deuterated 2-nitrophenol
2-Nonanone	821-55-6	---
2-Phenylphenol	90-43-7	2-Hydroxybiphenyl
2-Picoline	109-06-8	2-Methylpyridine
2-Undecanone	112-12-9	Methyl nonyl ketone
3,3',4,4',5-Pentachlorobiphenyl	---	see PCB 126
3,3',4,4'-Tetrachlorobiphenyl	---	see PCB 77
3,3',4-Trichlorobiphenyl	---	see PCB 35
3,3'-Dichlorobenzidine	91-94-1	3,3'-Dichloro-[1,1'-biphenyl]-4,4'-diamine
3-Chlorophenol	108-43-0	m-Chlorophenol
3-Chloropropionitrile	542-76-7	3-Chloropropanenitrile
3-Chlorotoluene	108-41-8	---
3-Hydroxybenzo[a]pyrene	13345-21-6	---
3-Methylchrysene	3351-31-3	---
3-Nitrofluoranthene	892-21-7	---
3-Nitrophenol	554-84-7	m-Nitrophenol
4,4'-Bipyridyl	553-26-4	4,4'-Dipyridyl
4,4'-DDD	---	see p,p'-DDD
4,4'-DDE	---	see p,p'-DDE
4,4'-DDT	---	see p,p'-DDT
4,4'-Dichlorobiphenyl	---	see PCB 15
4,4'-Methylene bis(o-chloroaniline)	*	---
4,4-Dibromooctafluorobiphenyl	10386-84-2	---

4,6-Dinitro-o-cresol		534-52-1	3,5-Dinitro-2-hydroxytoluene
4-Aminopyridine		504-24-5	4-Pyridinamine
4-Bromofluorobenzene		460-00-4	p-Bromofluorobenzene
4-Bromophenyl phenyl ether		101-55-3	p-Phenoxybromobenzene
4-Chloro-3-methyl phenol		59-50-7	Chlorocresol
4-Chloro-m-cresol		---	see 4-Chloro-3-methylphenol
4-Chloroaniline		106-47-8	4-chlorobenzeneanine
4-Chlorobenzotrifluoride		98-56-6	1-Chloro-4-(trifluoromethyl)benzene
4-Chlorobiphenyl		---	see PCB 3
4-Chlorophenol		106-48-9	p-Chlorophenol
4-Chlorophenyl phenyl ether		7005-72-3	p-Chlorodiphenyl oxide
4-Chlorotoluene		106-43-4	---
4-CPA		122-88-3	2-(4-Chlorophenoxy)propanamine
4-Isopropyltoluene		99-87-6	p-Cymene
4-Methyl-2-pentanone		109-10-1	---
4-Methylchrysene		3351-30-2	---
4-Nitrophenol		100-02-7	p-Nitrophenol
4H-Cyclopenta[def]phenanthrene-4-one		*	---
5-Methylchrysene		3697-24-3	---
5-Nitro-o-toluidine		99-55-8	---
6-Methylchrysene		1705-85-7	---
6-Nitrobenzo[a]pyrene		63041-90-7	---
6-Nitrochrysene		7496-02-8	---
7,12-Dimethylbenz[a]anthracene		57-97-6	---
7-Nitrobenz[a]anthracene		20268-51-3	---
7H-Dibenzo[c,g]carbazole		194-59-2	---
9-Fluorenone		486-25-9	---
9-Nitroanthracene		602-60-8	5-Nitroanthracene
Acenaphthene	•	83-32-9	1,2-Dihydroacenaphthylene
Acenaphthylene	•	208-96-8	---
Acetanilide		103-84-4	---
Acetone		67-64-1	---
Acetonitrile		75-08-5	---
Acetophenone		98-86-2	1-Phenyl-ethanone
Acrolein		107-02-8	Acrylic aldehyde
Acrylamine		79-06-1	Propenamide
Acrylonitrile		107-13-1	2-Propenenitrile
Alachlor	•	15972-60-8	2-Chloro-N-(2,6-diethylphenyl)-N-(methoxymethyl)-acetamide

Aldicarb	•	116-06-3	2-Methyl-2-(methylthio)propanal O-[(methylamino) carbonyl]oxime
Aldicarb sulfone	•	1646-88-4	2-Methyl-2-(methylsulfonyl)propanal o-[(methylamino)carbonyl)]oxime
Aldicarb sulfoxide	•	1646-87-3	2-Methyl-2-(methylsulfinyl)propanal o-[(methylamino)carbonyl]oxime
Aldrin	•	309-00-2	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-dimethanonaphthalene
Allyl alcohol		107-18-6	2-Propen-1-ol
Allyl chloride		107-05-1	3-Chloro-1-propene
alpha,alpha,2,6-Tetrachlorotoluene		*	---
alpha-BHC		319-84-6	alpha-Lindane
alpha-Endosulfan		959-98-8	---
alpha-HCH		---	see alpha-BHC
Aniline		62-53-3	Benzenamine
Anisic acid		*	(unspecified form)
Anthanthrene	•	191-26-4	Dibenzo(def,mno)chrysene
Anthracene	•	120-12-7	Paranaphthalene
Anthraquinone		84-65-1	---
Aroclor 1016		12674-11-2	(mixture)
Aroclor 1221		11104-28-2	(mixture)
Aroclor 1232		11141-16-5	(mixture)
Aroclor 1242		53469-21-9	(mixture)
Aroclor 1248		12672-29-6	(mixture)
Aroclor 1254		11097-69-1	(mixture)
Aroclor 1260		11096-82-5	(mixture)
Aroclor 1262		37324-23-5	(mixture)
Aroclor 1268		11100-14-4	(mixture)
Asulam	•	3337-71-1	Methyl sulphanilylcarbamate
Atrazine	•	1912-24-9	6-Chloro-N-ethyl-N'-(1-methylethyl)-1,3,5-triazine-2,4-diamine
Azobenzene		103-33-3	---
Bentranil	•	1022-46-4	2-Phenyl-4-oxo-3,1-benzoxazine
Benz(ah)anthracene		---	see Benzo[ah]anthracene
Benzene		71-43-2	---
Benzene-d6		1076-43-3	Deuterated benzene
Benzidine		92-87-5	[1,1'-Biphenyl]-4,4'-diamine
Benzoic acid		65-85-0	---
Benzonitrile		100-47-0	---

Benzophenone		119-61-9	Diphenyl ketone
Benzo[ah]anthracene		*	---
Benzo[a]anthracene		---	see Benz[a]anthracene
Benzo[a]fluoranthene		203-33-8	1,2-Benzofluoranthene
Benzo[a]fluorenone		479-79-8	---
Benzo[a]pyrene	•	50-32-8	3,4-Benzpyrene
Benzo[a]pyrene-d12		*	Deuterated benzo[a]pyrene
Benzo[b]chrysene		214-17-5	1,2:6,7-Dibenzophenanthrene
Benzo[b]fluoranthene		205-99-2	Benz[e]acephenanthrylene
Benzo[b]naphtho[1,2-d]thiophene		205-43-6	---
Benzo[b]naphtho[2,1-d]thiophene		239-35-0	---
Benzo[b]naphtho[2,3-d]thiophene		243-46-9	---
Benzo[b]naphto[1,2-d]furan		205-39-0	---
Benzo[b]naphto[2,1-d]furan	•	239-30-5	Naphtho[1,2-b]benzofuran
Benzo[c,d]pyren-6-one		3074-00-8	---
Benzo[c]chrysene	•	194-69-4	1,2:5,6-Dibenzophenanthrene
Benzo[c]phenanthrene	•	195-19-7	3,4-Benzophenanthrene
Benzo[e]pyrene	•	192-97-2	4,5-Benzopyrene
Benzo[ghi]fluoranthene	•	203-12-3	Benzo[mno]fluoranthene
Benzo[ghi]perylene	•	191-24-2	1,12-Benzoperylene
Benzo[ghi]perylene-13C		*	Labeled 1,12-Benzoperylene
Benzo[j]fluoranthene	•	205-82-3	10,11-Benzofluoranthene
Benzo[k]fluoranthene	•	207-08-9	11,12-Benzofluoranthene
Benzyl chloride		100-44-7	alpha-Chlorotoluene
Benz[a]acridine		225-11-6	---
Benz[a]anthracene	•	56-55-3	1,2-Benzanthracene
Benz[c]acridine		225-51-4	---
beta-BHC		319-85-7	beta-Lindane
beta-Endosulfan		33213-65-9	---
Biphenyl		92-52-4	---
bis(1-Chloroethyl)ether		6986-48-7	1,1'-Oxybis(1-chloroethane)
bis(2-Chloroethoxy)methane		111-91-1	Bis(2-chloroethyl) formal
bis(2-Chloroethyl)ether		111-44-4	1,1'-Oxybis(2-chloroethane)
bis(2-Chloroisopropyl)ether		108-60-1	---
bis(2-Ethylhexyl)phthalate		---	see Di-n-octyl phthalate
bis(2-Ethylhexyl)phthalate-d4		*	Deuterated dioctyl phthalate
Bromobenzene		108-86-1	---
Bromochloroacetonitrile		83463-62-1	---
Bromochloromethane		74-97-5	---

Bromochloromethane-d2		*	Deuterated bromochloromethane
Bromodichloromethane		75-27-4	---
Bromoform		75-25-2	Tribromomethane
Bromomethane		74-83-9	---
Bromoxynil	•	1089-84-5	3,5-Dibromo-4-hydroxybenzonitrile
Bromoxynil octanoate		1689-99-2	2,6-Dibromo-4-cyanophenyl octanoic acid ester
Bupirimate	•	41483-43-6	5-Butyl-2-ethylamino-6-methylpyrimidin-4-yl-dimethylsulphamate
Butyl benzyl phthalate		85-68-7	1,2-Benzenedicarboxylic acid butyl phenylmethyl ester
Carbaryl	•	63-25-2	1-Naphthyl methylcarbamate
Carbazole	•	86-74-8	Dibenzopyrrole
Carbofuran	•	1563-66-2	2,3-Dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate
Carbon disulfide		75-15-0	---
Carbon tetrachloride		56-23-5	Tetra chloromethane
Carbon tetrachloride-13C		*	Labeled carbon tetrachloride
Chloral hydrate		75-87-6	Trichloroacetaldehyde
Chlorambucil	•	305-03-3	4-[bis(2-Chloroethyl)amino]benzebebutanoic acid
Chlorbenside	•	103-17-3	4-Chlorobenzyl 4-chlorophenyl sulfide
Chlordane	•	12789-03-6	1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methano-1H-indene
Chlorobenzene		108-90-7	---
Chlorobenzene-d5		3114-55-4	Deuterated chlorobenzene
Chlorobenzilate	•	510-15-6	Ethyl 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxybenzeneacetate
Chlorobromuron	•	13360-45-7	3-(4-Bromo-3-chlorophenyl)-1-methoxy-1-methyl urea
Chlorodibromomethane		124-48-1	---
Chloroethane		75-00-3	---
Chloroform		67-66-3	---
Chlorohexane		544-10-5	1-Chlorohexane
Chloromethane		74-87-3	---
Chlorophyll		---	(unspecified compound)
Chlorotoluron	•	15545-48-9	3-(3-Chloro-p-tolyl)-1,1-dimethylurea
Chrysene	•	218-01-9	1,2-Benzphenanthrene
cis-1,2-Dichloroethylene		156-59-2	---
cis-1,3-Dichloropropylene		10061-01-5	Z-1,3-Dichloropropene
cis-Permethrin		*	---
Coronene	•	191-07-1	---

Cyanazine		21725-46-2	2-(4-Chloro-6-ethylamino-1,3,5-triazin-2-ylamino)-2-methylpropionitrile
Cyclopenta[c,d]pyrene		27208-37-3	---
Cystine		---	(unspecified form)
DDD		---	(unspecified form)
DDE		---	(unspecified form)
DDT		---	(unspecified form)
DEET		134-62-3	N,N-Diethyl-3-methylbenzamide
delta-BHC		319-86-8	delta-Lindane
Desmetryn	•	1014-69-3	2-(Isopropylamino)-4-(methylamino)-6-(methylthio)-s-triazine
Di-n-butyl phthalate		84-74-2	Dibutylphthalate
Di-n-octyl phthalate		117-81-7	---
Diallate		2303-16-4	S-2,3-Dichloro allyl-N,N-di-isopropylthiocarbamate
Dibenzofuran	•	132-64-9	2,2'-Biphenylene
Dibenzothiophene	•	132-65-0	Diphenylene sulfide
Dibenzo[a,e]fluoranthene		5385-75-1	Dibenz[a,e]acenthrylene
Dibenzo[a,e]pyrene	•	192-65-4	Naphtho(1,2,3,4-def)chrysene
Dibenzo[a,h]anthracene	•	---	see Dibenz[a,h]anthracene
Dibenzo[a,h]pyrene	•	•	---
Dibenzo[a,i]pyrene	•	189-55-9	Benzo[rst]pantaphene
Dibenzo[a,l]pyrene	•	191-30-0	Dibenzo[def,p]chrysene
Dibenzo[b,d]furan		---	see Dibenzofuran
Dibenz[a,c]acridine	•	215-62-3	Phenanthracridine
Dibenz[a,c]anthracene	•	215-58-7	Benzo[b]triphenylene
Dibenz[a,h]acridine	•	226-36-8	---
Dibenz[a,h]anthracene		414-29-9	1,2:5,6-Dibenzanthracene
Dibenz[a,i]acridine	•	226-92-6	---
Dibenz[a,j]acridine	•	224-42-0	---
Dibenz[a,j]anthracene	•	224-41-9	1,2:7,8-Dibenzanthracene
Dibenz[c,h]acridine		224-53-3	---
Dibromobenzene		---	(not specified)
Dibromomethane		74-95-3	---
Dibutyl ether		142-96-1	2,2'-Oxy(bis)(2-methylpropane)
Dichlobenil	•	1194-65-6	2,6-Dichlorobenzonitrile
Dichlone	•	117-65-6	2,3-Dichloro-1,4-naphthoquinone
Dichlorobromomethane		---	see Bromodichloromethane
Dichlorodifluoromethane		75-71-8	---
Dichloromethane		75-09-2	---

Dichlorprop	•	120-36-5	2-(2,4-Dichlorophenoxy) propionic acid
Dichlorprop (2-ethylhexyl ester)	•	*	---
Dicloran		90-30-9	2,6-Dichloro-4-nitroaniline
Dieldrin	•	60-57-1	3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-2,7:3,6-dimetnanonaphth-[2,3-b]-oxirene
Diethyl ether		60-29-7	1,11-Oxy(bis)ethane
Diethyl hexyl phthalate		---	see Di-n-octyl phthalate
Diethyl phthalate	•	84-66-2	o-Benzenedicarboxylic acid diethyl ether
Diethylstilbestrol	•	56-53-1	---
Diisodecyl phthalate		26761-40-0	1,2-Benzenecarboxylic acid diidodecyl ester
Dimethirimol	•	5221-53-4	5-Butyl-2(dimethylamino)-6-methyl-4(1H)-pyrimidinone
Dimethoate	•	60-51-5	o,o-Dimethyl S-[2-(methylamino)-2-oxoethyl) phosphorodithioate
Dimethyl phthalate		131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester
Dimethyl phthalate-d6		*	Deuterated dimethyl phthalate
Dinobuton	•	973-21-7	1-Methylethyl 2-(1-methylpropyl)-4,6-dinitrophenyl carbonate
Dinoseb	•	88-85-7	2-(1-Methylpropyl)-4,6-dinitrophenol
Dinoterb	•	1420-07-1	2-(1,1-Dimethylethyl)-4,6-dinitrophenol acetate ester
Dinoterb acetate		3204-27-1	---
Dioctyl phthalate		---	see Di-n-octyl phthalate
Dioxin		---	see 2,3,7,8-TCDD
Dioxin-13C12		*	Labeled dioxin
Diphenyl ether		101-84-8	1,11-Oxybisbenzene
Diphenyl sulphone		127-63-9	---
Diphenylamine		122-39-4	Phenyl ether
Diquat dibromide	•	85-00-7	6,7-Dihydropyrido[1,2-a:2',1'-c]pyrazinedium bromide
Disulfoton	•	298-04-4	o,o-Diethyl S-[2-(ethylthio)ethyl]phosphorodithioate
Diuron	•	330-54-1	3-(3,4-Dichlorophenyl)-1,1-dimethylurea
DNOC		---	see 4,6-Dinitro-o-cresol
Dodecane		112-40-3	---
Domoic acid	•	14277-97-5	---
Eicosane		112-95-8	---
Endosulfan sulfate		1031-07-8	---
Endrin	•	72-20-8	3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-2,7:3,6-dimethanonaphth[2,3-6]oxirene
Endrin aldehyde		7421-93-4	---

Endrin ketone		53494-70-5	(E)-4,4'-(1,2-Diethyl-1,2-ethenediyl)bis phenol
Epichlorohydrin		106-89-8	1-Chloro-2,3-epoxy propane
Ethirimol	•	23947-60-6	5-Butyl-2-ethylamino-6-methyl-4(1H)-pyrimidinone
Ethyl methacrylate		97-63-2	2-Methyl-2-propanoic acid ethyl ester
Ethyl methanesulfonate		62-50-0	Methanesulfonic acid ethyl ester
Ethyl parathion		56-38-2	Parathion
Ethylbenzene		100-41-4	- - -
Ethylene thiourea		96-45-7	2-Imidazolidone
Ethylenediamine		107-15-3	1,2-Ethanediamine
Fenoprop		- - -	see 2,4,5-TP
Fluoranthene	•	206-44-0	1,2-(1,8-Naphthylene)-benzene
Fluorene		86-73-7	o-Biphenylenemethane
Fluorobenzene		462-06-6	- - -
Fluorotrichloromethane		- - -	see Trichlorofluoromethane
gamma-BHC		58-89-9	Lindane, Hexachlorocyclohexane
gamma-HCH		- - -	see gamma-BHC
HCB		- - -	see Hexachlorobenzene
Heptachlor	•	76-44-8	1,4,5,6,7,8,8-Hepta-chloro-3a,4,7,7a-tetra-hydro-4,7-methano-1H-indene
Heptachlor epoxide	•	1024-57-3	1,4,5,6,7,8,8-Hepta-chloro-2,3-epoxy-3a,4,7,7a-tetrahydro-4,7-methanoindan
Heptadecane		629-78-7	- - -
Heptadiene		42441-75-8	- - -
Hexachlorobenzene		118-74-1	- - -
Hexachlorobiphenyl		26601-64-9	- - -
Hexachlorobutadiene		87-68-3	Perchloro-1,3-butadiene
Hexachlorocyclopentadiene		77-47-4	Hexachloro-1,3-cycio-pentadiene
Hexachloroethane		67-72-1	- - -
Hexachlorophene		70-30-4	2,2'-Methylenebis[2,4,6-trichlorophenol]
Hexachloropropylene		1888-71-7	Hexachloropropene
Hexacosane		630-01-3	- - -
Hexadecane		544-76-3	n-Hexadecane
Indeno[1,2,3-cd]fluoranthene	•	193-43-1	- - -
Indeno[1,2,3-cd]perylene	•	101686-49-1	- - -
Indeno[1,2,3-cd]pyrene	•	193-39-5	2,3,-o-Phenylenepyrene
Ioxynil		1689-83-4	4-Hydroxy-3,5-diiodobenzonitrile
Ioxynil octanoate		3861-47-0	4-Cyano-2,6-diiodophenyl octanoate
Isodrin		465-73-6	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-endo,endo-1,4:5,8-dimethanonaphthalene

Isophorone	•	78-59-1	3,5,5-Trimethyl-2-cyclohexen-1-one
Isopropyl benzene		---	see 1-Methyl ethyl benzene
Isosafrole	•	120-58-1	5-(1-Propenyl)-1,3-benzodioxole
Kepone	•	143-50-0	1,1a,3,3a,4,5,5,5a,5b,6-Decachlorooctahydro-1,3,4-metheno-2H-cuclobuta[cd]pentalen-2-one
Limonene	•	138-86-3	N,N-Dimethyl-4-nitroso-benzeneamine
Lindane		---	see gamma-BHC
Linuron	•	330-55-2	N'-(3,4-Dichlorophenyl)-N-methoxy-N-methylurea
m-Chlorobenzoic acid		*	---
m-Chlorotoluene		---	see 3-Chlorotoluene
m-Cresol		108-39-4	3-Methylphenol
m-Dichlorobenzene		---	see 1,3-Dichlorobenzene
m-Fluorobenzoic acid		456-22-4	3-Fluorobenzoic acid
m-Nitroaniline		99-09-2	3-Nitrobenzeneamine
m-Xylene		108-38-3	1,3-Dimethylbenzene
Malathion	•	121-75-5	Diethyl((diethoxyphosphinothioyl)thio) butanedioate
Malononitrile		109-77-3	Propane dinitrile
MCPA (2-butoxyethyl ester)	•	*	---
MCPA (2-ethylhexyl ester)	•	*	---
MCPA (acid)	•	94-74-6	2-Methyl-4-chlorophenoxyacetic acid
MCPB (acid)		94-81-5	4-(4-Chloro-o-tolyloxy) butyric acid
Mecarbam		2595-54-2	Ethyl[((diethoxyphosphinothioyl)thio)acetyl]methyl carbamate
Mecoprop	•	7085-19-0	2-[(4-Chloro-o-tolyl)oxy] propionic acid
Mecoprop (2-butoxyethyl ester)	•	*	---
Methacrylonitrile		126-98-7	2-Methyl-2-propenenitrile
Methane		74-82-8	---
Methidathion	•	950-37-8	S-2,3-Dihydro-5-methoxy-2-oxo-1,3,4-thiadiazol-3-ylmethyl o,o-dimethyl phosphorodithioate
Methoxychlor		---	see p,p'-Methoxychlor
Methyl bromide		74-83-9	---
Methyl chloride		---	see Chloromethane
Methyl ethyl ketone		78-93-3	2-Butanone
Methyl methacrylate		80-62-6	Methyl 2-methyl-2-propenoate
Methyl methanesulfonate		66-27-3	Methanesulfonic acid methyl ester
Methyl parathion		298-00-0	Dimethyl parathion
Methyl stearate		112-61-8	Octadecanoic acid methyl ester
Methyl thiouracil		56-04-2	2,3-Dihydro-6-methyl-2-thioxo-4(1H)-pyrimidinone
Methylene bis (o-chloroaniline)		*	---

Methylene chloride		75-09-2	Dichloromethane
Mirex	•	2385-85-5	1,1a,2,2,3,3a,4,5,5,5a,5b,6-Dodecachlorooctahydro-1,3,4-metheno-2H-cyclobuta-[c,d]pentalene
Monuron	•	150-68-5	3-(p-Chlorophenyl)-1,1-dimethylurea
N,N-Dimethylformamide		68-12-2	---
n-Butylbenzene		104-51-8	Butylbenzene
n-Decane		124-18-5	Decane
n-Dodecane		---	see Dodecane
n-Heptadecane		---	see Heptadecane
N-Nitroso-N-methyl ethylamine		*	---
N-Nitrosodi-n-propylamine		621-64-7	---
N-Nitrosodiethylamine		55-18-5	Diethylnitrosamine
N-Nitrosodimethylamine		62-75-9	Dimethylnitrosamine
N-Nitrosodiphenylamine		156-10-5	4-Nitrosodiphenylamine
N-Nitrosomorphine		---	see N-Nitrosomorpholine
N-Nitrosomorpholine		59-89-2	4-Nitrosomorpholine
N-Nitrosopyrrolidine		930-55-2	1-Nitrosopyrrolidine
n-Nonadecane		629-92-5	Nonadecane
n-Pentadecane		629-62-9	Pentadecane
n-Propylbenzene		103-65-1	Propylbenzene
n-Tetracosane		646-31-1	Tetracosane
n-Tetradecane		---	see Tetradecane
n-Tridecane		629-50-5	Tridecane
n-Undecane		1120-21-4	Undecane
Naphthalene		91-20-3	Naphthalene
Naphthalene-d8		1146-65-2	Deuterated naphthalene
Nicotine		54-11-5	(S)-3-(1-Methyl-2-pyrrolidinyl)pyridine
Nicotinic acid		59-67-6	Niacin
Nitrobenzene		98-95-3	---
Nitrobenzene-d5		*	Deuterated nitrobenzene
Nitrosodipropylamine		---	see N-Nitrosodi-n-propylamine
o,p'-DDE		*	---
o,p'-DDT		*	---
o,p'-TDE		*	---
o-Bromobenzoic acid		88-65-3	2-Bromobenzoic acid
o-Chlorotoluene		---	see 2-Chlorotoluene
o-Cresol		95-48-7	2-Methylphenol
o-Dichlorobenzene		---	see 1,2-Dichlorobenzene
o-Nitroaniline		88-74-4	2-Nitroaniline

o-Toluidine hydrochloride		636-21-5	---
o-Xylene		95-47-6	1,2-Dimethylbenzene
p,p'-DDD	•	72-54-8	2,2-bis(p-Chlorophenyl)-1,1-dichloroethane
p,p'-DDE	•	72-55-9	1,1'-(Dichloroethenylidene)-bis(4-chlorobenzene)
p,p'-DDT	•	50-29-3	1,1'-(2,2,2-Trichloroethylidene)bis[4-chlorobenzene]
p,p'-Methoxychlor	•	72-43-5	2,2-bis(p-Methoxyphenyl)1,1,1-trichloroethane
p,p'-TDE		---	see p,p'-DDD
p,p'-TDE (olefin)		•	---
p-Chloro-m-cresol		---	see 4-Chloro-3-methyl phenol
p-Chlorobenzoic acid		535-80-8	3-Chlorobenzoic acid
p-Chlorotoluene		---	see 4-Chlorotoluene
p-Cresol		106-44-5	4-Methylphenol
p-Cymene		•	Methyl(4-methylethyl)benzene
p-Dichlorobenzene		---	see 1,4-Dichlorobenzene
p-Dimethylaminoazobenzene		60-11-7	Methyl Yellow
p-Dioxane		123-91-1	1,4-Dioxane
p-Fluorobenzoic acid		456-22-4	4-Fluorobenzoic acid
p-Nitroaniline		100-01-6	1-Amino-4-nitrobenzene
p-Phenylenediamine		106-50-3	---
p-Xylene		106-42-3	1,4-Dimethylbenzene
Paraquat chloride	•	1910-42-5	1,1'-Dimethyl-4,4'-bipyridinium dichloride
PCB 101		37680-73-2	2,2',4,5,5'-Pentachlorobiphenyl
PCB 103		60145-21-3	2,2',4,5',6-Pentachlorobiphenyl
PCB 105		32598-14-4	2,3,3',4,4'-Pentachlorobiphenyl
PCB 114		74472-37-0	2,3,4,4',5-Pentachlorobiphenyl
PCB 118		31508-00-6	2,3',4,4',5-Pentachlorobiphenyl
PCB 121		56558-18-0	2,3',4,5',6-Pentachlorobiphenyl
PCB 126		57465-28-8	3,3',4,4',5-Pentachlorobiphenyl
PCB 128		38380-07-3	2,2',3,3',4,4'-Hexachlorobiphenyl
PCB 129		55215-18-4	2,2',3,3',4,5-Hexachlorobiphenyl
PCB 137		35694-06-5	2,2',3,4,4',5-Hexachlorobiphenyl
PCB 138		35065-28-2	2,2',3,4,4',5'-Hexachlorobiphenyl
PCB 141		52712-04-6	2,2',3,4,5,5'-Hexachlorobiphenyl
PCB 143		68194-15-0	2,2',3,4,5,6'-Hexachlorobiphenyl
PCB 15		2050-68-2	4,4'-Dichlorobiphenyl
PCB 151		52663-63-5	2,2',3,5,5',6-Hexachlorobiphenyl
PCB 153		35065-27-1	2,2',4,4',5,5'-Hexachlorobiphenyl
PCB 154		60145-22-4	2,2',4,4',5,6'-Hexachlorobiphenyl
PCB 156		38380-08-4	2,3,3',4,4',5-Hexachlorobiphenyl

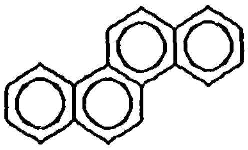
PCB 159	39635-35-3	2,3,3',4,5,5'-Hexachlorobiphenyl
PCB 170	35065-30-6	2,2',3,3',4,4',5-Heptachlorobiphenyl
PCB 171	52663-71-5	2,2',3,3',4,4',6-Heptachlorobiphenyl
PCB 173	68194-16-1	2,2',3,3',4,5,6-Heptachlorobiphenyl
PCB 18	37680-65-2	2,2',5-Trichlorobiphenyl
PCB 180	35065-29-3	2,2',3,4,4',5,5'-Heptachlorobiphenyl
PCB 182	60145-23-5	2,2',3,4,4',5,6'-Heptachlorobiphenyl
PCB 183	52663-69-1	2,2',3,4,4',5',6-Heptachlorobiphenyl
PCB 185	52712-05-7	2,2',3,4,5,5',6-Heptachlorobiphenyl
PCB 187	52663-68-0	2,2',3,4',5,5',6-Heptachlorobiphenyl
PCB 189	39635-31-9	2,3,3',4,4',5,5'-Heptachlorobiphenyl
PCB 191	74472-50-7	2,3,3',4,4',5',6-Heptachlorobiphenyl
PCB 194	35694-08-7	2,2',3,3',4,4',5,5'-Octachlorobiphenyl
PCB 195	52663-78-2	2,2',3,3',4,4',5,6-Octachlorobiphenyl
PCB 196	*	2,2',3,3',4,4',5',6-Octachlorobiphenyl
PCB 20	38444-84-7	2,3,3'-Trichlorobiphenyl
PCB 200	40186-71-8	2,2',3,3',4,5',6,6'-Octachlorobiphenyl
PCB 201	*	2,2',3,3',4',5,5',6-Octachlorobiphenyl
PCB 202	2136-99-4	2,2',3,3',5,5',6,6'-Octachlorobiphenyl
PCB 203	52663-76-0	2,2',3,4,4',5,5',6-Octachlorobiphenyl
PCB 205	74472-53-0	2,3,3',4,4',5,5',6-Octachlorobiphenyl
PCB 206	40186-72-9	2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl
PCB 207	52663-79-3	2,2',3,3',4,4',5,6,6'-Nonachlorobiphenyl
PCB 208	52663-77-1	2,2',3,3',4,5,5',6,6'-Nonachlorobiphenyl
PCB 209	2051-24-3	2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl
PCB 28	7012-37-5	2,4,4'-Trichlorobiphenyl
PCB 3	2051-62-9	4-Chlorobiphenyl
PCB 31	16606-02-3	2,4',5-Trichlorobiphenyl
PCB 35	37680-69-6	3,3',4-Trichlorobiphenyl
PCB 40	38444-93-8	2,2',3,3'-Tetrachlorobiphenyl
PCB 44	35065-28-2	2,2',3,5'-Tetrachlorobiphenyl
PCB 49	41464-40-8	2,2',4,5'-Tetrachlorobiphenyl
PCB 52	35693-99-3	2,2',5,5'-Tetrachlorobiphenyl
PCB 54	15968-05-5	2,2',6,6'-Tetrachlorobiphenyl
PCB 60	33025-41-1	2,3,4,4'-Tetrachlorobiphenyl
PCB 66	32598-10-0	2,3',4,4'-Tetrachlorobiphenyl
PCB 7	33284-50-3	2,4-Dichlorobiphenyl
PCB 77	32598-13-3	3,3',4,4'-Tetrachlorobiphenyl
PCB 8	34883-43-7	2,4'-Dichlorobiphenyl

PCB 86		55312-69-1	2,2',3,4,5-Pentachlorobiphenyl
PCB 87		38380-02-8	2,2',3,4,5'-Pentachlorobiphenyl
PCBs		---	(mixture)
PCN Halowax 1000		58718-66-4	(mixture)
PCN Halowax 1001		58718-67-5	(mixture)
PCN Halowax 1099		39450-05-0	(mixture)
Pentachlorobenzene		608-93-5	---
Pentachloroethane		76-01-7	---
Pentachloronitrobenzene		82-68-8	---
Pentachlorophenol		87-86-5	---
Pentachlorophenol-13C		*	Labeled Pentachlorophenol
Permethrin	•	52645-53-1	(3-Phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropane carboxylic acid ester
Perylene		198-55-0	Dibenz[de,kl]anthracene
Phenacetin	•	62-44-2	p-Acetophenetidide
Phenanthrene	•	85-01-8	---
Phenanthrene-d10		1517-22-2	Deuterated phenanthrene
Phenol		108-95-2	Carbolic acid
Phenol-d5		*	Deuterated phenol
Phthalic anhydride		85-44-9	---
Picloram	•	1918-02-1	4-Amino-3,5,6-trichloro-2-pyridine carboxylic acid
Piperonyl butoxide	•	51-03-6	5[(2-(2'-Butoxyethoxy)ethoxy)methyl)-6-propyl-1,3-benzodioxide
Pirimicarb	•	23103-98-2	2-(Dimethylamino)-5,6-dimethyl-4-pyridimidyl dimethylcarbamate
Pristane		1921-70-6	2,6,10,14-Tetramethylpentadecane
Prometryn	•	7287-19-6	2,4-bis(Isopropylamino)-6-(methylthio)-s-triazine
Propane		74-98-6	---
Propargyl alcohol		107-19-7	2-Propyn-1-ol
Propionic acid		79-09-4	Propanoic acid
Propionitrile		107-12-0	Propanenitrile
Propoxur	•	114-26-1	2-(1-Methylethoxy)phenyl methylcarbamate
Pyrene	•	129-00-0	Benzo[def]phenanthrene
Pyridine		110-86-1	---
Quintozene		---	see Pentachloronitrobenzene
Reserpine		50-55-5	---
Resorcinol		108-46-3	1,3-Benzenediol
Saccharin		81-07-2	0-Benzoic sulfimide
Safrole		94-59-7	5-(2-Propenyl)-1,3-benzodioxole

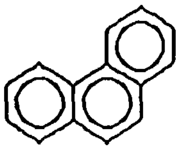
sec-Butylbenzene		135-98-8	(1-Methylpropyl)benzene
Silvex		- - -	see 2,4,5-TP
Simazine	•	122-34-9	2,4-diamine-6-Chloro-N,N'-diethyl-1,3,5-triazine
Styrene		100-42-5	- - -
t-Butylbenzene		98-06-6	1,1-Dimethylethylbenzene
Tecnazene		117-18-0	1,2,4,5-Tetrachloro-3-nitrobenzene
Terbutryn	•	886-50-0	N-(1,1-Dimethylethyl)-N')ethyl-6-(methylthio)-1,3,5-triazine-2,4-diamine
Tetrachloroethylene		127-18-4	Perchloroethylene
Tetradecane		629-59-4	- - -
Thioacetamide		62-55-5	- - -
Thiourea		62-56-6	- - -
Thiram	•	137-26-8	Tetramethylthiuram disulfide
Toluene		108-88-3	Methylbenzene
Toxaphene		8001-35-2	- - -
trans-1,2-Dichloroethane		- - -	see trans-1,2-Dichloroethylene
trans-1,2-Dichloroethylene		156-60-5	trans-1,2-Dichloroethene
trans-1,3-Dichloropropylene		10061-02-6	(E)-1,3-Dichloro-1-propene
trans-Permethrin		•	- - -
Trichloro-p-dioxin		- - -	(not specified)
Trichloro-p-dioxin-13C		•	Labeled trichloro-p-dioxin
Trichlorodibenzo-p-dioxin		- - -	(not specified)
Trichlorodibenzo-p-dioxin - 13C		- - -	(not specified)
Trichloroethylene		79-00-5	- - -
Trichlorofluoromethane		75-69-4	FREON 11
Tricosane		638-67-5	- - -
Trietazine		1912-26-1	6-Chloro-N,N,N'-triethyl-1,3,5-triazine-2,4-amine
Triphenylene	•	217-59-4	9,10-Benzphenanthrene
Urea		57-13-6	- - -
Urethane		51-79-6	Ethyl carbamate
Vinyl acetate		108-05-4	Ethylenethanoate
Vinyl chloride		75-01-4	Chloroethene

Appendix D
Selected Organic Compounds Structures

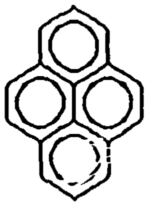
Anthracene
120-12-7



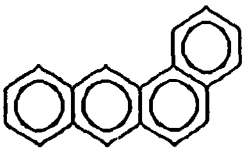
Chrysene
218-01-9



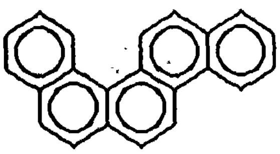
Phenanthrene
85-01-8



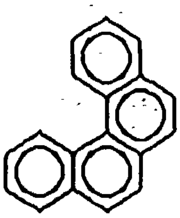
Pyrene
129-00-0



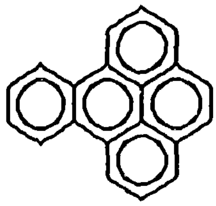
Benz[a]anthracene
56-55-3



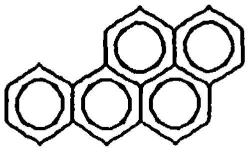
Benzo[c]chrysene
194-69-4



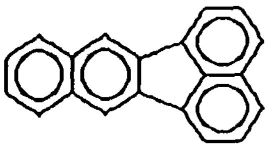
Benzo[c]phenanthrene
195-19-7



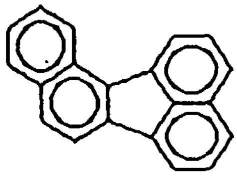
Benzo[e]pyrene
192-97-2



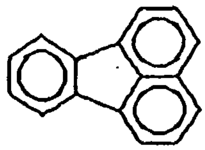
Benzo[a]pyrene
50-32-8



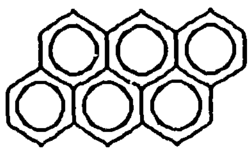
Benzo[k]fluoranthene
207-08-9



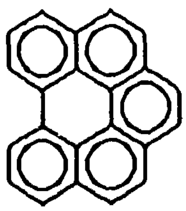
Benzo[j]fluoranthene
205-82-3



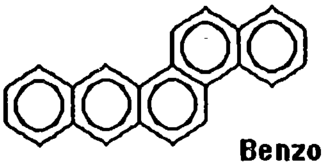
Fluoranthene
206-44-0



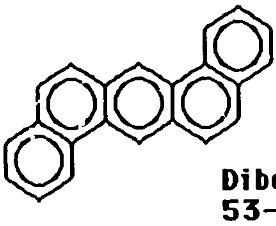
Anthanthrene
191-26-4



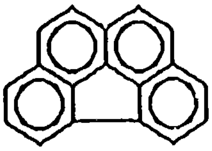
Benzo[ghi]perylene
191-24-2



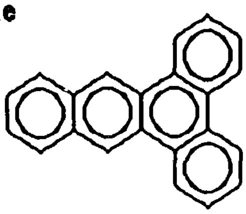
Benzo[b]chrysene
214-17-5



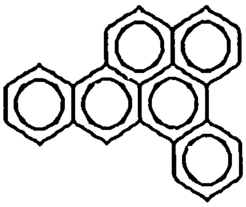
Dibenz[a,h]anthracene
53-70-3



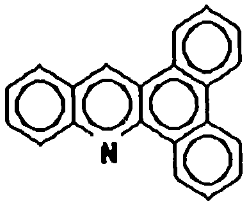
Benzo[ghi]fluoranthene
203-12-3



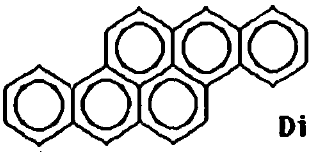
Dibenz[a,c]anthracene
215-58-7



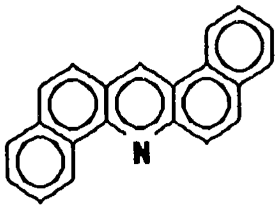
Dibenzo[a,e]pyrene
192-65-4



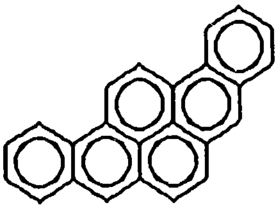
Dibenz[a,c]acridine
215-62-3



Dibenzo[a,h]pyrene

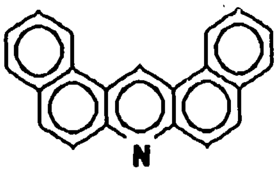


Dibenz[a,h]acridine
226-36-8

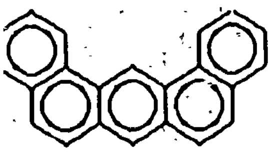


Dibenzo[a,i]pyrene
189-55-9

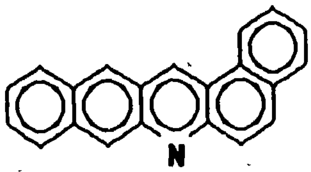
II.4.2



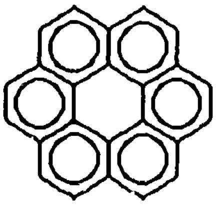
Dibenz[a,j]acridine
224-42-0



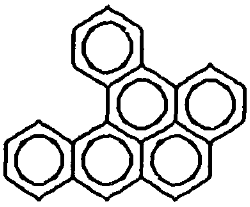
Dibenz[a,j]anthracene
224-41-9



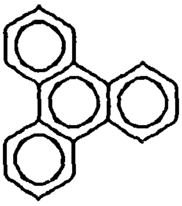
Dibenz[a,i]acridine
226-92-6



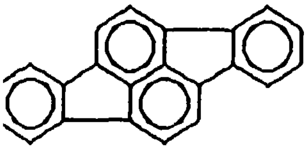
Coronene
191-07-1



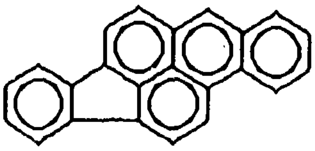
Dibenzo[a,l]pyrene
191-30-0



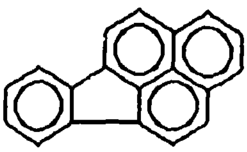
Triphenylene
217-59-4



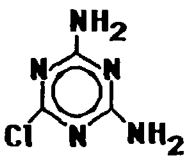
Indeno[1,2,3-cd]=
fluoranthene
193-43-1



Indeno[1,2,3-cd]=
perylene
101686-49-1

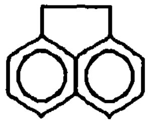


Indeno[1,2,3-cd]=
pyrene
193-39-5

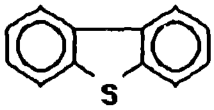


Simazine
122-34-9

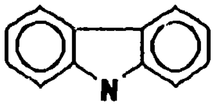
Acetanaphthylene
208-96-8



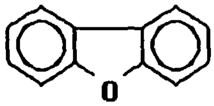
Acenaphthene
83-32-9



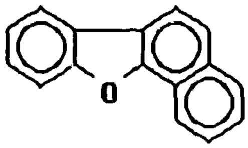
Dibenzothiophene
132-65-0



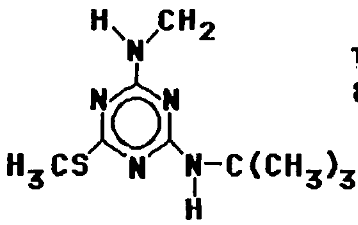
Carbazole
86-74-8



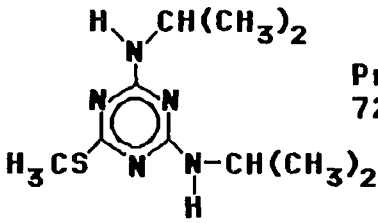
Dibenzofuran
132-64-9



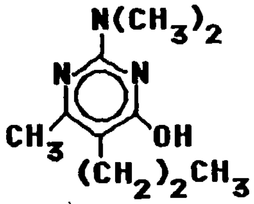
Benzo[b]naphtho=
[2,1-d]furan
239-30-5



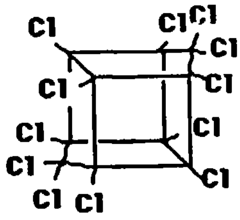
Terbutryn
886-50-0



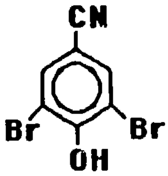
Prometryn
7287-19-6



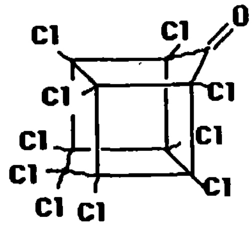
Dimethirimol
5221-53-4



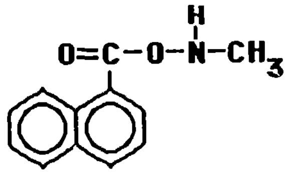
Mirex
2385-85-5



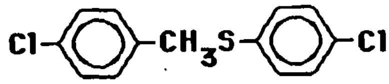
Bromoxynil
1089-84-5



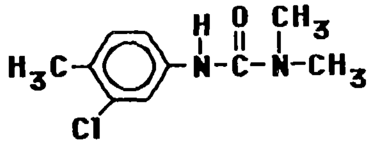
Kepone
143-50-0



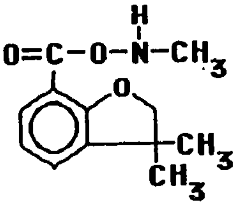
Carbaryl
63-25-2



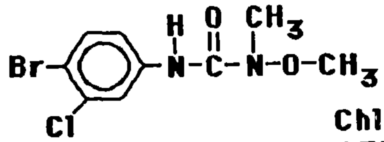
Chlorbenside
103-17-3



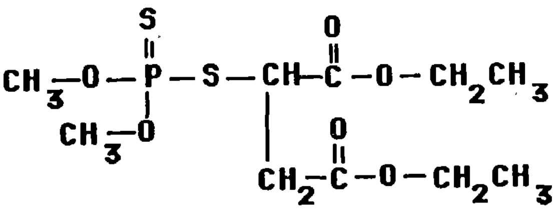
Chlortoluron
15545-48-9



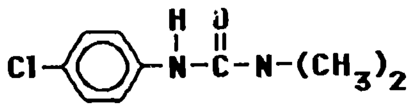
Carbofuran
1563-66-2



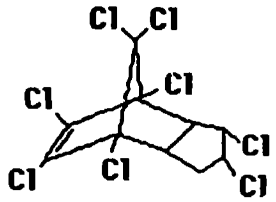
Chlorbromuron
13360-45-7



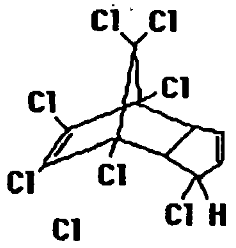
Malathion
121-75-5



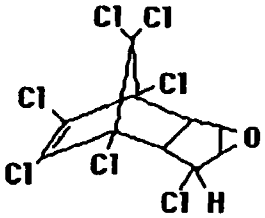
Monuron
150-68-5



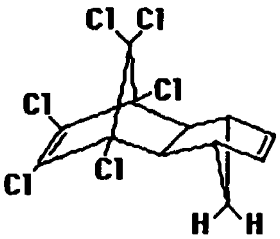
Chlordane
12789-03-6



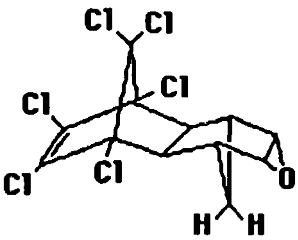
Heptachlor
76-44-8



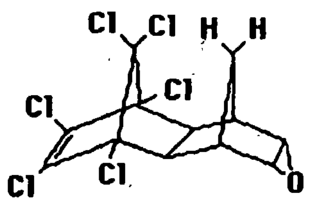
Heptachlor
epoxide
1024-57-3



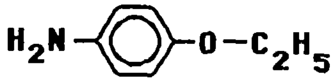
Aldrin
309-00-2



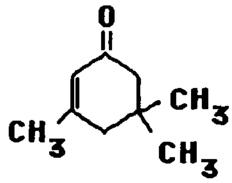
Dieldrin
60-57-1



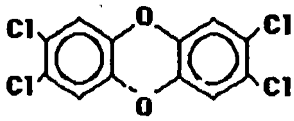
Endrin
72-20-8



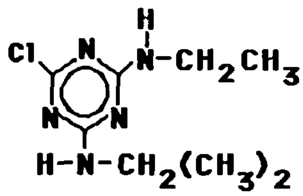
Phenacetin
62-44-2



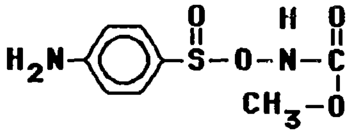
Isophorone
78-59-1



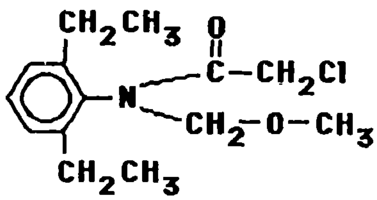
2,3,7,8-TCDD
1746-01-6



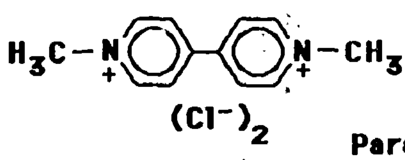
Atrazine
1912-24-9



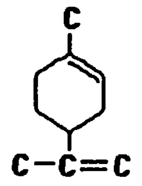
Asulam
3337-71-1



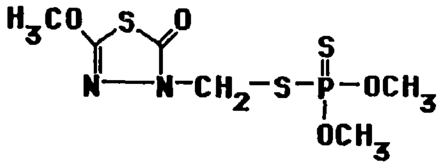
Alachlor
15972-60-8



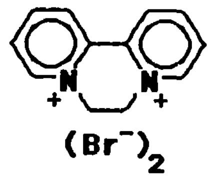
Paraquat chloride
1910-42-5



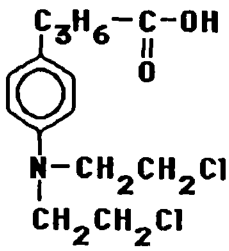
Limonene
138-86-3



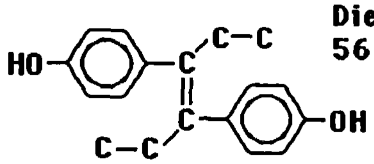
Methidathion
950-37-8



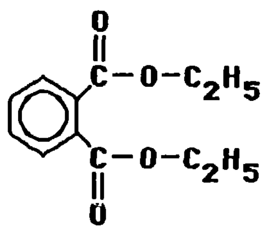
Diquat dibromide
85-00-7



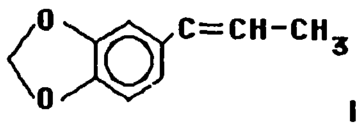
Chlorambucil
305-03-3



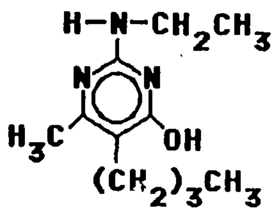
Diethylbestrol
56-53-1



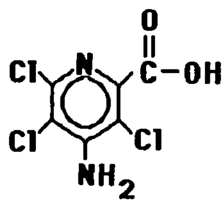
Diethyl phthalate
84-66-2



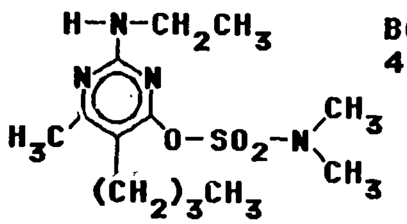
Isosafrole
120-58-1



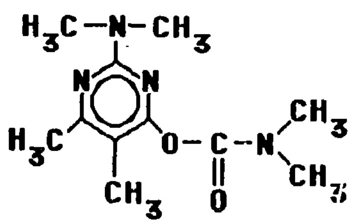
Ethirimol
23947-60-6



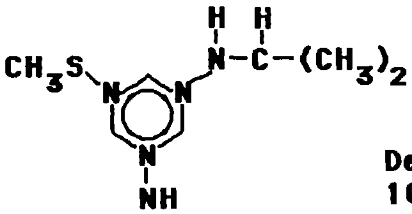
Picloram
1918-02-1



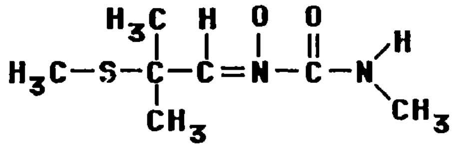
Bupirimate
41483-43-6



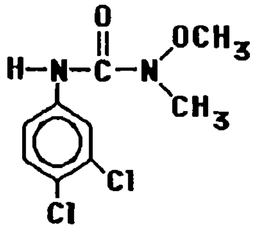
Pirimicarb
23103-98-2



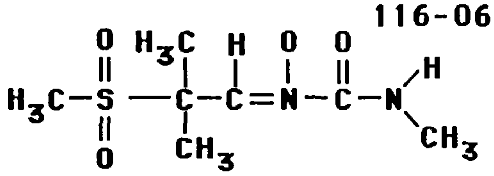
Desmetryn
1014-69-3



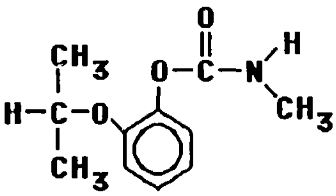
Aldicarb
116-06-3



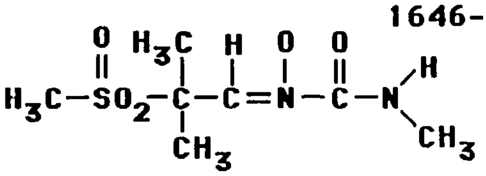
Linuron
330-55-2



Aldicarb sulfo
1646-88-4

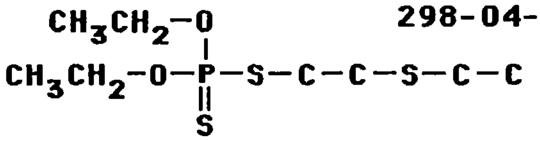


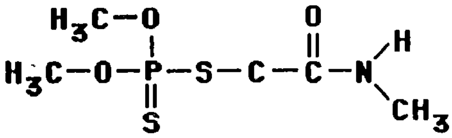
Propoxur
114-26-1



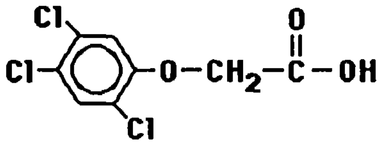
Aldicarb sulfoxide
1646-87-3

Disulfoton
298-04-4

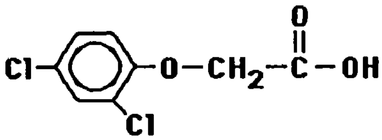




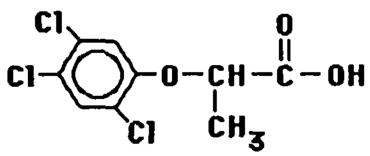
Dimethoate
60-51-5



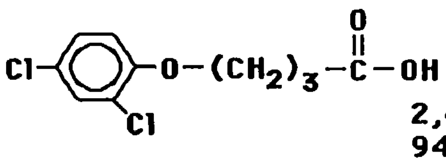
2,4,5-T
93-76-5



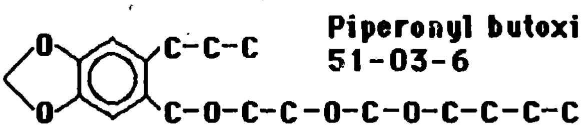
2,4-D
94-75-7



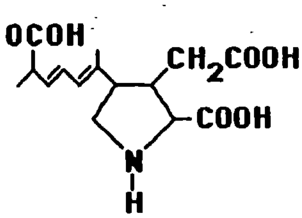
2,4,5-TP
93-72-1



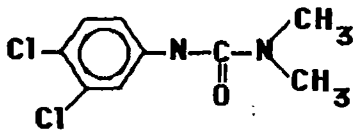
2,4-DB
94-28-6



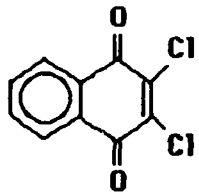
Piperonyl butoxide
51-03-6



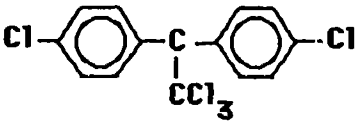
Domoic acid
14277-97-5



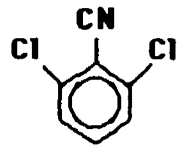
Diuron
330-54-1



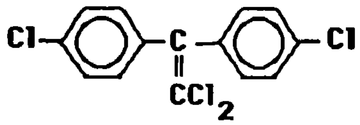
Dichlone
117-65-6



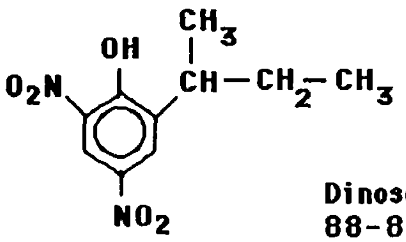
p,p'-DDT
50-29-3



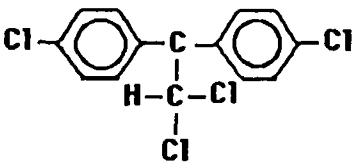
Dichlobenil
1194-65-6



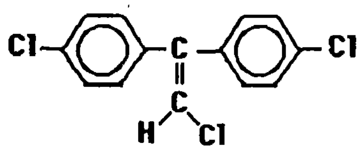
p,p'-DDE
72-55-9



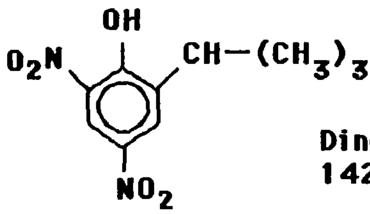
Dinoseb
88-85-7



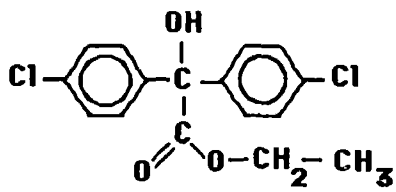
p,p'-DDD
72-54-8



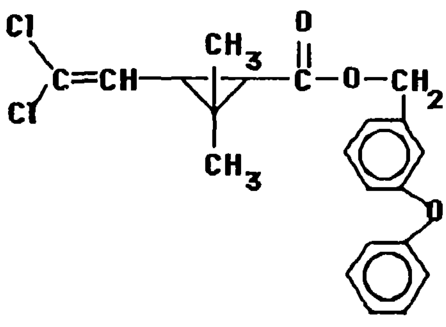
p,p'-TDE
(olefin)
(NA)



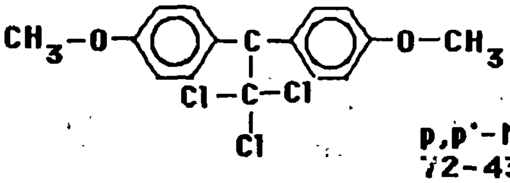
Dinoterb
1420-07-1



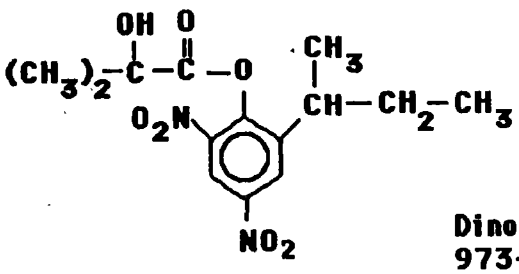
Chlorobenzilate
510-15-6



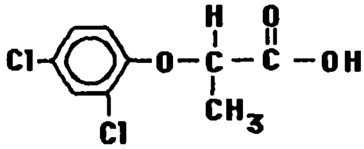
Permethrin
52645-53-1 (mixture)



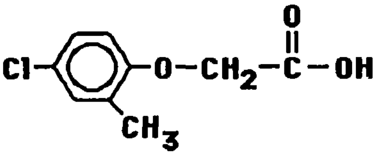
p,p'-Methoxychlor
72-43-5



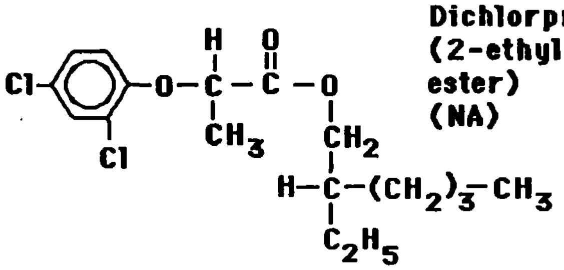
Dinobuton
973-21-7



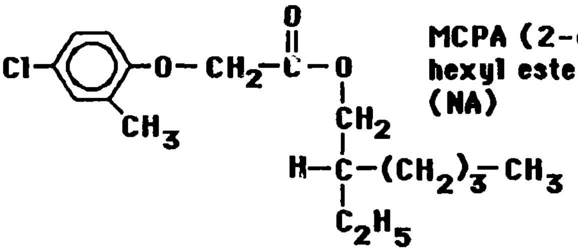
Dichlorprop
120-36-5



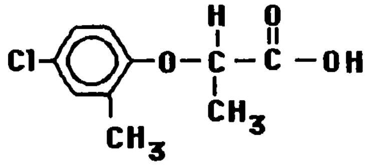
MCPA
94-74-6



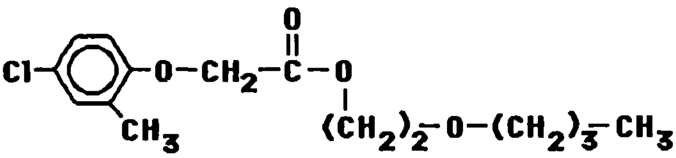
Dichlorprop
(2-ethylhexyl
ester)
(NA)



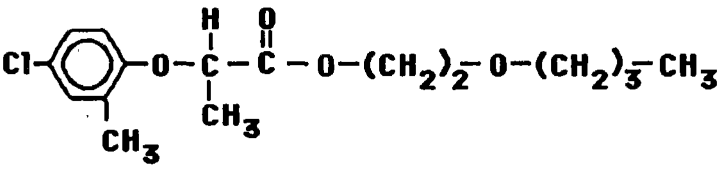
MCPA (2-ethyl=
hexyl ester)
(NA)



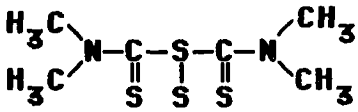
Mecoprop
7085-19-0



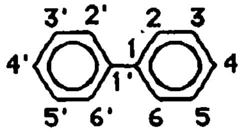
MCPA (2-butoxyethyl=
ester)
(NA)



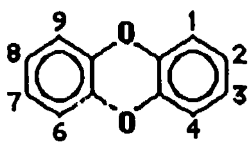
Mecoprop (2-butoxy=
ethyl ester)
(NA)



Thiram
137-26-8



PCB
(parent structure)



Dioxin
(parent structure)

ASHES

CRM 038

Coal Fly Ash

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of fly ash from pulverized coal.

Certified concentration (µg/g)* :

Element	Value	Uncertainty (±)
Na	3.74	0.15
V	(334)	
Cr	(178)	
Mn	479	16
Fe (mg/g)	33.8	0.7
Co	53.8	1.9
Ni	(194)	
Cu	176	9
Zn	581	29
As	48.0	2.3
Cd	4.6	0.3
Hg	2.10	0.15
Pb	262	11
Th	(17.3)	

Order information:

CRM 038 can be purchased for 1500 BFR per unit (5-g vial) respectively. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

* Values in parenthesis not certified.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

CRM 176

City Waste Incineration Ash

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of ash from city waste incineration.

Certified concentrations (µg/g)* :

Element	Value	Uncertainty (±)
S	(44.6)	
Cr	863	30
Mn	(1.5)	
Fe	21.3	1.1
Co	30.9	1.3
Ni	123.5	4.2
Cu	1302	26
Zn	25.77	0.38
Se	41.2	2.1
As	(93.3)	
Cd	470	9
Sb	412	18
Hg	31.4	1.1
Tl	2.85	0.19
Pb	10.87	0.17

* Values in parenthesis not certified.

Matrix non-certified concentrations (mg/g):

Oxide	Value
Na_2O	58.0
MgO	36.2
Al_2O_3	191.9
P_2O_5	12.7
K_2O	54.2
CaO	123.1
TiO_2	14.2
SiO_2	300.3

Order information:

CRM 176 can be purchased for 2500 per unit (30-g vial) respectively. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

NIES No. 8

Vehicle Exhaust Particulates

Source:

National Institute for Environmental Studies
Yatabe-machi
Tsukuba, Ibaraki, 305
JAPAN

Description:

This material was prepared from particulate matter collected from electrostatic precipitators in very large ventilators connected to a highway tunnel. The collected material was mixed by making a paste with 35% ethanol, air dried, oven dried, ground, sieved, and homogenized in a polyethylene container in a ball-mill apparatus. The material contains approximately 80% C.

Certified concentrations (µg/g unless noted):

Element	Value	Uncertainty (±)
Na (%)	0.192	0.008
Mg (%)	0.101	0.005
Al (%)	0.33	0.02
K (%)	0.115	0.008
Ca (%)	0.53	0.02
V	17	2
Cr	25.5	1.5
Co	3.3	0.3
Ni	18.5	1.5
Cu	67	3
Zn (%)	0.104	0.005
As	2.6	0.2
Sr	89	3
Cd	1.1	0.1
Sb	6.0	0.4
Pb	219	9

Reference concentrations (µg/g unless noted):

Element	Value
P	510
Sc	0.55
Se	1.3
Br	56
Rb	4.6
Mo	6.4
Ag	0.20
Cs	0.24
La	1.2
Ce	3.1
Sm	0.20
Eu	0.05
Lu	0.02
Th	0.35

Order Information:

NIES No. 8 (7-g bottles) can be obtained free of charge. Please contact Dr. K. Okamoto at the address shown above.

Reference:

National Institute for Environmental Studies (1987) NIES certified reference material "Vehicle Exhaust Particulates." Information sheet. National Institute for Environmental Studies, Yatabe-machi, Tsukuba, Ibaraki, 305, Japan.

Okamotom K. (1987) A new certified reference material, vehicle exhaust particulates. Analytical Sciences, 3:(191-2)

SRM 1633a

Trace Elements in Coal Fly Ash

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The fly ash was obtained from a coal fired power plant and is a product of Pennsylvania and West Virginia, USA, coals. The ash was sieved and blended for two hours.

Certified concentrations (µg/g dry weight unless noted):

Element	Value	Uncertainty (±)
Na (%)	0.17	0.01
Mg (%)	0.455	0.010
Al (%)	14.3	1.0
Si (%)	22.8	0.8
K (%)	1.88	0.06
Ca (%)	1.11	0.01
V	297	6
Cr	196	6
Mn	179	8
Fe (%)	9.4	0.1
Ni	127	4
Cu	118	3
Zn	220	10
As	145	15
Se	10.3	0.6
Rb	131	2
Sr	830	30
Cd	1.00	0.15
Sb	6.8	0.4
Hg	0.16	0.01
Tl	5.7	0.2
Pb	72.4	0.4
Th	24.7	0.3
U	10.2	0.1

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value
Be	12
S (%)	0.18
Ti (%)	0.8
Sc	40
Co	46
Ga	58
Mo	29
Cs	11
Ba	0.15
Ce	180
Eu	4
Hf	8

Order information:

SRM 1633a can be purchased for US$156 per unit (75-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1985) SRM 1633a. Trace elements in coal fly ash. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1648

Urban Particulate Matter

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This material was prepared from urban particulate matter collected in the St. Louis, Missouri, USA, area using filter bags. The collected particulate matter was sieved, blended and bottled. The material was collected over a period of 12 months and is, therefore, time integrated.

Certified concentrations (µg/g unless noted):

Element	Value	Uncertainty (±)
Na (%)	0.425	0.002
Al (%)	3.42	0.11
K (%)	1.05	0.01
V	140	3
Cr	403	12
Fe (%)	3.91	0.10
Ni	82	3
Cu	609	27
Zn (%)	0.479	0.014
As	115	10
Se	27	1
Cd	75	7
Pb (%)	0.655	0.008
U	5.5	0.1

Noncertified concentrations (µg/g unless noted):

Element	Value
Mg (%)	0.8
S (%)	5.0
Cl (%)	0.45
Sc	7
Ti (%)	0.40
Mn	860
Co	18
Br	500
Rb	52
Ag	6
In	1.0
I	20
Sb	45
Cs	3
Ba	737
La	42
Ce	55
Sm	4.4
Eu	0.8
Hf	4.4
W	4.8
Th	7.4

Order information:

SRM 1648 can be purchased for US$159 per unit (2-g vials). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1982) SRM 1648. Urban particulate matter. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1649

Urban Dust/Organics

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This material was prepared from urban particulate matter collected in the St. Louis, Missouri, USA, area using filter bags. The collected particulate matter was sieved, blended and bottled. The material was collected over a period of 12 months and is, therefore, time integrated.

Certified concentrations (μg/g):

Compound	Value	Uncertainty (±)
Fluoranthene	7.1	0.5
Benz[a]anthracene	2.6	0.3
Benzo[a]pyrene	2.9	0.5
Benzo[ghi]perylene	4.5	1.1
Indeno[1,2,3-cd]pyrelene	3.3	0.5

Noncertified concentrations (μg/g unless noted)* :

Compound	Value	Uncertainty (±)
Phenanthrene	4.5	0.3
Pyrene	6.2	0.2
Chrysene	3.7	0.2
Triphenylene	1.7	0.1
Perylene	0.65	0.02
Benzo[e]pyrene$^{\Delta}$	3.3	0.2

* Liquid chromatography using perylene-d_{12} as internal standard unless noted.

$^{\Delta}$ Gas chromatography.

Compound	Value	Uncertainty (±)
Benzo[b]fluoranthene[◊]	6.2	0.3
Benzo[k]fluoranthene	2.1	0.1
Dibenz[a,h]anthracene	0.41	0.07

Element	Value	Uncertainty (±)
S (%)	3.27	0.08
Cl (%)	0.282	0.014
Sc	8.73	0.08
Cr	211	3
Co	16.4	0.3
Fe (%)	3.00	0.02
Zn (%)	0.167	0.003
As	67.0	1.4
Se	25.6	0.5
Br (%)	0.119	0.001
Rb	47	5
Mo	14	3
Ag	3.5	0.3
Cd	18	3
Sn	56	26
Sb	29.9	0.7
Cs	2.85	0.10
Ba	569	35
La	33.3	0.3
Ce	51.6	1.1
Sm	4.71	0.05
Eu	0.87	0.04
Hf	4.41	0.10
W	3.8	0.9
Th	6.63	0.14
U	2.65	0.16

Order information:

SRM 1649 can be purchased for US$205 per unit (10-g vials). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1982) SRM 1649. Urban dust/organics. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

◊ Liquid chromatography using 7-methylfluoranthene as internal standard.

SRM 1650

Diesel Particulate Matter

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This material was collected from the heat exchangers of a dilution tube facility following 200 engine hours of particle accumulation. More than one four-cycle diesel engine, operating under a variety of conditions, was used to generate the particulate material.

Certified concentrations (µg/g):

Compound	Value	Uncertainty (±)
Fluoranthene	51	4
Pyrene	48	4
Benz[a]anthracene	6.5	1.1
Benzo[a]pyrene	1.2	0.3
Benzo[ghi]perylene	2.4	0.6
1-Nitropyrene	19	2

Noncertified concentrations (µg/g):

Compound	Value
Phenanthrene	71
Chrysene	22
Benzo[k]fluoranthene	2.1
Benzo[e]pyrene	9.6
Perylene	0.13
9-Fluorenone	33
Indeno[1,2,3-cd]pyrene	2.3
2-Nitrofluorene	0.2
7-Nitrobenz[a]anthracene	2.8
6-Nitrobenzo[a]pyrene	1.6

Order information:

SRM 1650 can be purchased for US$325 per unit (5 vials). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1985) SRM 1650. Diesel particulate matter. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2689 - 2691

Coal Fly Ashes

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Fly ahes were obtained from three different coal-fired power plants and are products of Kentucky, Colorado and Wyoming, USA, coals. Coarse particles found in the ash, mostly quartz and partially burned fragments, were ground to pass through a No. 100 (150 µm) sieve and blended back into the rest of the ash. The material was then homogenized in a ribbon blender and hermetically sealed in glass vials under controlled temperature and humidity conditions. These SRMs are intended for use in the evaluation of analytical methods and techniques used in the classification of coal fly ash and for the determination of constituent elements in coal fly ash and/or materials of similar matrix.

Certified concentrations (weight percent):

	SRM					
	2689		2690		2691	
Element	Value	Uncertainty (±)	Value	Uncertainty (±)	Value	Uncertainty (±)
Na	0.25	0.03	0.24	0.02	1.09	0.05
Mg	0.61	0.05	1.53	0.05	3.12	0.08
Al	12.94	0.21	12.35	0.28	9.81	0.39
Si	24.06	0.08	25.85	0.17	16.83	0.12
P	0.10	0.01	0.52	0.01	0.51	0.02
S	-	-	0.15	0.01	0.83	0.05
K	2.20	0.03	1.04	0.04	0.34	0.01
Ca	2.18	0.06	5.71	0.13	18.45	0.32
Ti	0.75	0.01	0.52	0.01	0.90	0.02
Fe	9.32	0.06	3.57	0.06	4.42	0.03

	SRM 2689	SRM 2690	SRM 2691

Noncertified concentrations (weight percent):

Element	Value	Value	Value
Mn	0.03	0.03	0.02
Sr	0.07	0.20	0.27
Ba	0.08	0.65	0.66

Source and description of raw materials:

Coal type	Bituminous	Sub-bituminous	Sub-bituminous
Mine	Western Kentucky	Craig, Colorado	Gillette, Wyoming
Btu/lb	12,000	9,700	8,800
Ash (wt. %)	12	5.3	4.8
S (wt. %)	1.5	0.3	0.3

Order information:

Each of these SRMs can be purchased for US$130 per unit (3 10-g vials). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1986) SRM 2689, 2690, and 2691. Coal fly ashes. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

GASES

CRM 313 - 317

Carbon Monoxide and Nitrous Oxide in Nitrogen

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

These CRMs are gas mixtures intended primarily for the laboratories in charge of the verification of automobile exhaust gases.

Certified concentrations (%):

CRM	Chemical	Value	Uncertainty (±)
313	CO	4.483	0.013
314	CO	500.9	1.5
315	CO	50.2	0.2
316	CO	9.63	0.03
317	NO	95.7	0.4

Order information:

CRM 313 and 314 can be purchased for 30000 per unit (100-bar cylinder); CRM 315 and 316, for 20000 per unit (90-bar cylinder); and CRM 317, for 25000 per unit (90-bar cylinder). Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

CRM 366 - 367

Sulfur Dioxide in Air

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

These CRMs are sulfur dioxide in synthetic dry air. No further information available.

Certified concentrations (µmole/mole):

CRM	Value
366	0.4
367	0.1

Order information:

No further information available. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

SRM 1625 through 1912

Gas Permeation Tubes

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are used in the preparation of mixtures of known gaseous content for calibrating air pollution monitoring apparatus. Each permeation tube is individually calibrated and certified permeation rates are reported for temperatures in the range of 20° to 30°C.

SRM	Chemical	Permeation rate (µg/min) at 25°C
1625	SO_2	2.8
1626	SO_2	1.4
1627	SO_2	0.56
1629a	NO_2	1.0
1911	Benzene	0.4
1912	Tetrachloroethylene	1.0

Order information:

SRM 1625, 1626, 1627, 1629a, 1911 and 1912 can be purchased for US$248, 328, 210, 319, 405 and 381 per unit respectively. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1985) SRM 1912. Tetrachloroethylene permeation device. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD.

National Bureau of Standards (1987) SRM 1625. Sulfur dioxide permeation tube. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD.

National Bureau of Standards (1987) SRM 1627. Sulfur dioxide permeation tube. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD.

National Bureau of Standards (1987) SRM 1629a. Nitrogen dioxide permeation device. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD.

National Bureau of Standards (1988) SRM 1911. Benzene permeation device. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD.

National Bureau of Standards (1989) SRM 1626. Sulfur dioxide permeation tube. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD.

SRM 1658a - 1660a

Methane and Propane in Air

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of methane and propane (μmole/ mole):

SRM	Chemical	Value
1658a	Methane	1
1659a	Methane	10
1660a	Methane	4
	Propane	1

Order information:

These SRMs are available for US$673 per cylinder. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1661a through 1696

Sulfur Dioxide in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of sulfur dioxide (μmole/mole):

SRM	Value
1661a	500
1662a	1000
1663a	1500
1664a	2500
1693a	50
1694a	100
1696	3500

Order information:

SRM 1661a, 1663a, 1664a and 1696 are available for US$636; and SRM 1662a for US$609. No prices are available for SRM 1693a and 1694a. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1665b - 1669b

Propane in Air

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of propane (µmole/mole unless noted):

SRM	Value
1665b	3
1666b	10
1667b	50
1668b	100
1669b	500

Order information:

These SRMs are available for US$676 except for SRM 1668b which is available for US$659 and SRM 1669b for US$673. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1670 - 1672

Carbon Dioxide in Air

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of carbon dioxide (μmole/mole):

SRM	Value
1670	330
1671	340
1672	350

Order information:

These SRMs are available for US$673. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1674b through 2634

Carbon Dioxide in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of carbon dioxide (mole percent):

SRM	Value
1674b	7.0
1675b	14.0
2619a	0.5
2620a	1.0
2621a	1.5
2622a	2.0
2623a	2.5
2624a	3.0
2625a	3.5
2626a	4.0
2633	400
2634	800

Order information:

SRM 1674b and 1675b are available for US$693; 2619a for US$613; 2620a, 2621a, 2623a, and 2625a for US$621; SRM 2622a and 2624a for US$589; SRM 2626a for US$610; and SRM 2633 and 2634 for US$509. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1677c through 2642a

Carbon Monoxide in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of carbon monoxide (μmole/mole unless noted):

SRM	Value
1677c	10
1678c	50
1679c	100
1680b	500
1681b	1000
2635a	25
2636a	250
2637a	2500
2638a	5000
2639a	1 mole percent
2640	2 mole percent
2641	4 mole percent
2642a	8 mole percent

Order information:

SRM 1677c, 1678c, 1679c and 1680b are available for US$621; SRM 1681b, 2640 and 2641 for US$693; SRM 2635a for US$813; SRM 2636a for US$834; and SRM 2637a, 2638a, 2639a and 2642a for US$831. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1683b through 2631

Nitric Oxide in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of nitric oxide (µmole/mole):

SRM	Value
1683b	50
1684b	100
1685b	250
1686b	500
1687b	1000
2627a	5
2628a	10
2629a	20
2630	1500
2631	3000

Order information:

SRM 1683b and 1684b are available for US$912; 1685b and 1686b for US$885; SRM 2627a, 2628a and 2629a for US$1045; and SRM 2630 and 2631 for US$787. No price is available for SRM 1687b. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1804

Volatile Toxic Organics in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations (5 nmole/mole):

Compound

Vinyl chloride
1,3-Butadiene
Bromomethane
Trichlorofluoromethane
Dichloromethane
Chloroform
1,2-Dichloroethane
1,1,1-Trichloroethane
Benzene
Carbon tetrachloride
1,2-Dichloropropane
Trichloroethylene
Toluene
1,2-Dibromoethane
Tetrachloroethylene
Chlorobenzene
Ethylbenzene
o-Xylene

Order information:

Price not available at the time of writing (Summer 1989). Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1805 - 1806

Benzene in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of benzene (μmole/mole):

SRM	Value
1805	0.25
1806	10

Order information:

These SRMs are available for US$860. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1808 - 1809

Tetrachloroethylene in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of tetrachloroethylene (µmole /mole):

SRM	Value
1808	0.25
1809	10

Order information:

These SRMs are available for US$875. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1811 - 1814

Organic Gases in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

SRM 1811 **Aromatic organic gases (0.25 ppm of each compound)**

Benzene
Toluene
Chlorobenzene
Bromobenzene

SRM 1812 **Aromatic organic gases (10 ppm of each compound)**

Benzene
Toluene
Chlorobenzene
Bromobenzene

SRM 1813 **Aliphatic organic gases (0.25 ppm of each compound)**

Carbon tetrachloride
Chloroform
Tetrachloethylene
Vinyl chloride

SRM 1814 **Aliphatic organic gases (10 ppm of each compound)**

Carbon tetrachloride
Chloroform
Tetrachloethylene
Vinyl chloride

Order information:

SRM 1811 and 1812 can be purchased for US$1564 per cylinder; SRM 1813 for US$1566; and SRM 1814 for US$1466 per cylinder. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2607 - 2610

Carbon Dioxide and Nitrous Oxide in Air

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations (μmole/mole):

SRM	Compound	Value
2607, 2608	CO_2	340
	N_2O	300
2609, 2610	CO_2	380
	N_2O	330

Order information:

SRM 2607 and 2609 can be purchased for US$2407 per unit (3.7 cubic meters); and SRM 2608 and 2610 can be purchased for US$676 per unit (0.71 cubic meters). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2612a - 2614a

Carbon Monoxide in Air

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of carbon monoxide (μmole/mole):

SRM	Value
2612a	10
2613a	20
2614a	45

Order information:

These SRMs are available for US$621. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2645a through 2650

Propane in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of propane (µmole/mole unless noted):

SRM	Value
2645a	500
2646a	1000
2647a	2500
2648a	5000
2649	1 mole percent
2650	2 mole percent

Order information:

SRM 2645a, 2646a, 2647a and 2648a are available for US$815; and SRM 2649 and 2650 for US$509. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2651 - 2652

Propane and Oxygen in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of oxygen (mole percent):

SRM	Compound	Value
2651	Propane	0.01
	Oxygen	5.0
2652	Propane	0.01
	Oxygen	10.0

Order information:

These SRMs are available for US$509. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2654 - 2656

Nitrogen Dioxide in Air

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of nitrogen dioxide (µmole/mole):

SRM	Value
2654	500
2655	1000
2656	2500

Order information:

These SRMs are available for US$787. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2657a - 2659a

Oxygen in Nitrogen

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for calibrating apparatus used to measure various components of gas mixtures and atmospheric pollutants.

Certified concentrations of oxygen (mole percent):

SRM	Value
2657a	2
2658a	10
2659a	21

Order information:

These SRMs are available for US$690. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

INSTRUMENTAL PERFORMANCE

CLB-1

Individual Chlorinated Biphenyls (PCBs) in Isooctane

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Atlantic Research Laboratory
1411 Oxford Street
Halifax, Nova Scotia B3H 2Z1
CANADA

Description:

CLB-1 is a set of four mixtures of pure, synthetic chlorinated biphenyls (PCBs) in isooctane. The set includes 51 compounds, and composition of each mixture has been selected to assure easy chromatographic resolution of the components. To help assess the resolution of the separation, each mixture contains a pair of congeners which elute closely. CLB-1-D contains the group of PCBs which were tentatively determined in HS-1 and HS-2. The congener nomenclature is described in Ballschmiter and Zell (1980), and the general purpose chemical nomenclature can be found in the Appendix C.

Certified concentrations of PCB congeners (μg/mL):

CLB-1-A

PCB*		Value
18		11.9
54		16.8
31		6.7
49		7.8
44		6.0
40		5.0
121		3.1
86	R**	2.9
87	R	3.9
77		5.6
153		2.1
159		1.2
156		1.5
209		1.8

CLB-1-B

PCB*		Value
15		92.8
52		15.4
103		10.9
60		3.9
154		6.3
143		6.1
105		4.2
182		4.0
128		5.0
202	R	3.7
173	R	2.3
208		2.5
207		4.0
205		3.3
209		2.9

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* In order of GLS elution (fused silica capillary column coated with SE-54).
** R is a resolution testing pair.

CLB-1 (cont.)

CLB-1-C PCB*		Value	CLB-1-D PCB*		Value
15		139.5	15		77.5
114		6.4	101		9.0
153		7.4	151		5.1
137		8.0	118		3.9
129		8.7	153		3.4
183		7.3	141		2.8
185		3.8	138		4.2
171	R	5.3	187		3.4
200	R	8.4	180		2.9
191		5.1	170		3.2
201	R	5.9	201	R	4.4
203	R	5.2	196	R	3.5
189		4.9	195		2.6
206		7.4	194		2.4
209		5.3	209		2.8

Order information:

CLB-1 can be purchased for US$105 per unit (set of 4 1-mL ampoules). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

Ballschmiter, K., and M. Zell (1980) Analysis of polychlorinated biphenyls (PCB) by glass capillary gas chromatography. Fresenius Z. Anal. Chem., 302:20-31.

National Research Council Canada (1985) CLB-1. Mixtures in isooctane of individual chlorinated biphenyl (PCB) compounds. Description sheet. National Research Council Canada, Marine Analytical Standards Program, Halifax, Nova Scotia, B3H 3Z1, Canada.

CRM 034 through 183

Organic Compounds for Elemental Analysis

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

Homogeneity has been demonstrated at the 1 mg level. No further information available.

Ceritified values (mg/g):

	Element	Value	Uncertainty (±)
CRM 034 Bis(diethyltinchloride) oxide $C_8H_{20}Cl_2OSn_2$	C	218.1	0.4
	H	45.4	0.3
	Cl	160.8	0.5
	O	36.8	0.6
	Sn	538.0	0.7
CRM 035 Triphenylleadimidazole $C_{21}H_{18}N_2Pb$	C	498.7	0.5
	H	36.1	0.4
	N	54.9	0.3
	Pb	409.6	0.7
CRM 036 Mercurisuccinimide $C_8H_8HgN_2O_4$	C	242.3	0.4
	H	20.3	0.3
	N	70.6	0.4
	O	161.1	0.6
	Hg	505.7	0.6

	Element	Value	Uncertainty (±)
CRM 071			
N-(4-Bromophenyl)-N-(2-chloro-4-nitrophenyl) thiourea			
$C_{13}H_9BrClN_3O_2S$	C	403.9	0.3
	H	23.7	0.3
	Br	206.5	0.4
	Cl	91.7	0.5
	N	108.5	0.5
	O	82.8	0.4
	S	83.0	0.5
CRM 072			
N-(4-Chloro-4-nitrophenyl)-N-(4-iodophenyl) thiourea			
$C_{13}H_9ClIN_3O_2S$	C	361.3	1.0
	H	21.0	0.4
	Cl	81.1	0.8
	I	293.2	0.8
	N	96.5	0.6
	O	73.3	0.6
	S	73.5	0.5
CRM 073			
1-[1-(4-Bromophenylmethyl)-4-piperidinyl]-5-chloro-2-(trifluoromethyl)-1H-benzimidazole			
$C_{20}H_{18}BrClF_3N_3$	C	507.9	0.5
	H	38.4	0.2
	Br	169.0	0.5
	Cl	74.9	0.7
	F	120.7	0.4
	N	88.8	0.5
CRM 127			
Tetramethylammonium tetraphenylborate			
	C	855.0	0.6
	H	82.1	0.3
	N	35.5	0.4
	B	27.4	0.1
CRM 183			
Bis(triphenylphosphine)-copper-trifluoromethanesulfonate			
	C	602.9	0.4
	H	41.2	0.3
	F	77.1	0.6
	S	43.5	0.7
	P	84.2	0.6
	Cu	85.4	0.6

Order Information:

These standards can be purchased for 2000 BFR per unit (5-g bottle except for CRM 183 available in 1-g bottles and CRM 073 available in 4-g bottles). Prices include handling and normal postage. Price subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

CRM 046 through 370

Polycyclic Aromatic Hydrocarbons

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

These standards are representative of the many polycyclic aromatic compounds present in the environment which are known or suspected to be carcinogenic. The certified purity of these materials ranges from 99.0 to 99.8%. The standards are available in units of 100 mg of homogeneous powder in screw-capped amber vials unless noted.

Standards of certified purity:

Standard	Chemical	Vial size
CRM 046	Benzo[b]chrysene	
CRM 047	Benzo[b]fluoranthene	
CRM 048	Benzo[k]fluoranthene	
CRM 049	Benzo[j]fluoranthene	
CRM 050	Benzo[e]pyrene	
CRM 051R	Benzo[a]pyrene	
CRM 052	Benzo[ghi]perylene	
CRM 053	Indeno[1,2,3-cd]pyrene	
CRM 077	1-Methylchrysene	
CRM 078	2-Methylchrysene	
CRM 079	3-Methylchrysene	
CRM 080	4-Methylchrysene	
CRM 081R	5-Methylchrysene	
CRM 082	6-Methylchrysene	
CRM 091	Anthanthrene	
CRM 092	10-Azabenzo[a]pyrene	
CRM 093	1-Methylbenz[a]anthracene	
CRM 094	Dibenz[a,c]anthracene	

CRM 046 - 370 (cont.)

Standard	Chemical	Vial size
CRM 095	Dibenz[a,j]anthracene	
CRM 096	Dibenzo[a,l]pyrene	
CRM 097	Benzo[a]fluoranthene	
CRM 133	Dibenzo[a,e]pyrene	
CRM 134	Benzo[c]phenanthrene	
CRM 135	Benzo[b]naphtho[2,1-d]thiophene	
CRM 136	Benzo[b]naphtho[2,3-d]thiophene	
CRM 137	Benzo[b]naphtho[1,2-d]thiophene	
CRM 138	Dibenz[a,h]anthracene	
CRM 139	Benzo[ghi]fluoranthene	
CRM 140	Benzo[c]chrysene	
CRM 152	Dibenz[a,i]acridine	+
CRM 153	Dibenz[a,h]acridine	
CRM 154	Dibenz[a,j]acridine	
CRM 155	Dibenz[a,c]acridine	
CRM 156	Dibenz[c,h]acridine	
CRM 157	Benz[a]acridine	
CRM 158	Benz[c]acridine	
CRM 159	Dibenzo[a,h]pyrene	
CRM 160	Fluoranthene	
CRM 168	1-Nitropyrene	*
CRM 177	Pyrene	
CRM 265	Dibenzo[a,e]fluoranthene	+
CRM 266	7H-Dibenzo[c,g]carbazole	+
CRM 267	Indeno[1,2,3-cd]fluoranthene	+
CRM 268	Dibenzo[a,i]pyrene	+
CRM 269	Chrysene	+
CRM 270	Triphenylene	+
CRM 271	Benz[a]anthracene	+
CRM 272	Coronene	+
CRM 289	2,4'-Dichlorobiphenyl	+
CRM 290	2,3,3'-Trichlorobiphenyl	+
CRM 291	2,4,4'-Trichlorobiphenyl	+
CRM 292	3,3',4-Trichlorobiphenyl	+
CRM 293	2,2',5,5',-Tetrachlorobiphenyl	+
CRM 294	2,2',4,5,5',-Pentachlorobiphenyl	+
CRM 295	2,3',4,4',5-Pentachlorobiphenyl	+
CRM 296	2,2',3,4,4',5-Hexachlorobiphenyl	+
CRM 297	2,2',4,4',5,5'-Hexachlorobiphenyl	+
CRM 298	2,2',3,4,4',5,5'-Heptachlorobiphenyl	+
CRM 305	1-Nitropyrene	*
CRM 306	1-Nitronaphthalene	*
CRM 307	2-Nitronaphthalene	*
CRM 308	9-Nitroanthracene	*
CRM 309	6-Nitrochrysene	*
CRM 310	3-Nitrofluoranthene	*
CRM 311	6-Nitrobenzo[a]pyrene	*
CRM 312	2-Nitro-7-methoxynaphtho[2,1-b]furan	*

+ 25-mg vial.
* 10-mg vial.

CRM 046 - 370 (cont.)

Standard	Chemical	Vial size
CRM 337	Dibenzo[b,d]furan	
CRM 338	4H-Cyclopenta[def]phenanthrene-4-one	
CRM 339	Benzo[c,d]pyren-6-one	
CRM 340	Benzo[b]naphto[1,2-d]furan	
CRM 341	Benzo[b]naphto[2,1-d]furan	
CRM 342	Benzo[a]fluorenone	
CRM 343	3-Hydroxybenzo[a]pyrene	
CRM 362	1,2,3,4-TCDD in nonane	
CRM 363	2,3,7,8-TCDD in nonane	
CRM 364	1,2,3,7,8-PCDD in nonane	
CRM 370	1,2,3,4,7,8-HCDD in nonane	

Order information:

Most of these standards can be purchased for 4000 BFR per unit (10, 25 or100-mg bottle). Not all prices were available at the time of writing. Prices include handling and normal postage. Price subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

Comments:

Many of these compounds are carcinogens or cancer suspect agents. Appropriate care must be exercised in their handling and disposal.

CSK - KIO_3

Potassium Iodate

Source:

Sagami Chemical Research Center
Nishi-Ohnuma 4-4-1
Sagamihara-shi 229
JAPAN

Available from:

Wako Chamicals USA
1600 Bellwood Rd.
Richmond, VA 23237
USA

Wako Chemicals GmbH
Nissanstr. 2, 4040 Neuss 1
WEST GERMANY

Wako Pure Chemical Industries Ltd.
1-2, Doshomachi 3-Chome
Chuo-Ku, Osaka
JAPAN

Description:

The standard solution of 0.01000 N potassium iodate (KIO_3) for use in the analysis of dissolved oxygen is prepared by Wako under the supervision of the Sagami Chemical Research Center of Japan. The solution has the highest accuracy and stability possible. The solutions are sealed in glass bottles and sterilized. These standard solutions were used in the Cooperative Study of the Kuroshio and Adjacent Regions (CSK) Program of UNESCO/IOC, 1965-1979, and in other programs.

Order information:

CSK potassium iodate solutions can be purchased for US$50.25 per unit (300-mL bottle) from Wako USA. Price subject to change without notice. Prices from Wako West Germany and Wako Japan not available.

References:

Ambe, M., J. Kajiwara, T. Yoshihara, and K. Sugawara (1975) Preparation of the standard solutions of nitrate and their application to seawater and freshwater. J. Oceanogr. Soc. Japan, 31:85-92.

Ambe, M. (1978) Note of the experience in the preparation of CSK standard solutions and the ICES-SCOR Intercalibration Experiment, 1969-1970. Mar. Chem., 6:171-8.

Sagami Chemical Research Center (1988?) General guide to the use of CSK standard solutions, No.1. Sagami Chemical Research Center, Sagamihara, Kanagawa Prefecture, Japan.

DACS-1

Domoic Acid

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Atlantic Research Laboratory
1411 Oxford Street
Halifax, Nova Scotia B3H 2Z1
CANADA

Description:

Domoic acid was the causative agent of amnesic shellfish poisoning from the ingestion of toxic mussels in Canada in 1987. A major research effort is currently underway at NRCC on the chemistry and determination of domoic acid (1989), and a description of the analytical methodology used during the shellfish poisoning episode can be found in Quilliam and Wright (1989).

Domoic acid concentration (µg/mL):

89 µg/mL in acetonitrile/water mixture (1:9 v/v).

Order information:

DACS-1 can be purchased for US$125 per unit (set of 4 5-mL ampoules). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1989) DACS-1. Domoic acid calibration solution. Information sheet. National Research Council Canada, Marine Analytical Standards Program, Halifax, Nova Scotia, B3H 3Z1, Canada.

National Research Council Canada (1989) MACSP Update. Instrument calibration solution for domoic acid, DACS-1. Information sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

Quilliam, M. A., and J. L. C. Wright (1989) The amnesic shellfish poisoning mystery. Anal. Chem., 61(18):1053A-60A.

E001 - E1186

Toxic and Hazardous Materials

Source:

US Environmental Protection Agency
Quality Assurance Branch
EMSL-Cincinnati
Cincinnati, OH 45268
USA

Description:

These standards are prepared, verified, and distributed through the Repository for Toxic and Hazardous Materials, as standards and surrogate compounds for all trace organics of interest to the US Environmental Protection Agency. The chemicals are purified as necessary, verified as to percent purity, made into single-analyte solutions, and stored in sealed glass ampoules. The data sheet supplied with each ampoule contains general chemical data, solution specifications, storage and preservation recommendations, information on purities and health hazards, safe handling instructions, and is distributed with gas or high performance liquid chromatograms showing peak areas and retention times of compounds and impurities if any. Updates on the availability of these materials can be obtained through the EPA Quality Assurance Newsletter. Contact the Technical Editor of the Newsletter at the address shown above.

Quality assurance standards (5 mg of ≥99% pure compound/mL in methanol unless noted):

Standard	Chemical	Purity *	Concentration
E001	Acenaphthene		
E002 +	Acrolein		
E003	Acrylonitrile		(10 mg/mL)
E004	Benzene		
E005	Benzidine		
E006	Chlorobenzene		(1 mg/mL)
E007	1,2,4-Trichlorobenzene		
E008 •	Hexachlorobenzene		(1 mg/mL)

* QAR 95-98%; QAT <95% purity.
+ Solution in p-dioxane.
• Solution in acetone.

Standard	Chemical	Purity *	Concentration
E009	1,2-Dichloroethane		(1 mg/mL)
E010	1,1,1-Trichloroethane	QAR	(1 mg/mL)
E011	Hexachloroethane		
E012	1,1-Dichloroethane		(5.5 mg/mL)
E013	1,1,2-Trichloroethane	QAR	
E014	1,1,2,2-Tetrachloroethane	QAR	
E015 Δ	Chloroethane		
E016	bis(2-Chloroethyl)ether		
E017	2-Chloroethyl vinyl ether	QAR	
E018	2-Chloronaphthalene		
E019	2,4,6-Trichlorophenol		
E020	p-Chloro-m-cresol		
E021	Chloroform		
E022	2-Chlorophenol		
E023	1,2-Dichlorobenzene		(1 mg/mL)
E025	1,4-Dichlorobenzene		
E026	3,3'-Dichlorobenzidine		
E027	1,1-Dichloroethylene		(1 mg/mL)
E028	trans-1,2-Dichloroethylene		(11.5 mg/mL)
E029	2,4-Dichlorophenol		
E030	1,2-Dichloropropane		(10 mg/mL)
E033	2,4-Dinitrotoluene		
E034	2,6-Dinitrotoluene		
E036	Ethylbenzene		(10 mg/mL)
E037	Fluoranthene		
E038	4-Chlorophenyl phenyl ether		
E039	4-Bromophenyl phenyl ether		
E040	bis(2-Chloroisopropyl) ether	QAR	
E041	bis(2-Chloroethoxy) methane	QAR	
E042	Methylene chloride		(10 mg/mL)
E043 Δ	Methyl chloride		
E044 Δ	Methyl bromide	QAR	
E046	Dichlorobromomethane		
E047	Fluorotrichloromethane		
E050	Hexachlorobutadiene		
E051	Hexachlorocyclopentadiene		
E052	Isophorone		
E053	Naphthalene		
E054	Nitrobenzene		
E055	2-Nitrophenol		
E056	4-Nitrophenol		
E057	2,4-Dinitrophenol	QAR	
E058	4,6-Dinitro-o-cresol		
E059	N-Nitrosodimethylamine		
E060	N-Nitrosodiphenylamine		
E061	N-Nitrosodi-n-propylamine		
E062	Pentachlorophenol		

* QAR 95-98%; QAT <95% purity.
Δ Solution in 2-propanol.

E001 - 1186 (cont.)

Standard	Chemical	Purity *	Concentration
E063	Phenol		
E064	bis(2-Ethyl hexyl) phthalate		
E065	Butyl benzyl phthalate		
E066	Di-n-butyl phthalate		
E067	Di-n-octyl phthalate		
E068	Diethyl phthalate		
E069	Dimethyl phthalate		
E070	Benzo[a]anthracene		(1 mg/mL)
E071 *	Benzo[a]pyrene		(1 mg/mL)
E072 *	Benzo[b]fluoranthene		(2.5 mg/mL)
E073 *	Benzo[k]fluoranthene		(1 mg/mL)
E074 *	Chrysene		(1 mg/mL)
E075	Acenaphthylene	QAR	
E076 *	Anthracene		(1 mg/mL)
E077 +	Benzo[ghi]perylene		(1 mg/mL)
E078	Fluorene	QAR	
E079	Phenanthrene		
E081 *	Indeno[1,2,3-c,d]pyrene		(0.5 mg/mL)
E082	Pyrene		(1 mg/mL)
E083	Tetrachloroethylene		
E084	Toluene		
E085	Trichloroethylene		(10 mg/mL)
E088	Dieldrin		(1 mg/mL)
E089	Chlordane	QAT	
E091	4,4'-DDE		
E092	4,4'-DDD		
E093 +	*alpha*-Endosulfan		(1 mg/mL)
E094 +	*beta*-Endosulfan		(1 mg/mL)
E095 +	Endosulfan sulfate	QAR	(1 mg/mL)
E096	Endrin	QAR	
E097	Endrin aldehyde		(2.5 mg/mL)
E098	Heptachlor		
E099	Heptachlor epoxide		(2.5 mg/mL)
E100	*alpha*-BHC		(2.5 mg/mL)
E101	*beta*-BHC		(2.5 mg/mL)
E102	*gamma*-BHC		
E103	*delta*-BHC		(1 mg/mL)
E104	Aroclor 1242	QAT	
E107	Aroclor 1232	QAT	
E108 ∞	Aroclor 1248	QAT	
E111	Toxaphene	QAT	
E124	4,4'-DDT		
E125 ∞	Aroclor 1016	QAT	
E126 ∞	Aroclor 1221	QAT	

* QAR 95-98%; QAT <95% purity.
* Solution in acetone.
+ Solution in p-dioxane.
∞ Solution in isooctane.

E001 - 1186 (cont.)

Standard	Chemical	Purity *	Concentration
E129	Aroclor 1260	QAT	(0.5, 1, 3 mg/mL)
E130 ∞	Aroclor 1262	QAT	
E131 •	Aroclor 1268	QAT	(2.5 mg/mL)
E132 ∞	Aroclor 1242	QAT	(0.5, 1, 3 mg/mL)
E135 ∞	Aroclor 1254	QAT	(0.5, 1, 3 mg/mL)
E136	Bromochloromethane		(10 mg/mL)
E149	2,4-Dichlorotoluene		
E150	2-Chlorotoluene		
E151	3-Chlorotoluene		
E152	4-Chlorotoluene	QAR	
E153	4-Chlorobenzotrifluoride		
E156	Pentachloronitrobenzene		(1 mg/mL)
E168	*alpha,alpha*,2,6-Tetrachlorotoluene		
E169 ◊	Benzyl chloride	QAR	
E170	2,3-Dichloro-1-propene		(10 mg/mL)
E171	1,2-Dibromoethane		(10 mg/mL)
E173	cis-1,2-Dichloroethylene	QAR	(10 mg/mL)
E175	1,2,3-Trichlorobenzene		
E176	1,3,5-Trichlorobenzene		
E177 ◊	1,2,4,5-Tetrachlorobenzene	QAR	(2.5 mg/mL)
E179	2,4,5-Trichlorophenol	QAR	
E180	2,4,6-Trichloroaniline		
E182	3-Chlorophenol		
E183	4-Chlorophenol		
E188	Phenanthrene-d_{10}		(150 µg/mL)
E189 •	Phenol-d_5		(100 µg/mL)
E190	2,4-Dimethylphenol-3,5,6-d_3	QAR	(100 µg/mL)
E191 •	Pentachlorophenol-$^{13}C_6$		(100 µg/mL)
E192 •	Dimethyl phthalate-d_6		(150 µg/mL)
E193 •	2-Fluorophenol	QAR	(100 µg/mL)
E194 •	2-Fluorobiphenyl		(100 µg/mL)
E195 •	1-Fluoronaphthalene		(100 µg/mL)
E196	1,4-Dichlorobutane-d_8		(150 µg/mL)
E197	2-Bromo-1-chloropropane-d_6	QAT	(150 µg/mL)
E198	Bromochloromethane-d_2		(150 µg/mL)
E199 •	Benzo[ghi]perylene-$^{13}C_{12}$		(100 µg/mL)
E200	Chlorodibromomethane	QAR	
E201	o-Xylene		
E202	m-Xylene		
E203	p-Xylene		
E212	Bromoform		
E214	1,3-Dichlorobenzene		
E218	1,3-Dichloropropylene isomers	QAR	

* QAR 95-98%; QAT <95% purity.
∞ Solution in isooctane.
• Solution in acetone.
◊ Solution in acetonitrile.

E001 - 1186 (cont.)

Standard	Chemical	Purity *	Concentration
E219 *	Mirex		(1 mg/mL)
E220	Aldrin		
E222	2,3,5-Trichlorophenol	QAR	
E224	2,4-Dimethylphenol	QAR	
E225	1,2,3,4-Tetrachlorobenzene		(2.5 mg/mL)
E231 *	Dibenzo[a,h]anthracene		(1 mg/mL)
E232	Fluorobenzene		(150 µg/mL)
E233	4-Bromofluorobenzene		(150 µg/mL)
E234 *	4,4-Dibromooctafluorobiphenyl		(100 µg/mL)
E237	n-Undecane		
E238	n-Dodecane		
E239	n-Tridecane		
E240	n-Tetradecane		
E241	n-Pentadecane		
E242	n-Heptadecane		(2.5 mg/mL)
E244	n-Nonadecane		(1 mg/mL)
E250	o-Cresol	QAR	
E251	m-Cresol	QAR	
E252	p-Cresol		
E255	Dibutyl ether		
E257	Styrene		
E258 ◊	Epichlorohydrin		
E260	Pentachlorobenzene		(2.5 mg/mL)
E261	Dibenzofuran		
E262	Diphenyl ether		
E263	Diphenylamine		
E270	Acrylamine		(10 mg/mL)
E271	Pyridine		(10 mg/mL)
E275 ◊	p-Phenylenediamine		(1 mg/mL)
E282	Diisodecyl phthalate		
E284	Acetone		
E285	Diethyl ether		(4.5 mg/mL)
E286 ◊	1,2-Epoxybutane		
E292 ◊	1-Acetyl-2-thiourea		(1mg/mL)
E293 ◊	Phthalic anhydride		(1mg/mL)
E294	Thiourea		
E295	Phenacetin		
E297	4-Aminopyridine		
E298	N-Nitrosopyrrolidine		
E299 ◊	2-Fluoroacetamide		
E300	Pentachloroethane	QAR	
E302	2,6-Dichlorophenol		
E305	4-Chloroaniline		
E306	Urethane		
E311	Methyl ethyl ketone		(10 mg/mL)
E322	4,4'-Methylene bis (o-chloroaniline)		

* QAR 95-98%; QAT <95% purity.

* Solution in acetone.

◊ Solution in acetonitrile.

E001 - 1186 (cont.)

Standard	Chemical	Purity *	Concentration
E323	Hexachlorophene	QAR	
E324	o-Nitroaniline		
E325	m-Nitroaniline		
E327 ◊	Vinyl acetate		
E329	Ethylene thiourea		
E330 ◊	2,4-Dichlorophenoxyacetic acid		
E334	N-Nitrosodiethylamine		
E335	1,1,1,2-Tetrachloroethane	QAR	
E337	Malononitrile		
E338	Propionitrile		
E342	p-Nitroaniline		
E344	5-Nitro-o-toluidine		
E345 ◊	Dimethoate	QAR	(1 mg/mL)
E346	Dichlorodifluoromethane		(5.3 mg/mL)
E349	4-Methyl-2-pentanone		(1mg/mL)
E358	Ethylenediamine		(1 mg/mL)
E360	Carbon tetrachloride		(10 mg/mL)
E363	Carbon disulfide		
E364	Hexachloropropylene		(1 mg/mL)
E366	Safrole		
E368	1,2,3-Trichloropropane		
E369	Saccharin		(2 mg/mL)
E370	2,4,5-T	QAR	(1 mg/mL)
E375	3-Chloropropionitrile		(1 mg/mL)
E378	Methyl thiouracil		(1 mg/mL)
E379 ◊	Thiram	QAR	(1 mg/mL)
E403 ◊	1,3-Propane sultone		(1 mg/mL)
E406	Bromobenzene		
E411	Acetophenone		
E419	1-Naphthylamine		(1 mg/mL)
E429	p-Dimethylaminoazobenzene		
E431 ◊	Methyl methanesulfonate	QAR	(1 mg/mL)
E439	Methyl methacrylate		(1 mg/mL)
E455 ◊	Dinoseb		
E456 ◊	Ethyl methanesulfonate		(1 mg/mL)
E458	1-Nitrosopiperidine		
E470	PCN Halowax 1099	QAT	
E471	PCN Halowax 1001	QAT	
E472	PCN Halowax 1000	QAT	
E473 Δ	Acetonitrile		
E475	Allyl alcohol		(1 mg/mL)
E476	Allyl chloride		(1 mg/mL)
E480	p-Dioxane		(10 mg/mL)
E485	N-Nitrosomorpholine		
E499	Isosafrole		
E503	o-Toluidine hydrochloride		(2 mg/mL)

* QAR 95-98%; QAT <95% purity.

◊ Solution in acetonitrile.

Δ Solution in 2-propanol.

E001 - 1186 (cont.)

Standard	Chemical	Purity *	Concentration
E063	Phenol		
E064	bis(2-Ethyl hexyl) phthalate		
E065	Butyl benzyl phthalate		
E066	Di-n-butyl phthalate		
E067	Di-n-octyl phthalate		
E068	Diethyl phthalate		
E069	Dimethyl phthalate		
E070	Benzo[a]anthracene		(1 mg/mL)
E071 *	Benzo[a]pyrene		(1 mg/mL)
E072 *	Benzo[b]fluoranthene		(2.5 mg/mL)
E073 *	Benzo[k]fluoranthene		(1 mg/mL)
E074 *	Chrysene		(1 mg/mL)
E075	Acenaphthylene	QAR	
E076 *	Anthracene		(1 mg/mL)
E077 +	Benzo[ghi]perylene		(1 mg/mL)
E078	Fluorene	QAR	
E079	Phenanthrene		
E081 *	Indeno[1,2,3-c,d]pyrene		(0.5 mg/mL)
E082	Pyrene		(1 mg/mL)
E083	Tetrachloroethylene		
E084	Toluene		
E085	Trichloroethylene		(10 mg/mL)
E088	Dieldrin		(1 mg/mL)
E089	Chlordane	QAT	
E091	4,4'-DDE		
E092	4,4'-DDD		
E093 +	*alpha*-Endosulfan		(1 mg/mL)
E094 +	*beta*-Endosulfan		(1 mg/mL)
E095 +	Endosulfan sulfate	QAR	(1 mg/mL)
E096	Endrin	QAR	
E097	Endrin aldehyde		(2.5 mg/mL)
E098	Heptachlor		
E099	Heptachlor epoxide		(2.5 mg/mL)
E100	*alpha*-BHC		(2.5 mg/mL)
E101	*beta*-BHC		(2.5 mg/mL)
E102	*gamma*-BHC		
E103	*delta*-BHC		(1 mg/mL)
E104	Aroclor 1242	QAT	
E107	Aroclor 1232	QAT	
E108 ∞	Aroclor 1248	QAT	
E111	Toxaphene	QAT	
E124	4,4'-DDT		
E125 ∞	Aroclor 1016	QAT	
E126 ∞	Aroclor 1221	QAT	

* QAR 95-98%; QAT <95% purity.
* Solution in acetone.
+ Solution in p-dioxane.
∞ Solution in isooctane.

Standard	Chemical	Purity *	Concentration
E129	Aroclor 1260	QAT	(0.5, 1, 3 mg/mL)
E130 ∞	Aroclor 1262	QAT	
E131 *	Aroclor 1268	QAT	(2.5 mg/mL)
E132 ∞	Aroclor 1242	QAT	(0.5, 1, 3 mg/mL)
E135 ∞	Aroclor 1254	QAT	(0.5, 1, 3 mg/mL)
E136	Bromochloromethane		(10 mg/mL)
E149	2,4-Dichlorotoluene		
E150	2-Chlorotoluene		
E151	3-Chlorotoluene		
E152	4-Chlorotoluene	QAR	
E153	4-Chlorobenzotrifluoride		
E156	Pentachloronitrobenzene		(1 mg/mL)
E168	*alpha,alpha*,2,6-Tetrachlorotoluene		
E169 ◊	Benzyl chloride	QAR	
E170	2,3-Dichloro-1-propene		(10 mg/mL)
E171	1,2-Dibromoethane		(10 mg/mL)
E173	cis-1,2-Dichloroethylene	QAR	(10 mg/mL)
E175	1,2,3-Trichlorobenzene		
E176	1,3,5-Trichlorobenzene		
E177 ◊	1,2,4,5-Tetrachlorobenzene	QAR	(2.5 mg/mL)
E179	2,4,5-Trichlorophenol	QAR	
E180	2,4,6-Trichloroaniline		
E182	3-Chlorophenol		
E183	4-Chlorophenol		
E188	Phenanthrene-d_{10}		(150 µg/mL)
E189 *	Phenol-d_5		(100 µg/mL)
E190	2,4-Dimethylphenol-3,5,6-d_3	QAR	(100 µg/mL)
E191 *	Pentachlorophenol-$^{13}C_6$		(100 µg/mL)
E192 *	Dimethyl phthalate-d_6		(150 µg/mL)
E193 *	2-Fluorophenol	QAR	(100 µg/mL)
E194 *	2-Fluorobiphenyl		(100 µg/mL)
E195 *	1-Fluoronaphthalene		(100 µg/mL)
E196	1,4-Dichlorobutane-d_8		(150 µg/mL)
E197	2-Bromo-1-chloropropane-d_6	QAT	(150 µg/mL)
E198	Bromochloromethane-d_2		(150 µg/mL)
E199 *	Benzo[ghi]perylene-$^{13}C_{12}$		(100 µg/mL)
E200	Chlorodibromomethane	QAR	
E201	o-Xylene		
E202	m-Xylene		
E203	p-Xylene		
E212	Bromoform		
E214	1,3-Dichlorobenzene		
E218	1,3-Dichloropropylene isomers	QAR	

* QAR 95-98%; QAT <95% purity.
∞ Solution in isooctane.
* Solution in acetone.
◊ Solution in acetonitrile.

E001 - 1186 (cont.)

Standard	Chemical	Purity •	Concentration
E219 *	Mirex		(1 mg/mL)
E220	Aldrin		
E222	2,3,5-Trichlorophenol	QAR	
E224	2,4-Dimethylphenol	QAR	
E225	1,2,3,4-Tetrachlorobenzene		(2.5 mg/mL)
E231 *	Dibenzo[a,h]anthracene		(1 mg/mL)
E232	Fluorobenzene		(150 µg/mL)
E233	4-Bromofluorobenzene		(150 µg/mL)
E234 *	4,4-Dibromooctafluorobiphenyl		(100 µg/mL)
E237	n-Undecane		
E238	n-Dodecane		
E239	n-Tridecane		
E240	n-Tetradecane		
E241	n-Pentadecane		
E242	n-Heptadecane		(2.5 mg/mL)
E244	n-Nonadecane		(1 mg/mL)
E250	o-Cresol	QAR	
E251	m-Cresol	QAR	
E252	p-Cresol		
E255	Dibutyl ether		
E257	Styrene		
E258 ◊	Epichlorohydrin		
E260	Pentachlorobenzene		(2.5 mg/mL)
E261	Dibenzofuran		
E262	Diphenyl ether		
E263	Diphenylamine		
E270	Acrylamine		(10 mg/mL)
E271	Pyridine		(10 mg/mL)
E275 ◊	p-Phenylenediamine		(1 mg/mL)
E282	Diisodecyl phthalate		
E284	Acetone		
E285	Diethyl ether		(4.5 mg/mL)
E286 ◊	1,2-Epoxybutane		
E292 ◊	1-Acetyl-2-thiourea		(1mg/mL)
E293 ◊	Phthalic anhydride		(1mg/mL)
E294	Thiourea		
E295	Phenacetin		
E297	4-Aminopyridine		
E298	N-Nitrosopyrrolidine		
E299 ◊	2-Fluoroacetamide		
E300	Pentachloroethane	QAR	
E302	2,6-Dichlorophenol		
E305	4-Chloroaniline		
E306	Urethane		
E311	Methyl ethyl ketone		(10 mg/mL)
E322	4,4'-Methylene bis (o-chloroaniline)		

• QAR 95-98%; QAT <95% purity.

* Solution in acetone.

◊ Solution in acetonitrile.

Standard	Chemical	Purity *	Concentration
E323	Hexachlorophene	QAR	
E324	o-Nitroaniline		
E325	m-Nitroaniline		
E327 ◊	Vinyl acetate		
E329	Ethylene thiourea		
E330 ◊	2,4-Dichlorophenoxyacetic acid		
E334	N-Nitrosodiethylamine		
E335	1,1,1,2-Tetrachloroethane	QAR	
E337	Malononitrile		
E338	Propionitrile		
E342	p-Nitroaniline		
E344	5-Nitro-o-toluidine		
E345 ◊	Dimethoate	QAR	(1 mg/mL)
E346	Dichlorodifluoromethane		(5.3 mg/mL)
E349	4-Methyl-2-pentanone		(1 mg/mL)
E358	Ethylenediamine		(1 mg/mL)
E360	Carbon tetrachloride		(10 mg/mL)
E363	Carbon disulfide		
E364	Hexachloropropylene		(1 mg/mL)
E366	Safrole		
E368	1,2,3-Trichloropropane		
E369	Saccharin		(2 mg/mL)
E370	2,4,5-T	QAR	(1 mg/mL)
E375	3-Chloropropionitrile		(1 mg/mL)
E378	Methyl thiouracil		(1 mg/mL)
E379 ◊	Thiram	QAR	(1 mg/mL)
E403 ◊	1,3-Propane sultone		(1 mg/mL)
E406	Bromobenzene		
E411	Acetophenone		
E419	1-Naphthylamine		(1 mg/mL)
E429	p-Dimethylaminoazobenzene		
E431 ◊	Methyl methanesulfonate	QAR	(1 mg/mL)
E439	Methyl methacrylate		(1 mg/mL)
E455 ◊	Dinoseb		
E456 ◊	Ethyl methanesulfonate		(1 mg/mL)
E458	1-Nitrosopiperidine		
E470	PCN Halowax 1099	QAT	
E471	PCN Halowax 1001	QAT	
E472	PCN Halowax 1000	QAT	
E473 Δ	Acetonitrile		
E475	Allyl alcohol		(1 mg/mL)
E476	Allyl chloride		(1 mg/mL)
E480	p-Dioxane		(10 mg/mL)
E485	N-Nitrosomorpholine		
E499	Isosafrole		
E503	o-Toluidine hydrochloride		(2 mg/mL)

* QAR 95-98%; QAT <95% purity.
◊ Solution in acetonitrile.
Δ Solution in 2-propanol.

Standard	Chemical	Purity *	Concentration
E513 ◊	Thioacetamide		(1 mg/mL)
E519	Nicotine	QAR	(1 mg/mL)
E524 ◊	1,2-Propanediol		(1 mg/mL)
E527	1,3-Dinitrobenzene		
E536 Δ	Vinyl chloride		
E540 ◊	Diethylstilbestrol		(1 mg/mL)
E541 ◊	Benzoic acid		
E542	Aniline		
E543 §	Propargyl alcohol		(1 mg/mL)
E548	N,N-Dimethylformamide		
E552 ◊	2,4,5-TP	QAR	
E559 ◊	Reserpine		(1 mg/mL)
E560 ◊	Ethyl parathion		(1 mg/mL)
E565	2-Naphthylamine		(1 mg/mL)
E566 ◊	Chlorambucil		
E567	7,12-Dimethylbenz[a]anthracene	QAR	(1 mg/mL)
E572 ◊	Methyl parathion		(1 mg/mL)
E573 §	Kepone	QAR	(1 mg/mL)
E574 ◊	Chlorobenzilate		(1 mg/mL)
E577 ◊	1,2:3,4-Diepoxy butane		(1 mg/mL)
E615 ◊	2,4-Dithiobiuret		(1 mg/mL)
E623 ◊	Diallate	QAR	(1 mg/mL)
E654 ◊	Disulfoton		(1 mg/mL)
E657	1-Propanamine		(1 mg/mL)
E659	2-Methyl-1-propanol		
E662	3-Nitrophenol		
E669	1-Methyl ethyl benzene		
E673 ◊	Propionic acid		
E686	Methacrylonitrile		(1 mg/mL)
E687	Ethyl methacrylate		(1 mg/mL)
E688	2-Picoline		
E700	Resorcinol		
E701 ◊	Benzonitrile		(1 mg/mL)
E713 ◊	Picloram		(1 mg/mL)
E715	Carbofuran		
E776	1,2-Dichlorobenzene-d_4		(150 µg/mL)
E856	Isodrin		
E862	2-Cyclohexyl-4,6-dinitrophenol		(1 mg/mL)
E928	1,3-Dichloro-2-propanol		
E932	2,4-Diaminotoluene		(1 mg/mL)
E952	p,p'-Methoxychlor		
E954 ◊	Aldicarb		(1 mg/mL)
E974	N-Nitroso-N-methyl ethylamine	QAR	(1 mg/mL)

* QAR 95-98%; QAT <95% purity.
◊ Solution in acetonitrile
Δ Solution in 2-propanol.
§ Solution in cyclohexanone.

Standard	Chemical	Purity *	Concentration
E993	1,2-Dibromo-3-chloropropane		
E995 ◊	Aldicarb sulfone		(1 mg/mL)
E996 ◊	Aldicarb sulfoxide	QAR	(1 mg/mL)
E1036 ◊	Endrin ketone	QAR	(1 mg/mL)
E1089	Alachlor		(1 mg/mL)
E1090	Atrazine		(1 mg/mL)
E1097	Dibromomethane		
E1103	1,3,5-Trimethylbenzene		
E1104	sec-Butylbenzene		
E1105	n-Butylbenzene		
E1106	t-Butylbenzene		
E1107	1,2,4-Trimethylbenzene	QAR	
E1108	4-Isopropyltoluene	QAR	
E1109	1,3-Dichloropropane		
E1112	n-Propylbenzene		
E1166	1,1-Dichloro-1-propylene	QAR	
E1167	2,2-Dichloropropane		
E1179 •	Chloral hydrate		(1 mg/mL)
E1181 •	1,1,1-Trichloroacetone	QAR	(1 mg/mL)
E1186 •	Bromochloroacetonitrile	QAR	(1 mg/mL)

Order information:

At this time (Summer 1989), the solutions are available free of charge. Please contact EPA at the address shown above. The EPA requires that requests for these materials be signed by the laboratory director.

Reference:

Environmental Protection Agency (1989) EPA Newsletter Quality Assurance, 11(1). US Environmental Protection Agency, Cincinnati, OH, USA.

Koide, H. (1989) Private communication.

* QAR 95-98%; QAT <95% purity.

◊ Solution in acetonitrile.

• Solution in acetone.

EPA QC - Element Solutions

EPA Quality Control Samples

Source:

US Environmental Protection Agency
Quality Assurance Branch
EMSL - Cincinnati
Cincinnati, OH 45268
USA

Description:

These samples are part of the quality control samples prepared, verified, and distributed by EPA as part of their quality assurance program. Component mix and concentration ranges reflect their use in standard EPA analytical procedures. Updates on the availability of these materials can be obtained through the EPA Quality Assurance Newsletter. Contact the Technical Editor of the Newsletter at the address shown above.

QC samples for water quality analyses:

Trace metals in 5% HNO_3

Sample WP I (1-1000 µg/L)

Be, Al, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Cd, Hg, Pb

Sample WP II (1-100 µg/L)

Ag, Sb, Tl

Sample WP III (0.1-10 µg/L)

Na, Mg, Ca, K, Ba, Mo

QC samples for water quality analyses:

EP metals in acetic acid (0.2-100 µg/L)

Cr, As, Se, Ag, Cd, Ba, Hg, Pb

Elements in 5% nitric acid for analysis by inductively coupled plasma

Sample 1 (1 mg/L)

Be, Mg, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Mo, Cd, Sb, Tl, Pb

Sample II (0.5-10 mg/L)

B, Na, Al, Si, K, Ag, Ba

Trace metals in 5% HNO_3 (1.0-400 µg/L)

Cr, As, Se, Ag, Cd, Ba, Hg, Pb

QC samples for drinking water quality analyses:

Trace metals in acetic acid (0.2-100 µg/L)

Cr, As, Se, Ag, Cd, Ba, Hg, Pb

Order Information:

At this time (Summer 1989), the solutions are available free of charge. Please contact EPA at the address shown above. The EPA requires that requests for these materials be signed by the laboratory director.

Reference:

Environmental Protection Agency (1989) EPA Newsletter Quality Assurance, 11(1). US Environmental Protection Agency, Cincinnati, OH, USA.

EPA QC - Nutrients in Water

EPA Quality Control Samples

Source:

US Environmental Protection Agency
Quality Assurance Branch
EMSL - Cincinnati
Cincinnati, OH 45268
USA

Description:

The sample is part of the quality control samples prepared, verified, and distributed by EPA as part of their quality assurance program. Component mix and concentration range reflects its use in standard EPA analytical procedures. Updates on the availability of this material can be obtained through the EPA Quality Assurance Newsletter. Contact the Technical Editor of the Newsletter at the address shown above.

Quality control samples:

Nutrients in Water (0.5-5 mg/L)

- Nitrate-N
- Ammonia-N
- Kjeldahl-N
- Orthophosphate
- Total P

Order Information:

At this time (Summer 1989), the solutions are available free of charge. Please contact EPA at the address shown above. The EPA requires that requests for these materials be signed by the laboratory director.

Reference:

Environmental Protection Agency (1989) EPA Newsletter Quality Assurance, 11(1). US Environmental Protection Agency, Cincinnati, OH, USA.

EPA QC - Organic Solutions

EPA Quality Control Samples

Source:

US Environmental Protection Agency
Quality Assurance Branch
EMSL - Cincinnati
Cincinnati, OH 45268
USA

Description:

These samples are part of the quality control samples prepared, verified, and distributed by EPA as part of their quality assurance program. Component mix and concentration ranges reflect their use in standard EPA analytical procedures. Updates on the availability of these materials can be obtained through the EPA Quality Assurance Newsletter. Contact the Technical Editor of the Newsletter at the address shown above.

QC samples for water quality analyses:

Polychlorinated biphenyl (PCB) congeners calibration solutions (180-200 ng/mL) in isooctane

- 2,4-Dichlorobiphenyl
- 2,2',5-Trichlorobiphenyl
- 2,4,4'-Trichlorobiphenyl
- 2,2',3,5'-Tetrachlorobiphenyl
- 2,2',5,5'-Tetrachlorobiphenyl
- 2,3',4,4'-Tetrachlorobiphenyl
- 3,3',4,4'-Tetrachlorobiphenyl
- 2,2',4,5,5'-Pentachlorobiphenyl
- 2,3,3',4,4'-Pentachlorobiphenyl
- 2,3',4,4',5-Pentachlorobiphenyl
- 3,3',4,4',5-Pentachlorobiphenyl
- 2,2',3,3',4,4'-Hexachlorobiphenyl
- 2,2',3,4,4',5'-Hexachlorobiphenyl
- 2,2',4,4',5,5'-Hexachlorobiphenyl
- 2,2',3,4,4',5,5'-Heptachlorobiphenyl
- 2,2',3,3',4,4',5-Heptachlorobiphenyl
- 2,2',3,3',4,4',5,6-Octachlorobiphenyl
- 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl
- 2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl

QC samples for priority pollutants/hazardous wastes/toxic chemicals:

n-Alkanes in acetone (0.05-2 µg/L)

Dodecane
Eicosane
Heptadecane
Hexacosane
Tetradecane
Tricosane

Chlorinated hydrocarbons in acetone (10-100 µg/L) (EPA method 612)

1,2,4-Trichlorobenzene
2-Chloronaphthalene
Hexachlorobenzene
Hexachlorobutadiene
Hexachloroethane
m-Dichlorobenzene
o-Dichlorobenzene
p-Dichlorobenzene

Chlorinated hydrocarbon pesticides in acetone (EPA method 608)

Sample WP I (2-10 µg/L)

Aldrin
DDD
DDE
DDT
Dieldrin
Heptachlor

Sample WP II (50 µg/L)

Chlordane

Sample WP III (2-10 µg/L)

alpha-BHC
alpha-Endosulfan
beta-BHC
beta-Endosulfan
Endrin
Aldehyde
Heptachlor epoxide

EPA QC -Organic Solutions (cont.)

EP Pesticides and herbicides in acetone (10-13,000 µg/L)

- 2-4-D
- Endrin
- Lindane
- Methoxychlor
- Silvex

GC/MS, Acid extractable compounds in methanol (100 µg/L) (EPA method 625)

- 2,4,6-Trichlorophenol
- 2,4-Dichlorophenol
- 2,4-Dimethylphenol
- 2-Chlorophenol
- 2-Nitrophenol
- 4-Chloro-3-methylphenol
- 4-Nitrophenol
- Pentachlorophenol
- Phenol

GS/MS, Base neutral extractable compounds in methanol (EPA method 625)

Sample I (20-400 µg/L) in methanol

- 1,2,4-Trichlorobenzene
- 1,2-Dichlorobenzene
- 1,3-Dichlorobenzene
- 2,4-Dinitrotoluene
- 2,6-Dinitrotoluene
- 2-Chloronaphthalene
- Benzo[a]anthracene
- Benzo[k]fluoranthene
- bis-1-(Chloroethyl) ether
- bis-2-(Chloroethoxy) methane
- Diethyl phthalate
- Di-n-butyl phthalate
- Di-n-octyl phthalate
- Hexachlorobenzene
- Hexachlorobutadiene
- Isophorone
- Nitrosodipropylamine (N-Nitrosodi-n-propylamine)
- Phenanthrene
- Pyrene

EPA QC -Organic Solutions (cont.)

Sample II (20-400 µg/L) in methanol

1,4-Dichlorobenzene
4-Bromophenyl phenyl ether
4-Chlorophenyl phenyl ether
Acenaphthene
Anthracene
Benzo[a]pyrene
Benzo[a,h]anthracene
Benzo[b]fluoranthene
Benzo[ghi]perylene
bis-2-(Chloroisopropyl)ether
Butyl benzyl phthalate
Dimethyl phthalate
Fluoranthene
Fluorene
Hexachloroethane
Naphthalene
Nitrobenzene

Sample III (30-400 µg/L) in acetone

1,2,3,4-Tetrachlorobenzene
1,2,4,5-Tetrachlorobenzene
1,3,5-Trichlorobenzene
2,4,6-Trichloroaniline
2,4-Dichlorotoluene
4-Chlorobenzotrifluoride
m-Chlorotoluene
Pentachlorobenzene

GC/MS, Pesticides in acetone (EPA method 625)

Sample I (100 µg/L)

alpha-BHC
DDD
Dieldrin
Endrin
gamma-BHC
Heptachlor
Heptachlor epoxide

Sample II (20-200 µg/L)

alpha-Endosulfan
Aldrin
beta-BHC
beta-Endosulfan
delta-BHC
4,4'-DDE
4,4'-DDT

EPA QC -Organic Solutions (cont.)

Haloethers in acetone (10-150 µg/L) (EPA method 611)

4-Bromophenyl phenyl ether
4-Chlorophenyl phenyl ether
bis(2-Chloroethoxy) methane
bis(2-Chloroethyl) ether
bis(2-Chloroisopropyl) ether

Nitroaromatics and isophorone in acetone (1-150 µg/L) (EPA method 609)

2,6-Dinitrotoluene
2,4-Dinitrotoluene
Isophorone
Nitrobenzene

Phenols (GC) in acetone (2-275 µg/L) (EPA method 604)

2,4,6-Trichlorophenol
2,4-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2-Chlorophenol
2-Nitrophenol
4-Chloro-3-methylphenol
4-Nitrophenol
Pentachlorophenol
Phenol

Phthalate esters in acetone (20-200 µg/L) (EPA method 606)

Butyl benzyl phthalate
di-n-Dibutyl phthalate
Diethyl hexyl phthalate
Diethyl phthalate
Dimethyl phthalate
Dioctyl phthalate

Polychlorinated biphenyls in acetone (1-50 µg/L) (EPA method 608)
(Specific Aroclor must be requested)

Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260

Polynuclear aromatics in acetone (EPA method 610)

Sample I (5-100 μg/L)

Acenaphthene
Anthracene
Benzo[k]fluoranthene
Chrysene
Naphthalene
Pyrene

Sample II (10-100 μg/L)

1,2-Benzanthracene (Benzo[a]anthracene)
Acenaphthylene
Benzo[a]pyrene
Benzo[b]fluoranthene
Benzo[ghi]perylene
Dibenzo[ah]anthracene
Fluoranthene
Phenanthrene

QC samples for drinking water analyses:

Herbicides in methanol (10-100 μg/L)

2,4,5-TP
2,4-D

Chlorinated hydrocarbon pesticides in acetone

Sample WS I (0.20-20 μg/L)

Endrin
Lindane
Methoxychlor

Sample WS II (5-10 μg/L)

Toxaphene

Trihalomethanes in methanol (20 μg/L)

Bromoform
Chlorodibromomethane
Chloroform
Dichlorobromomethane

EPA QC -Organic Solutions (cont.)

Volatile organic contaminants in methanol (20 µg/L)

Sample I (EPA methods 503, 524, 602, and 624)

1,3,5-Trimethylbenzene
Benzene
Ethylbenzene
m-Xylene
n-Propylbenzene
p-Chlorotoluene
p-Dichlorobenzene

Sample II (EPA methods 503, 524, 602, and 624)

1,1,1-Trichloroethane
m-Dichlorobenzene
o-Xylene
p-Cymene
p-Xylene
t-Butylbenzene

Sample III (EPA methods 503, 524, 602, and 624)

1,2,4-Trimethylbenzene
Chlorobenzene
Isopropyl benzene
n-Butylbenzene
o-Dichlorobenzene
sec-Butylbenzene
Toluene

Sample IV in methanol (EPA methods 503, 524, 601, and 624)

1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethylene
1,1,2-Trichloroethane
1,1-Dichloroethylene
1,1-Dichloropropene
Bromoform
bis(2-Chloroethyl) ether
cis-1,2-Dichloroethylene

Sample V in methanol (EPA methods 503, 524, 601, and 624)

1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethylene
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
Bromochloromethane
Carbon tetrachloride
Chloroform
m-Dichlorobenzene
Pentachloroethane

EPA QC -Organic Solutions (cont.)

Sample VI in methanol (EPA methods 503, 524, 601, and 624)

1,1-Dichloroethane
1,2,3-Trichloropropane
1,2-Dichloroethane
1,3-Dichloropropane
2-Chloroethyl ethyl ether
Bromobenzene
Bromodichloromethane
Chlorobenzene
o-Dichlorobenzene
Dichloromethane

Sample VII in methanol (EPA methods 503, 524, 601, and 624)

1,1,2,2-Tetrachloroethane
1,2-Dichloropropane
Chlorodibromomethane
Chlorohexane
Dibromomethane
o-Chlorotoluene
p-Dichlorobenzene
trans-1,2-Dichloroethane
Trichlorofluoromethane
Pyrene (in acetone)

QC samples for biology/microbiology:

Chlorophyll in acetone

Three concentration levels (3-80 μg/L) for fluorometric analysis and one (0.2-80 mg/L) for spectrometric analysis.

Order Information:

At this time (Summer 1989), the solutions are available free of charge. Please contact EPA at the address shown above. The EPA requires that requests for these materials be signed by the laboratory director.

Reference:

Environmental Protection Agency (1989) EPA Newsletter Quality Assurance, 11(1). US Environmental Protection Agency, Cincinnati, OH, USA.

P11-01 - P17-02

Reference Materials for Pesticide Analysis

Source:

Office of Reference Materials
Laboratory of the Government Chemist
Queen's Road, Teddington
Middlesex TW11 0LY
ENGLAND

Description:

These pesticide samples of certified purity are intended for use as certified reference materials in the analysis of technical grade pesticides, formulations and residues. They are approved by the Collaborative International Pesticides Analytical Council Limited (CIPAC).

Available pesticides:

Compound	Sample number	Purity (mole percent)	Price (£)
Chlorinated compounds			
Aldrin	P11-23	99.5	35
alpha-BHC	P11-01	99.5	35
beta-BHC	P11-02	99.2	35
delta-BHC	P11-03	99.6	35
gamma-BHC	P11-04	99.9	35
Chlorbenside	P11-06	99.3	8
Chlordane	P11-08	Technical	20
o,p'-DDE	P11-09	99.3	35
p,p'-DDE	P11-10	99.8	35
o,p'-DDT	P11-11	99.2	35
p,p'-DDT	P11-12	99.8	20
Dichlobenil	P11-13	99.4	20
Dichlone	P11-14	99.9	8
p-Dichlorobenzene	P11-15	99.7	20
Dicloran	P11-16	99.9	20
Dieldrin	P11-22	99.5	35
alpha-Endosulfan	P11-19	99.7	20
beta-Endosulfan	P11-20	99.9	20
Endrin *	P11-21	99.9	20

* 0.25-g vials

P11-01 - P17-02 (cont.)

Compound	Sample number	Purity (mole percent)	Price (£)
Hexachlorobenzene	P11-31	99.9	20
Quintozene	P11-25	99.6	20
o,p'-TDE	P11-26	99.4	35
p,p'-TDE	P11-27	99.3	35
p,p'-TDE (olefin)	P11-29	99.5	8
Tecnazene	P11-30	99.9	20
Organophosphorus compounds			
Dimethoate	P12-04	99.5	25
Malathion	P12-05	99.6	25
Mecarbam	P12-06	99.6	25
Methidathion	P12-07	99.4	25
Phenoxy-acids and related compounds			
4-CPA	P13-01	99.9	8
2,4-D (acid)	P13-02	99.7	20
2,4-D (methyl ester)	P13-03	99.7	20
2,4-DB	P13-04	99.2	20
2,4-Dichlorobenzoic acid	P13-05	99.5	8
Dichlorprop	P13-13	99.7	20
Dichlorprop (2-ethylhexyl ester)	P13-17	99.4	30
Fenoprop	P13-06	99.5	20
MCPA (acid)	P13-07	99.6	20
MCPA (2-ethylhexyl ester)	P13-14	99.6	30
MCPA (2-butoxyethyl ester)	P13-16	99.8	30
MCPB (acid)	P13-08	99.6	20
Mecoprop (MCPP)	P13-09	99.4	20
Mecoprop (2-butoxyethyl ester)	P13-15	99.5	30
2,4,5-T (acid)	P13-10	99.8	20
2,4,5-T (methyl ester)	P13-11	99.7	20
2,4,6-TBA (acid)	P13-12	99.0	20
Substituted urea compounds			
Chlorobromuron	P14-01	99.6	8
Chlorotoluron	P14-02	99.8	20
Diuron	P14-03	99.9	20
Linuron	P14-04	99.5	20
Monuron	P14-05	99.8	20
Heterocyclic and miscellaneous compounds			
Anthraquinone	P16-01	99.7	20
Asulam	P16-02	99.5	20
Atrazine	P16-03	99.3	20
Azobenzene	P16-04	99.6	8
Bentranil	P16-05	99.1	8
Biphenyl	P16-06	99.9	8
2,2'-Bipyridyl	P16-07	99.9	8
4,4'-Bipyridyl	P16-08	99.9	8
Bromoxynil	P16-09	99.9	20
Bromoxynil octanoate	P16-10	99.5	20
Bupirimate	P16-36	99.9	20

Compound	Sample number	Purity (mole percent)	Price (£)
Carbaryl	P16-11	99.4	20
Cyanazine	P16-35	99.4	25
DEET	P16-12	99.0	20
Desmetryn	P16-32	98.5	8
Dimethirimol	P16-33	99.6	8
Dinobuton	P16-13	98.6	8
Dinoseb	P16-14	99.5	20
Dinoterb	P16-15	99.7	20
Dinoterb acetate	P16-16	99.7	8
Diphenyl sulphone	P16-17	99.9	8
Diquat dibromide	P16-18	-	20
DNOC	P16-19	99.6	20
Ethirimol	P16-34	99.4	8
Ioxynil	P16-20	99.9	20
Ioxynil octanoate	P16-21	99.2	20
Methyl mercury chloride	P15-02	>98	20
Paraquat chloride	P16-22	-	20
Pentachlorophenol	P16-23	99.3	20
2-Phenylphenol	P16-24	99.6	8
Piperonyl butoxide	P16-25	97.9	20
Pirimicarb	P16-26	99.8	8
Prometryn	P16-27	99.8	20
Propoxur	P16-28	99.9	20
Simazine	P16-29	99.9	20
Terbutryn	P16-30	99.7	20
Trietazine	P16-31	99.3	8
Pyrethroids			
cis-Permethrin	P17-01	99.1	30
trans-Permethrin	P17-02	99.5	30

Order information:

These samples are available in 5-gram quantities in screw capped vials unless noted. Price subject to change without notice. Please contact LGC at the address shown above.

Reference:

Laboratory of the Government Chemist (1988) Reference materials for pesticide analysis. Information leaflet. Office of Reference Materials, Laboratory of the Government Chemist, Queen's Road, Teddington, Middlesex TW11 0LY, England.

SRM 141c through 2144

Microchemical Elemental Analysis

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These materials are highly purified chemicals used in evaluating microchemical procedures for the determination of C, N, S, H, Cl, F and/or Br in organic matter. SRM 142 is used for microdeterminations of methoxyl ion (CH_3O-).

Ceritified composition (nominal weight percent):

SRM	Compound	Element							
		C	H	N	Br	Cl	F	S	CH_3O-
141c	Acetanilide	71.09	6.71	10.36	-	-	-	-	-
142	Anisic acid	-	-	-	-	-	-	-	20.40
143c	Cystine	29.99	5.03	11.66	-	-	-	26.69	-
148	Nicotinic acid	58.54	4.09	11.38	-	-	-	-	-
2141	Urea	-	-	46.63	-	-	-	-	-
2142	o-Bromobenzoic acid	-	-	-	39.80	-	-	-	-
2143	p-Fluorobenzoic acid	-	-	-	-	-	13.54	-	-
2144	m-Chlorobenzoic acid	-	-	-	-	22.62	-	-	

Order information:

These SRMs range in price from US$70 to US$132 per unit (2-g vial). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1969) SRM 142. Anisic acid. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Bureau of Standards (1970) SRM 148. Nicotinic acid. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Bureau of Standards (1970) SRM 2141. Urea. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Bureau of Standards (1970) SRM 2142. o-Bromobenzoic acid. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Bureau of Standards (1973) SRM 2144. m-Chlorobenzoic acid. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Bureau of Standards (1976) SRM 141c. Acetanilide. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Bureau of Standards (1976) SRM 143c. Cystine. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Bureau of Standards (1982) SRM 2143. p-Fluorobenzoic acid. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 185f

Potassium Hydrogen Phthalate

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM-185f is composed of potassium hydrogen phthalate ($KHC_8H_4O_4$) purchased from a commercial source and may contain impurities such as occluded water, free acid or alkali, chlorides, sulfur or heavy metals. This SRM is intended for use in the preparation of solutions for calibrating electrodes for pH measuring systems. The pH value of the standards, pH(S), corresponds to $\log(1/a_H)$ where a_H is a conventional activity of the hydrogen (hydronium) ion referred to the standard state on the molal scale. The certified values listed below were derived from emf measurements of cells without liquid junction by the method of calculation described in Bates (1962). The uncertainty of the pH(S) is estimated not to exceed ±0.005 units for the temperature range 0 to 50° C.

pH(S) of a 0.05 molal solution:

Temperature (° C)	pH(S)
0.0	4.006
5.0	4.001
10.0	3.999
15.0	3.999
20.0	4.001
25.0	4.006
30.0	4.012
35.0	4.021
37.0	4.025
40.0	4.031
45.0	4.043
50.0	4.057

Order information:

SRM 185f can be purchased for US$98 per unit (60 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Bates, R.G. (1962) Revised standard values for pH measurements from 0 to 95°C. J. Res. National Bureau of Standards, 66A:179-84.

National Bureau of Standards (1984) SRM-185f. Potassium hydrogen phthalate. Certificate of analysis . National Bureau of Standards, Gaithersburg, MD, USA.

SRM 186d

Potassium Dihydrogen Phosphate - Id
Disodium Hydrogen Phosphate - IId

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for use in preparing buffer solutions to calibrate electrodes for pH(S) measuring systems. The chemicals meet the American Chemical Society's specifications for reagent grade materials; they do contain, however, impurities such as water, free acid or alkali, carbon dioxide, chlorides, sulfur compounds and heavy metals. The pH(S) values correspond to $\log(1/a_H)$ where a_H is a conventional activity of the hydrogen ion referred to the standard state on the molal scale. The certified values listed below were derived from emf measurements of cells without liquid junction by a method of calculation similar to that described in Bates (1962). The uncertainty of the pH(S) is estimated not to exceed ±0.005 units from 0 to 50°C.

pH(S) of a 0.025 molal solution with respect to both potassium dihydrogen phthalate and disodium hydrogen phosphate:

Temperature (° C)	pD(S)
0.	6.988
5.0	6.955
10.0	6.926
15.0	6.901
20.0	6.880
25.0	6.863
30.0	6.850
35.0	6.840
40.0	6.833
45.0	6.830
50.0	6.829

Order information:

These SRMs can each be purchased for US$97 per unit (30 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Bates, R.G. (1962) Revised standard values for pH measurements from 0 to 95°C. J. Res. National Bureau of Standards, 66A:179-84.

National Bureau of Standards (1988) Potassium dihydrogen phosphate (186-Id), disodium hydrogen phosphate (186-IId). Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 610 - 617

Trace Elements In Glass Matrices

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs were produced and certified to facilitate the development of trace analytical methods. A glass support matrix (72% SiO_2, 12% CaO, 14% Na_2O, 2% Al_2O_3) was spiked with 500, 50, 1 and 0.02 ppm each of 61 elements to produce the 4 sets of SRMs. The material was prepared in rod form and then sliced into 3- and 1-mm thick wafers. The certification process for some of the spiked elements is underway.

Certified concentrations (µg/g unless noted)*:

Element	SRM 610, 611 Value	SRM 610, 611 Uncertainty (±)	SRM 612, 613 Value	SRM 612, 613 Uncertainty (±)
B	(351)	-	(32)	-
K	(461)	-	(64)	-
Ti	(437)	-	(50.1)	(0.8)
Mn	485	10	39.6	0.8
Fe	458	9	51	2
Co	(390)	-	35.5	1.2
Ni	458.7	4	38.8	0.2
Cu	(444)	(4)	(37.7)	(0.9)
Zn	(433)	-	-	-
Rb	425.7	0.8	31.4	0.4
Sr	515.5	0.5	78.4	0.2
Ag	(254)	(10)	22.0	0.3
La	-	-	(36)	-
Ce	-	-	(39)	-
Sm	-	-	(39)	-
Eu	-	-	(36)	-
Gd	-	-	(39)	-

* Values in parenthesis are interim as certification process continues.

Element	SRM 610, 611 Value	SRM 610, 611 Uncertainty (±)	SRM 612, 613 Value	SRM 612, 613 Uncertainty (±)
Yb	-	-	(42)	-
Au	(25)	-	(5)	-
Tl	(61.8)	(2.5)	(15.7)	(0.3)
Pb	426	1	38.57	0.2
Th	457.2	1.2	37.79	0.08
U	461.5	1.1	37.38	0.08

Element	SRM 614, 615 Value	SRM 614, 615 Uncertainty (±)	SRM 616, 617 Value	SRM 616, 617 Uncertainty (±)
B	(1.30)	(0.2)	(0.20)	(0.02)
K	30	1	29	1
Sc	(0.59)	(0.04)	(0.026)	(0.012)
Ti	(3.1)	(0.3)	(2.5)	(0.7)
Fe	(13.3)	(1)	(11)	(2)
Co	(0.73)	(0.02)	-	-
Ni	(0.95)	-	-	-
Cu	1.37	0.07	(0.80)	(0.09)
Ga	(1.3)	-	(0.23)	(0.02)
Rb	0.855	0.005	(0.100)	(0.007)
Sr	45.8	0.1	41.72	0.05
Ag	0.42	0.04	-	-
Sb	(1.06)	-	(0.078)	(0.007)
La	(0.83)	(0.02)	(0.034)	(0.007)
Eu	(0.99)	(0.04)	-	-
Au	(0.5)	-	(0.18)	(0.01)
Tl	(0.269)	(0.005)	(0.0082)	(0.0005)
Pb	2.32	0.04	1.85	0.04
Th	0.748	0.006	0.0252	0.0007
U	0.823	0.002	0.0721	0.0013

Order information:

These SRMs consist of 3- and 1-mm wafers and can be purchased for US$128 per set (6 wafers). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1982) SRM 610, 611. Trace elements in a glass matrix. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1982) SRM 612, 613. Trace elements in a glass matrix. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1982) SRM 614, 615. Trace elements in a glass matrix. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1982) SRM 616, 617. Trace elements in a glass matrix. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 640b

Silicon Powder 2ø/d-Spacing Standard for X-Ray Diffraction

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM was prepared for use as an external or internal 2ø/d-spacing calibration standard for powder diffractometry. SRM 640b is a high purity silicon powder prepared by grinding electronic grade silicon rods, followed by jet milling to reduce particle size. The median particle size is about 5 µm.

Certified lattice parameter (Å):

Spacing	Value	Uncertainty (±)
(a)	5.430940	0.000035

Order information:

SRM 640b can be purchased for US$114 per unit (7.5-gram bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1987) SRM 640b. Silicon powder 2ø/d-spacing standard for x-ray diffraction. Certificate of analysis . National Bureau of Standards, Gaithersburg, MD, USA.

SRM 674a

X-Ray Powder Diffraction Intensity Set

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of five different phases, bottled separately. These are: alpha-Al_2O_3 (corundum structure), ZnO (wurtzite structure), TiO_2 (rutile structure), Cr_2O_3 (corundum structure), and CeO_2 (fluorite structure). These phases can be used as internal standards for quantitative analysis and as external standards for checking the intensity response of x-ray diffraction instruments. The five phases cover the range of linear absorption coefficients from 100 to 1000 cm^{-1} for Cu K-alpha radiation.

Certified intensities of major lines:

hkl	2ø (°)	I^{rel}	Sigma
alpha-Al_2O_3 (corundum structure)*			
012	25.54	58.7	0.19
104	35.10	87.2	0.22
110	37.72	38.3	0.09
113	43.30	100.0	NA$^{\Delta}$
024	52.48	46.1	0.07
116	57.44	94.1	0.09
214	66.44	35.7	0.09
300	68.14	52.4	0.34

* Two broad, very weak peaks (32.80 and 45.5° 2ø) can be detected. These lines are possibly due to gamma-Al_2O_3 (PDF 29-63).

$^{\Delta}$ Not available.

SRM 674a (cont.)

hkl	2θ (°)	Irel	Sigma
ZnO (wurtzite structure)◊			
100	31.70	57.9	0.12
002	34.36	42.1	0.06
101	36.18	100.0	NA
102	47.48	23.5	0.02
110	56.52	35.4	0.07
103	62.80	31.6	0.05
200	66.30	4.8	0.01
112	67.88	25.6	0.06
TiO_2 (rutile structure)∞			
110	27.38	100.0	NA
101	36.04	42.7	0.09
111	41.18	20.4	0.03
211	54.28	56.6	0.07
220	56.58	16.6	0.04
002	62.72	8.0	0.03
301	68.96	(17.2)	0.07
112	69.76	(5.6)	0.12
Cr_2O_3 (corundum structure)§			
012	24.42	67.6	0.35
104	33.53	100.0	NA
110	36.12	80.8	0.68
113	41.40	30.9	0.13
024	50.14	36.9	0.19
116	54.76	92.1	0.22
214	63.38	28.6	0.13
300	65.04	37.5	0.20
CeO_2 (fluorite structure)			
111	28.60	100.0	NA
200	33.12	27.8	0.05
220	47.52	55.2	0.19
311	56.38	43.8	0.14

◊ Anatase was observed at ≈1.0 wt. % level. Unexplained very weak peaks at 13.9 and 18.0° 2θ were also detected.

∞ Small unexplained intensity deviations from smooth background.

§ Three unexplained, broad, very weak diffraction peaks were observed at 14.40, 16.64, and 23.75° 2θ.

Reference intensity ratios (relative to the 113 line of Al_2O_3), Cu K-alpha radiation (μ = 124.1 cm^{-1}):

Phase	hkl	I/Ic	Sigma
ZnO	101	5.33	0.06
TiO_2	110	3.32	0.04
Cr_2O_3	104	2.16	0.02
CeO_2	111	13.15	0.10

Lattice parameters (25 ± 2°C), Cu K-alpha radiation (μ = 124.1 cm^{-1}):

Phase	Crystal	a (Å)	Sigma	c (Å)	Sigma
Al_2O_3	Trigonal	4.759397	0.000080	12.99237	0.00022
ZnO	Hexagonal	3.249074	0.000055	5.206535	0.000101
TiO_2	Tetragonal	4.593939	0.000062	2.958862	0.000063
Cr_2O_3	Trigonal	4.959610	0.000079	13.59747	0.00025
CeO_2	Cubic	5.411102	0.000097	NA	NA

Order information:

SRM 674a can be purchased for US$255 per unit (20-gram bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1989) SRM-674a. X-ray powder diffraction intensity set. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 675

Low 2ø (Large d-Spacing) Standard for X-Ray Powder Diffraction

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM was prepared for use as an external or internal low 2ø (large d-spacing) calibration standard for powder diffractometry. The material is synthetic fluorophlogopite mica and is best suited for reflection diffractometry as pressed samples have a high degree of preferred orientation in which only the 00l reflections have significant intensity. The mica was ground to pass a 75-µm sieve.

Certified d-spacing (Å):

Spacing	Value	Uncertainty (±)
d(001)	9.98104	0.00007

Order information:

SRM 675 can be purchased for US$135 per unit (5 gram bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1982) SRM 675. Low 2ø (large d-spacing) standard for x-ray powder diffraction. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 930D and 1930

Glass Filters for Spectrophotometry

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 930D consists of three neutral glass filters. The glass filters have transmittances of approximately 10, 20, and 30%. Each filter is individually calibrated and certified for absorbance and transmittance at wavelengths 440, 465, 546.1, 590, and 635 nm. The 546.1 nm wavelength coincides with the mercury emission line. SRM 1930 compliments 930D and consists of three individual glass filters in metal holders.

Order information:

SRM 930D can be purchased for US$1061 per unit (set of 3 filters); and SRM 1930 for US$1458. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1987) SRM 1930. Glass filters for spectrophotometry, Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 931d

Liquid Filters

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These filters are absorbance standards for use in ultraviolet and visible spectrophotometry. This SRM consists of three sets of four vials, each containing a blank solution and three solutions of different concentrations of an absorbing liquid. The net absorbances are certified for each concentration at wavelengths of 302, 395, 512, and 678 nm.

Order information:

SRM-931d can be purchased for US$196 per unit (3 sets of 4 10-mL vials). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 935

Potassium Dichromate

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of crystalline potassium dichromate ($K_2Cr_2O_7$) of established purity certified for use as an ultraviolet absorbance standard. Solutions made with this SRM in 0.001 N perchloric acid ($HClO_4$) are certified for their molecular emission spectrum at 23.5° C and wavelengths of 235, 257, 313, 345, and 350 nm.

Order information:

SRM 935a can be purchased for US$137 per unit (15-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 936

Quinine Sulfate Dihydrate

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of powdered quinine sulfate dihydrate of known purity certified for use as an spectrofluorimetric emission standard. Solutions made with this SRM in 0.1 N perchloric acid ($HClO_4$) are certified for their molecular emission spectrum, E(g), at 25° C and a wavelength range of 375 to 675 nm.

Order information:

SRM 936 can be purchased for US$146 per unit (1-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1543

GC/MS System Reference Standard

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended primarily for use in evaluating the sensitivity of gas chromatography/mass spectrometry (GC/MS) instrumentation. It consists of four solutions: two concentrations of methyl stearate in hexane and two concentrations of benzophenone in hexane.

Certified concentrations (ng/μL):

Compound	Value	Uncertainty (±)
Methyl stearate	0.99	0.02
Methyl stearate	4.98	0.08
Benzophenone	1.01	0.02
Benzophenone	5.01	0.07

Order information:

SRM 1543 can be purchased for US$88 per unit (4 ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1984) SRM 1543. GC/MS system reference material. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

Comments:

SRM 8443 is composed of 5 kits of SRM 1543 and can be purchased for US$175.

SRM 1583

Chlorinated Pesticides in 2,2,4-Trimethylpentane

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Pesticides and 2,2,4-trimethylpentane were obtained from commercial sources. The pesticide solutions were prepared at NBS by weighing and mixing individual pesticides and 2,2,4-trimethylpentane. These solutions were dispensed into 2-mL amber ampoules. This SRM is intended primarily for calibrating methods for the determination of the chlorinated pesticides certified in this standard. It can also be used for adding known amounts of these pesticides to samples in recovery studies.

Certified concentrations (µg/g):

Compound	µg/g Value	µg/g Uncertainty (±)	µg/mL Value	µg/mL Uncertainty (±)
Aldrin	0.86	0.01	0.59	0.01
gamma-BHC	1.11	0.01	0.77	0.01
delta-BHC	0.76	0.01	0.53	0.01
p,p'-DDE	1.23	0.03	0.85	0.02
p,p'-DDT	1.90	0.10	1.31	0.07
Heptachlor epoxide	(0.997)*			

Order information:

SRM 1583 can be purchased for US$164 per unit (6 2-mL ampoules with 1 mL of mixture). Price subject to change without notice. Please contact NIST at the address shown above.

* Information value only.

Reference:

National Bureau of Standards (1985) SRM 1583. Chlorinated pesticides in 2,2,4-trimethylpentane. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1584

Priority Pollutant Phenols in Methanol

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended primarily for the calibration of chromatographic instrumentation used in the determination of phenols. Due to its miscibility with water, it can also be used to fortify aqueous samples with known amounts of phenols. Since the density of methanol changes with temperature, the concentrations are certified only for the temperature range between 19 and 27°C only. The methanol solutions are sealed under nitrogen in amber glass ampoules.

Certified concentrations (µg/mL):

Congener	Value	Uncertainty (+)
2-Chlorophenol	64.4	1.4
4-Chloro-m-cresol	27.4	0.4
2,4-Dichlorophenol	35.6	1.3
2,4-Dimethylphenol	51.6	0.2
4,6-Dinitro-o-cresol	20.1	0.9
2,4-Dinitrophenol	(22.4)*	
2-Nitrophenol	25.2	0.7
4-Nitrophenol	20.7	0.7
Pentachlorophenol	15.4	1.1
Phenol	29.7	0.9
2,4,6-Trichlorophenol	20.4	1.9

Order information:

SRM 1584 can be purchased for US$135 per unit (5 1.2-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

* Information value only.

Reference:

National Bureau of Standards (1984) SRM 1584. Priority pollutant phenols in methanol. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1586

Isotopically Labeled and Unlabeled Priority Pollutants in Methanol

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 1586 is composed of two solutions that were prepared at NBS by weighing and mixing ten individual compounds and the methanol solvent. The solutions were kept chilled and were stored in ampoules. The ampoules were purged with nitrogen before being sealed. All the chemicals used in the preparation of this SRM were obtained from commercial sources and were deemed the best available at the time. Information on the purity and percent of molecules labeled can be found in the certificate of analysis. This SRM is intended primarily for use in the evaluation and calibration of analytical instrumentation used for the determination of priority pollutants as classified by the US Environmental Protection Agency.

Certified concentrations (µg/g):

Compound	Value	Uncertainty (±)
SRM 1586-1		
Benzene	101.1	0.8
Benzo(a)pyrene	49.2	0.2
bis(2-Ethyl hexyl) phthalate	63.9	1.7
Carbon tetrachloride	128.5	0.5
Chlorobenzene	133.0	0.6
2,4-Dichlorophenol	102.5	0.6
Naphthalene	126.5	1.2
Nitrobenzene	126.0	1.1
2-Nitrophenol	103.6	3.2
Phenol	117.0	1.3

SRM 1586 (cont.)

	Compound	Value	Uncertainty (±)
SRM 1586-2			
	Benzene-d_6	99.0	0.5
	Benzo(a)pyrene-d_{12}	44.1	2.1
	bis(2-Ethyl hoxyl) phthalate-d_4	60.4	0.7
	Carbon tetrachloride-^{13}C	124.4	2.1
	Chlorobenzene-d_5	144.0	1.3
	2,4-Dichlorophenol-d_3	82.2	1.6
	Naphthalene-d_8	126.6	1.0
	Nitrobenzene-d_5	134.5	1.4
	2-Nitrophenol-d_4	101.9	2.3
	Phenol-d_5	116.0	0.6

Order Information:

SRM 1586 can be purchased for US$207 per unit (2 5-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1984) SRM 1586. Isotopically labeled and unlabeled priority pollutants in methanol. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1587

Nitrated Polycyclic Aromatic Hydrocarbons in Methanol

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of four vials each containing approximately 1 mL of a methanol solution of seven nitrated polynuclear aromatic hydrocarbons (N-PAHs). Methanol was purged with argon (Ar) and its weight determined. After known weights of the seven N-PAHs were added to the methanol, the headspace of the mixing container was filled with Ar and the solution stirred in the dark for 20 hours. Each 2-mL amber glass ampoule was purged with Ar prior to the addition of the methanol solution and then flame-sealed.

Certified concentrations (μg/g):

Compound	Value	Uncertainty (±)
9-Nitroanthracene	5.01	0.11
7-Nitrobenz[a]anthracene	9.27	0.23
6-Nitrochrysene	8.13	0.11
2-Nitrofluoranthene	9.24	0.06
2-Nitrofluorene	9.67	0.39
1-Nitropyrene	8.95	0.28

Information only value (μg/g):

6-Nitrobenzo[a]pyrene	6.1

Order information:

SRM 1587 can be purchased for US$222 per unit (4 1-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1985) SRM 1587. Nitrated polycyclic aromatic hydrocarbons in methanol. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1614

Dioxin (2,3,7,8-TCDD in Isooctane)

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of separate solutions of unlabeled and labeled 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) in 2,2,4-trimethylpentane (isooctane). Three ampoules contain approximately 1.2 mL each of an isooctane solution on unlabeled 2,3,7,8-TCDD, and three ampoules contain approximately 1.2 mL each of an isooctane solution on ^{13}C-labeled 2,3,7,8-TCDD. This SRM is intended primarily for evaluation of analytical methods used in the determination of 2,3,7,8-TCDD. It can also be used for the purpose of adding known amounts of 2,3,7,8-TCDD to samples in recovery studies.

Certified concentrations:

Compound	ng/g Value	ng/g Uncertainty (±)	ng/mL Value	ng/mL Uncertainty (±)
2,3,7,8-TCDD	98.3	3.3	67.8	2.3
2,3,7,8-TCDD-^{13}C	95.6	1.5	65.9	1.0

Noncertified concentrations:

Solution	Compound	Value (ng/g)	Value (ng/mL)
Unlabeled	Trichlorodibenzo-p-dioxin-$^{12}C_{12}$	1.5	1.0
Labeled (^{13}C)	Trichlorodibenzo-p-dioxin-$^{13}C_{12}$	3.9	2.7

Order information:

SRM 1614 can be purchased for US$204 per unit (6 1.2-ml ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1985) SRM 1614. Dioxin (2,3,7,8-TCDD in isooctane). Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

WARNING:

The toxicity and/or carcinogenicity of 2,3,7,8-TCDD has not been precisely defined. This material, however, should be treated as a potential health hazard. Techniques used in handling radioactive and infectious materials are applicable to 2,3,7,8-TCDD.

SRM 1639

Halocarbons (in Methanol) for Water Analysis

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended primarily for use with chromatographic instrumentation used for the determination of halocarbons and in recovery studies for adding known amounts of the certified compounds to a sample. The methanol solution of halocarbons was prepared at NIST, chilled and stored in 2-mL amber glass ampoules. The ampoules were purged with argon immediately before filling with the methanol solution.

Certified concentrations (ng/μL):

Compound	Value	Uncertainty (±)
Bromodichloromethane	389.9	7.1
Bromoform	86.5	1.4
Carbon tetrachloride	157.0	4.4
Chlorodibromomethane	124.6	1.1
Chloroform	6235	340
Tetrachloroethylene	40.6	0.9
Trichloroethylene	85.8	2.6

Order information:

SRM 1639 can be purchased for US$212 per unit (4 ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1983) SRM 1639. Halocarbon (in methanol) for water analysis. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1641b - 1642b

Mercury in Water

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs consist of a solution of mercury in nitric acid. Gold tetrachloride ($AuCl_4$) has been added as a stabilizer at a concentration ten times that of Hg.

Certified concentrations:

SRM	Value	Uncertainty (±)
SRM 1641b (µg/mL)	1.52	0.04
SRM 1642b (ng/mL)	1.49	0.06

Order information:

SRM 1641b can be purchased for US$158 per unit (6 20-mL ampoules) and SRM 1642b for US$194 per unit (950 mL). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Bureau of Standards (1982) SRM 1642b. Mercury in water - ng/mL. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1983) SRM 1641b. Mercury in water - µg/mL. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1643b

Trace Elements in Water

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended primarily for use in evaluating the accuracy of trace element determination in filtered and acidified fresh water and for calibrating instrumentation used in these determinations. SRM 1643b was prepared at the US Geological Survey's National Water Quality Laboratory in Arvada, Colorado, USA, using high-purity reagents. All containers were acid-cleaned and sterilized before use. Solutions containing known amounts of Ca, Na, Mg, and K were added to a 0.5 M HNO_3 solution in a polyethylene tank. The solution was mixed, then filtered, sterilized, and transferred to 1-liter polyethylene bottles. The approximate concentrations of Ca, Na, Mg, and K were 35, 8, 15, and 3 µg/L respectively.

Certified concentrations (ng/g)*:

Element	Value	Uncertainty (±)
Be	19	2
V	45.2	0.4
Cr	18.6	0.4
Mn	28	2
Fe	99	8
Co	26	1
Ni	49	3
Cu	21.9	0.4
Zn	66	2
Se	9.7	0.5
Sr	227	6
Mo	85	3
Ag	9.8	0.8
Cd	20	1
Ba	44	2
Tl	8.0	0.2
Pb	23.7	0.7

* To convert to ng/mL, multiply by the density of the SRM, 1.017 g/mL at 23°C.

Noncertified concentrations (ng/g)*:

Element	Value
B	94
As	49
Bi	11

Order information:

SRM 1643b can be purchased for US$195 per unit (1-liter bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1984) SRM 1643b. Trace elements in water. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

* To convert to ng/mL, multiply by the density of the SRM, 1.017 g/mL at 23°C.

SRM 1644

Generator Columns for Polynuclear Aromatic Hydrocarbons

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of three 50 cm x 0.6 cm coiled, stainless-steel tubes, each packed with fine quintus quartz (sea sand) coated with approximately 0.5% by weight of the polynuclear aromatic hydrocarbon (PAH) of interest. A saturated aqueous solution of the PAH of interest can be generated by flowing high-purity water slowly through the column. Because the aqueous solubility of a compound is a well-defined thermodynamic quantity, a saturated solution has a fixed concentration. The concentration of these solutions generated at temperatures between 10 and 30°C are reported in the certificate of analysis. The generator columns are certified for two years or for a total aqueous purge volume of between 100 and 10,000 liters, whichever comes first.

Certified concentrations at 25° C (µg/kg):

Compound	Value	Uncertainty (±)
Anthracene	42.7	0.6
Benz[a]anthracene	9.05	1.0
Benzo[a]pyrene	1.59	0.04

Order information:

SRM 1644 can be purchased for US$308 per unit (set of 3 columns). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1981) SRM 1644. Generator columns for polynuclear aromatic hydrocarbons. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1647a

Priority Pollutant Polynuclear Aromatic Hydrocarbons (in Acetonitrile)

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The acetonitrile (C_2H_3N) solution of 16 polynuclear aromatic hydrocarbons (PAHs) was prepared gravimmetrically from individual compounds obtained from BCR (Community Bureau of Reference) and commercial sources. The solution was aliquoted into 2-mL amber glass ampoules. The ampoules were purged with argon just prior to filling. Ultraviolet absorption data between 205-600 nm are supplied. This SRM is intended for calibrating chromatographic instrumentation used in the determination of the PAHs certified for this SRM. It is also useful in recovery studies for adding known accurate amounts of these PAHs to a sample; and because of its miscibility with water, it can be used to fortify aqueous samples with known concentrations of PAHs. Since the density of acetonitrile changes with temperature, the concentrations are certified for the temperature range of 21 to 25°C.

Certified concentrations (µg/mL):

Compound	Value	Uncertainty (±)
Acenaphthene	19.6	0.5
Acenaphthylene	15.9	0.2
Anthracene	0.771	0.004
Benz[a]anthracene	3.82	0.02
Benzo[b]fluoranthene	4.08	0.05
Benzo[k]fluoranthene	4.61	0.02
Benzo[a]pyrene	4.82	0.03
Benzo[ghi]perylene	3.75	0.02
Chrysene	3.62	0.02
Dibenz[a,h]anthracene	3.72	0.05
Fluoranthene	7.68	0.07
Fluorene	4.76	0.06
Indeno[1,2,3-cd]pyrene	4.32	0.08
Naphthalene	19.9	0.4
Phenanthrene	3.37	0.02
Pyrene	8.25	0.02

Order information:

SRM 1647a can be purchased for US$156 per unit (5 2-mL vials). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1988) SRM 1647a. Priority pollutant polynuclear aromatic hydrocarbons. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1871 - 1875

Glasses for Microscopic Analysis

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended primarily for the analysis of glasses, ceramics and minerals by microanalytical techniques such as quantitative electron probe, secondary ion mass spectrometry, spark source mass spectrometry, and laser probe microanalysis. These glasses provide a highly homogeneous material at microscopic spatial resolution.

Certified concentrations (nominal weight percent)*:

Pb-Si Glass (SRM 1871)

Element	K-456		K-493		K-523	
	Value	Uncertainty (±)	Value	Uncertainty (±)	Value	Uncertainty (±)
O	(20.35)	-	(20.58)	-	(20.80)	-
Mg	-	-	-	-	(0.12)	-
Al	-	-	(0.13)	-	-	-
Si	13.37	0.24	(13.09)	(0.24)	(12.94)	(0.24)
P	-	-	-	-	(0.24)	-
Ti	-	-	(0.20)	-	(0.21)	-
Cr	-	-	-	-	(0.20)	-
Fe	-	-	(0.25)	-	-	-
Ni	-	-	-	-	(0.25)	-
Ge	-	-	-	-	(0.20)	-
Zr	-	-	(0.38)	-	(0.33)	-
Ba	-	-	-	-	(0.61)	-
Ce	-	-	(0.53)	-	-	-
Eu	-	-	-	-	(0.73)	-
Ta	-	-	(0.64)	-	-	-
Pb	65.67	0.26	63.28	0.26	63.10	0.26
Th	-	-	-	-	(0.08)	-
U	-	-	-	-	(0.23)	-
Total	(99.38)		(99.08)		(100.19)	

* Values in parenthesis are for information only and are not certified.

Pb-Ge Glass (SRM 1872)

Element	K-453 Value	K-453 Uncertainty (±)	K-491 Value	K-491 Uncertainty (±)	K-968 Value	K-968 Uncertainty (±)
O	(16.73)	-	(16.45)	-	(16.67)	-
Mg	-	-	-	-	(0.22)	-
Al	-	-	(0.10)	-	-	-
Si	-	-	(0.11)	-	-	-
P	-	-	-	-	(0.21)	-
Ti	-	-	(0.14)	-	(0.16)	-
Cr	-	-	-	-	(0.19)	-
Fe	-	-	(0.17)	-	-	-
Ni	-	-	-	-	(0.20)	-
Ge	28.43	0.34	26.10	0.34	25.93	0.34
Zr	-	-	(0.26)	-	(0.48)	-
Ba	-	-	-	-	(0.46)	-
Ce	-	-	(0.59)	-	-	-
Eu	-	-	-	-	(0.64)	-
Ta	-	-	(0.52)	-	-	-
Th	-	-	-	-	(0.12)	-
U	-	-	-	-	(0.05)	-
Pb	54.21	0.26	54.69	0.26	54.74	0.26
Total	(99.37)		(99.13)		(100.07)	

Ba-Zn-Si Glass (SRM 1873)

Element	K-458 Value	K-458 Uncertainty (±)	K-489 Value	K-489 Uncertainty (±)	K-963 Value	K-963 Uncertainty (±)
O	(31.86)	-	(31.70)	-	(32.00)	-
Mg	-	-	-	-	(0.34)	-
Al	-	-	(0.11)	-	-	-
Si	23.05	0.34	(22.23)	(0.34)	(21.96)	(0.34)
P	-	-	-	-	(0.33)	-
Ti	-	-	(0.27)	-	(0.32)	-
Cr	-	-	-	-	(0.31)	-
Fe	-	-	(0.35)	-	-	-
Ni	-	-	-	-	(0.33)	-
Zn	3.01	0.06	2.93	0.06	2.95	0.06
Ge	-	-	-	-	(0.47)	-
Zr	-	-	(0.40)	-	(0.61)	-
Ba	41.79	0.20	39.53	0.20	39.21	0.48
Ce	-	-	(0.80)	-	-	-
Eu	-	-	-	-	(0.95)	-
Ta	-	-	(0.95)	-	-	-
Pb	-	-	1.32	-	-	-
Th	-	-	-	-	(0.06)	-
U	-	-	-	-	(0.16)	-
Total	(99.71)		(100.59)		(100.00)	

Li-Al-B Glass (SRM 1874)

Element	K-495 Value	K-495 Uncertainty (±)	K-490 Value	K-490 Uncertainty (±)	K-546 Value	K-546 Uncertainty (±)
O	(63.49)	-	(60.74)	-	(61.36)	-
Mg	-	-	-	-	(0.17)	-
Al	10.89	0.23	(10.2)	-	(10.1)	-
Si	-	-	(0.19)	-	-	-
P	-	-	-	-	(0.42)	-
Ti	-	-	(0.31)	-	(0.39)	-
Cr	-	-	-	-	(0.14)	-
Fe	-	-	(0.38)	-	-	-
Ni	-	-	-	-	(0.39)	-
Ge	-	-	-	-	(0.50)	-
Zr	-	-	(0.53)	-	(0.52)	-
Ba	-	-	-	-	(0.99)	-
Ce	-	-	(1.46)	-	-	-
Eu	-	-	-	-	(1.21)	-
Ta	-	-	(1.02)	-	-	-
Pb	-	-	(1.47)	-	-	-
Th	-	-	-	-	(0.16)	-
U	-	-	-	-	(0.24)	-
Total	(99.68)		(100.01)		(100.39)	

Al-Mg-P Glass (SRM 1875)

Element	K-496 Value	K-496 Uncertainty (±)	K-497 Value	K-497 Uncertainty (±)	K-1013 Value	K-1013 Uncertainty (±)
Li	-	-	(0.0005)	-	-	-
B	-	-	(0.05)	-	-	-
O	(53.90)	-	(52.46)	-	(53.05)	-
Mg	6.65	0.17	6.49	0.17	5.86	0.26
Al	6.47	0.20	5.97	0.22	6.08	0.21
Si	-	-	(0.13)	-	-	-
P	32.98	0.55	31.59	0.58	32.26	0.56
Ti	-	-	(0.22)	-	(0.21)	-
Cr	-	-	-	-	(0.14)	-
Fe	-	-	(0.28)	-	-	-
Ni	-	-	-	-	(0.31)	-
Ge	-	-	-	-	(0.34)	-
Zr	-	-	(0.32)	-	(0.45)	-
Ba	-	-	-	-	(0.52)	-
Ce	-	-	(0.94)	-	-	-
Eu	-	-	-	-	(0.53)	-
Ta	-	-	(0.71)	-	-	-
Pb	-	-	(0.86)	-	-	-
Th	-	-	-	-	(0.10)	-
U	-	-	-	-	(0.15)	-
Total	(100.00)		(100.00)		(100.00)	

Order information:

These SRMs consists of 3 2x2x20 mm rods and can be purchased for US$314 per set. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1984) SRM 1871. Lead-silicate glasses for microanalysis. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 1872. Lead-germanate glasses for microanalysis. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 1873. Barium-zinc-silicate glasses for microanalysis. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 1874. Lithium-aluminum-borate glasses for microanalysis. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 1875. Aluminum-magnesium-phosphate glasses for microanalysis. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2009a

Didynium Glass Filter

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 2009s consists of a set of filters for use in checking the wavelength scale of scanning spectrophotometers between 400 and 760 nm for a bandpass range between 1.5 and 10.5 nm. Depending upon the bandwidth of the spectrophotometer, 12 to 22 wavelength corrections can be determined from 389 to 760 nm. SRM 2009a is approximately 1 cm wide by 3 cm high and is supplied in a holder which fits in the place of a standard analytical cuvette. For further information, consult Venable and Eckerle (1979).

Order information:

SRM 2009a can be purchased for US$450 per unit (one filter) each. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1984) SRM 2009a. Didynium glass filter for checking the wavelength scale of spectrophotometers. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

Venable, W. H., and K. Eckerle (1979) Standard reference materials: didynium glass filters for calibrating the wavelength scale of spectrophotometers - SRM 2009, 2010, 2013 and 2014. NBS Spec. Pub. 260-66, PB-80-104961. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2032

Potassium Iodide

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM consists of crystalline potassium iodide (KI) of established purity for use as a stray light standard in the ultraviolet. Aqueous solutions made with this material are certified for their specific absorbance at 23.5°C over a wavelength range from 240 to 280 nm.

Order Information:

SRM 2032 can be purchased for US$262 per unit (25-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2033

Potassium Iodide with Attenuator

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 2034 consists of the same material used in SRM 2032 plus a reference beam attenuator that can be used to assess the heterochromatic stray radiant energy (stray light) in ultraviolet absorption spectrometers in the spectral region below 260 nm. The attenuator consists of two semitransparent evaporated metal-on-fused silica (non-fluorescent) filters, each with a nominal transmittance of 10%.

Order Information:

SRM 2033 can be purchased for US$389 per unit (25-g bottle and attenuator). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Bureau of Standards (1980) SRM 2033. Crystalline potassium iodide with attenuator. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2034

Holmium Oxide Solution Wavelength Standard

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 2034 consists of a solution of holmium oxide (Ho_2O_3) in 10% perchloric acid in water, sealed in a nonfluorescent fused silica cuvette of nominal 10 mm light path. This SRM is used to establish the accuracy of the wavelength scale of conventional spectrophotometers in the spectral range of 240-650 nm. Details concerning the materials, instrumentation, method of certification and procedures for using this SRM can be found in Weidner *et al.* (1986).

Order Information:

SRM 2034 can be purchased for US$391 per unit (cuvette). Price subject to change without notice. Please contact NIST at the address shown above.

References:

National Bureau of Standards (1985) SRM 2034. Holmium oxide solution wavelength standard. National Bureau of Standards, Gaithersburg, MD, USA.

Weidner, V. R., R. Mavrodineau, K. D. Mielenz, R. A. Velapoldi, K. L. Eckerle, and B. Adams (1986) Standard reference materials: holmium oxide solution wavelength standard from 240-650 nm, SRM 2034. NBS Spec. Pub. 260-102. PB-86-245727. 56pp. National Bureau of Standards, Gaithersburg, MD.

SRM 2069a

SEM Performance Standard

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended for use in evaluating the performance of scanning electron microscopes (SEM). One edge of a single carbon fiber is used as a clearly defined boundary across which the electron beam scans. The slope of the resultant detector signal waveform is a measure of the SEM performance that can be related to the resolution capability of the SEM. The procedure to be followed in determining SEM performance is given on the back of the certificate of analysis. Additional carbon fibers are provided for mounting by the user.

Order Information:

SRM 2069a can be purchased for US$127 per unit. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1985) SRM 2069a. SEM performance standard. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2185

Potassium Hydrogean Phthalate

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM intended for use in preparing buffer solutions to calibrate electrodes for pD measuring systems. This substance meets the American Chemical Society's specifications for reagent grade materials; it does contain, however, impurities such as water, free alkali, silica, chlorides, sulfur compounds and heavy metals. The pD(S) values correspond to $\log(1/a_D)$ where a_D is a conventional activity of the deuterium ion referred to the standard state on the molal scale. The certified values listed below were derived from emf measurements of cells without liquid junction by a method of calculation similar to that described in Bates (1962). The uncertainty of the pD(S) is estimated not to exceed ±0.005 units for the temperature range 0 to 50° C.

pD(S) of a 0.05 molal solution:

Temperature (° C)	pD(S)
5.0	4.542
10.0	4.532
15.0	4.524
20.0	4.520
25.0	4.518
30.0	4.518
35.0	4.521
40.0	4.527
45.0	4.534
50.0	4.543

Order information:

This SRM can be purchased for US$119 per unit (60 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Bates, R.G. (1962) Revised standard values for pH measurements from 0 to 95°C. J. Res. National Bureau of Standards, 66A:179-84.

National Bureau of Standards (1984) Certificate of analysis, SRM 85, potassium hydrogen phthalate. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2186

Potassium Dihydrogen Phosphate - I
Disodium Hydrogen Phosphate - II

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs intended for use in preparing buffer solutions to calibrate electrodes for pD measuring systems. The chemicals meet the American Chemical Society's specifications for reagent grade materials; they do contain, however, impurities such as water, free alkali, silica, chlorides, sulfur compounds and heavy metals. The pD(S) values correspond to $\log(1/a_D)$ where a_D is a conventional activity of the deuterium ion referred to the standard state on the molal scale. The certified values listed below were derived from emf measurements of cells without liquid junction by a method of calculation similar to that described in Bates (1962). The uncertainty of the pD(S) is estimated not to exceed ±0.01 units.

pD(S) of a 0.05 molal solution with respect to both potassium dihydrogen phthalate and disodium hydrogen phosphate:

Temperature (° C)	pD(S)
5.0	7.539
10.0	7.504
15.0	7.475
20.0	7.449
25.0	7.428
30.0	7.411
35.0	7.397
40.0	7.387
45.0	7.381
50.0	7.377

Order information:

This SRM can each be purchased for US$99 per unit (30 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Bates, R.G. (1962) Revised standard values for pH measurements from 0 to 95°C. J. Res. National Bureau of Standards, 66A:179-84.

National Bureau of Standards (1968) Potassium dihydrogen phosphate (2186-I), disodium hydrogen phosphate (2186-II). Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2191a - SRM 2192a

Sodium Bicarbonate and Sodium Carbonate

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for use in preparing buffer solutions to calibrate electrodes for pD measuring systems. The sodium carbonate and bicarbonate meet the American Chemical Society's specifications for reagent grade materials; they do contain, however, impurities such as water, free alkali, silica, chlorides, sulfur compounds and heavy metals. The pD(S) values correspond to $\log(1/a_D)$ where a_D is a conventional activity of the deuterium ion referred to the standard state on the molal scale. The certified values listed below were derived from emf measurements of cells without liquid junction by the method of calculation similar to that described in Bates (1962). The uncertainty of the pD(S) is estimated not to exceed ±0.005 units for the temperature range 0 to 50° C.

pD(S) of a 0.025 molal solution with respect to both sodium carbonate and sodium bicarbonate:

Temperature (° C)	pD(S)
5.0	10.993
10.0	10.917
15.0	10.849
20.0	10.787
25.0	10.732
30.0	10.684
35.0	10.641
40.0	10.60*
45.0	10.57*
50.0	10.54*

* Due to some uncertainty at high temperatures, the last three values are certified to only 2 decimal places. The estimated uncertainty of within ±0.01 units for these temperatures.

Order information:

These SRMs can each be purchased for US$119 per unit (30 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Bates, R.G. (1962) Revised standard values for pH measurements from 0 to 95°C. J. Res. National Bureau of Standards, 66A:179-84.

National Bureau of Standards (1984) SRM 2191a. Sodium bicarbonate. SRM 2192a. Sodium carbonate. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2201 - 2203

Sodium Chloride, Potassium Chloride, Potassium Fluoride

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are primarily intended for use in the calibration of ion-selective electrodes for sodium, potassium, chloride and fluoride ions. The materials meet the American Chemical Society's specifications for reagent grade materials; they do contain, however, impurities such as chlorides, fluosilicates and heavy metals. The materials are certified for the activity coefficients at 25°C of the sodium, potassium, chloride and fluoride ions as appropriate at various concentrations and the related values pNa, pK, pCl and pF. Mean activity coefficients at temperatures from 15 to 45°C for any concentration up to 0.1 molal may also be calculated using the provided temperature-dependence equations.

[NOTE: The chlorinity (Cl ^{o}/oo, Cl g/kg seawater) of seawater, which is related to salinity, is currently most commonly determined using electrical conductivity. Chlorinity, in turn, can be related to pCl.]

Order information:

SRM 2201 can each be purchased for US$83 per unit (125 g); SRM 2202 for US$83 per unit (160 g); and SRM 2203 for US$139 per unit (125 g). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1973) SRM 2203. Potassium fluoride. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 2201. Sodium chloride. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984). SRM 2202. Potassium chloride. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 3101 - 3169

Spectrometric Standard Solutions

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for use as stock solutions in atomic absorption spectrometry, optical emission (plasma) spectrometry, spectrophotometry, or any other analytical technique that requires aqueous solutions for calibration. These standards were prepared gravimetrically using well-characterized high purity elements or salts to contain 10 mg/mL of the selected metal in 10% high-purity acid. Some of the high purity elements used in the preparation of these SRMs are available as NIST SRMs and are so noted below. NIST monitors the stability of these solutions and will notify purchasers of any change.

Available single element solutions (10 mg/mL unless noted):

SRM	Element	Metal or salt	Acid Concentration
3101	Al	SRM 1257	10 % HCl
3102	Sb	Metal	50 % HCl
3103	As	SRM 83d	15 % HCl
3104	Ba	$BaCO_3$	10 % HCl
3105	Be	Metal	10 % HCl
3106	Bi	Metal	10 % HNO_3
3107	B (5.00)	SRM 951	Water
3108	Cd	Metal	10 % HNO_3
3109	Ca	SRM 915	10 % HCl
3110	Ce	CeO_2	10 % HNO_3
3111	Cs	Cs_2CO_3	1 % HCl
3112	Cr	Metal	10 % HCl
3113	Co	Metal	10 % HNO_3
3114	Cu	SRM 393	10 % HNO_3
3115	Dy	Dy_2O_3	10 % HCl
3116	Er	Er_2O_3	10 % HCl
3117	Eu	Eu_2O_3	10 % HCl
3118	Gd	Gd_2O_3	10 % HCl

SRM 3101 - 3169 (cont.)

SRM	Element	Metal or salt	Acid Concentration
3119	Ga	Metal	10 % HCl
3120	Ge	Metal	In preparation
3121	Au	SRM 685w	10 % HCl
3122	Hf	Metal	In preparation
3123	Ho	Ho_2O_3	10 % HCl
3124	In	Metal	10 % HCl
3126	Fe	Metal	10 % HCl
3127	La	La_2O_3	10 % HCl
3128	Pb	SRM 49e	10 % HNO_3
3129	Li	SRM 924	1 % HCl
3130	Lu	Lu_2O_3	10 % HCl
3131	Mg	Metal	10 % HCl
3132	Mn	Metal	10 % HNO_3
3133	Hg	SRM 743	10 % HNO_3
3134	Mo	Metal	10 % HCl
3135	Nd	Nd_2O_3	10 % HCl
3136	Ni	Metal	10 % HNO_3
3137	Nb	Metal	5 % HNO_3+2 % HF
3138	Pd	Metal	10 % HCl
3139	P	SRM 194	0.05 % HCl
3140	Pt	SRM 680	10 % HCl
3141	K	SRM 999	1 % HCl
3142	Pr	Pr_6O_{11}	10 % HCl
3143	Re	Metal	10 % HNO_3
3145	Rb	SRM 984	1 % HCl
3147	Sm	Sm_2O_3	10 % HCl
3148	Sc	Sc_2O_3	10 % HCl
3149	Se	SRM 726	10 % HCl
3150	Si	$Na_2SiO_3 \cdot 9H_2O$	Water
3151	Ag	SRM 748	10 % HNO_3
3152	Na	SRM 919	1 % HCl
3153	Sr	$SrCO_3$	10 % HCl
3154	S	H_2SO_4	Water
3155	Ta	Metal	5 % HNO_3 + 2 % HF
3156	Te	Metal	10 % HCl
3157	Tb	Tb_4O_7	10 % HCl
3158	Tl	Metal	10 % HNO_3
3159	Th	ThO_2	10 % HNO_3
3160	Tm	Tm_2O_3	10 % HCl
3161	Sn	SRM 741	60 % HCl
3162	Ti	Metal	20 % HCl
3163	W	Metal	7 % HNO_3 + 4 % HF
3165	V (5.00)	NH_4O_3	10 % HNO_3
3166	Yb	Yb_2O_3	10 % HCl
3167	Y	Y_2O_3	10 % HCl
3168	Zn	SRM 740	10 % HCl
3169	Zr	SRM 1234	10 % HNO_3 + 2 % HF

Available multielement solutions (100 mg/mL unless noted):

SRM	Elements	Acid Concentration
3171	Al, Be (10), Cd, Cr, Fe, Mg, Mn, Ni, K, Na	5 % HNO_3
3172	As (200), Ba (10), Ca (10), Co, Cu, Pb, Se (500), Ag, Sr (10), Zn	5 % HNO_3
3173	Bi (200), B, Ce (50), Hg (200), P (200), Si, Tl (200), Th, V	5 % HNO_3
3174	Al, Be, B, Cd, Au, Hf, Fe, Pb, Tl, Zr	5 % HNO_3 + trace HF
3175	As (200), Be (10), La (50), Mo, P (200), Se (500), Te (500), Sn (200), Y (50)	10 % HCl
3176	Sb (500), Be (10), B, Dy, Eu, Gd, Nd, Ru, Ti (50)	15 % HCl

Order information:

These SRMs can be purchased for US$74 per unit (50-mL bottle) except for the Sc standard which is priced at US$122. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1986) SRM 3101. Spectrometric standard solution. Aluminum. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3104. Spectrometric standard solution. Barium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3109. Spectrometric standard solution. Calcium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3106. Spectrometric standard solution. Bismuth. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3121. Spectrometric standard solution. Gold. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3124. Spectrometric standard solution. Indium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3128. Spectrometric standard solution. Lead. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3129. Spectrometric standard solution. Lithium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3131. Spectrometric standard solution. Magnesium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3133. Spectrometric standard solution. Mercury. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3134. Spectrometric standard solution. Molybdenum. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3139. Spectrometric standard solution. Phosphorus. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3140. Spectrometric standard solution. Platinum. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3141. Spectrometric standard solution. Potassium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3145. Spectrometric standard solution. Rubidium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3149. Spectrometric standard solution. Selenium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3150. Spectrometric standard solution. Silicon. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3151. Spectrometric standard solution. Silver. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3152. Spectrometric standard solution. Sodium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3153. Spectrometric standard solution. Strontium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3156. Spectrometric standard solution. Tellerium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3158. Spectrometric standard solution. Thallium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3161. Spectrometric standard solution. Tin. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3162. Spectrometric standard solution. Titanium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3163. Spectrometric standard solution. Tungsten. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3165. Spectrometric standard solution. Vanadium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3168. Spectrometric standard solution. Zinc. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 3169. Spectrometric standard solution. Zirconium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3110. Spectrometric standard solution. Cerium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3111. Spectrometric standard solution. Cesium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3115. Spectrometric standard solution. Dysprosium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3116. Spectrometric standard solution. Erbium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3117. Spectrometric standard solution. Europium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3127. Spectrometric standard solution. Lanthanum. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3130. Spectrometric standard solution. Lutetium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3135. Spectrometric standard solution. Neodynium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3147. Spectrometric standard solution. Samarium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3148. Spectrometric standard solution. Scandium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3154. Spectrometric standard solution. Sulfur. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3160. Spectrometric standard solution. Thullium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3166. Spectrometric standard solution. Yterbium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3167. Spectrometric standard solution. Yttrium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1988) SRM 3120. Spectrometric standard solution. Germanium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1988) SRM 3122. Spectrometric standard solution. Hafnium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1988) SRM 3137. Spectrometric standard solution. Niobium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1988) SRM 3142. Spectrometric standard solution. Praseodynium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1988) SRM 3143. Spectrometric standard solution. Rhenium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1988) SRM 3157. Spectrometric standard solution. Terbium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1988) SRM 3159. Spectrometric standard solution. Thorium. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3102. Spectrometric standard solution. Antimony. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3103. Spectrometric standard solution. Arsenic. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3105. Spectrometric standard solution. Beryllium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3107. Spectrometric standard solution. Boron. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3108. Spectrometric standard solution. Cadmium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3112. Spectrometric standard solution. Chromium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3113. Spectrometric standard solution. Cobalt. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3114. Spectrometric standard solution. Copper. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3119. Spectrometric standard solution. Gallium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3126. Spectrometric standard solution. Iron. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3132. Spectrometric standard solution. Manganese. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3136. Spectrometric standard solution. Nickel. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3138. Spectrometric standard solution. Palladium. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

National Institute of Standards and Technology (1989) SRM 3155. Spectrometric standard solution. Tantalum. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 3181 - 3183

Anion Standard Solutions

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for use in anion ion chromatography. They consist of single component solutions prepared gravimetrically to contain 1000 µg of the anion per gram of solution. The solutions are prepared in 18 megohm water.

Concentrations (µg anion/g):

SRM	Anion	Salt	Value	Uncertainty (±)
3181	Sulfate	K_2SO_4	1000	5
3182	Chloride	KCl	1000	5
3183	Fluoride	NaF	1000	5

Order information:

SRM 3181, 3182 and 3183 can be purchased for US$69, 66, and 66 per unit (50-mL bottle) respectively. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1987) SRM 3181. Anion standard solution sulfate. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3182. Anion standard solution chloride. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 3183. Anion standard solution fluoride. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 4226B through 4949B

Alpha-Particle, Beta-Particle, Gamma-Ray, and Electron Capture Solutions

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Certain radioactivity SRMs have short half-lives and are available only at certain announced times. Others of intermediate half-lifes are issued periodically and may be out of stock. The amount of radionuclide in these SRMs is stated in terms of activity or decays per second. Becquerel (Bq) units are related to curies (Ci) by the formula

$$1 \text{ Ci} = 3.7 \times 10^{10} \text{ Bq}.$$

Radioactivity level (Bq/g):

SRM	Radionuclide	Emission	Approx. activity (Bq/g)	Date of calibration	Total uncertainty (%)
4226B *	Ni-63	β	1×10^6	12/84	1.1
4233B *	Ce-137 ∆				
4251B *	Ba-133	γ	4×10^5	6/81	1.4
4276C *	Sb-125	γ	2×10^4	9/88	NA ◊
	Eu-154		1×10^4		
	Eu-155		7×10^3		
4288 *	Tc-99	β	4×10^4	11/82	1.6
4321	U-238	α	263	11/86	0.4
4322 *	Am-241	α	39	11/86	1.0
4323 *	Pu-238	α	33	11/86	0.5

∆ Temporarily out of stock.
◊ Not available.
* License certification is required by NIST.

SRM	Radionuclide	Emission	Approx. activity (Bq/g)	Date of calibration	Total uncertainty (%)
4324 *	U-232	α	83	2/84	1.5
4327 *	Po-208	α	77	6/84	1.4
4328 *	Th-229	α	884	5/84	1.5
4329 *	Cm-243	α	69	6/84	1.4
4332B *	Am-243 Δ				
4334C *	Pu-242 Δ				
4338 *	Pu-240	α	18	4/80	1.0
4361B	H-3	β	1.12	8/87	1.0
4370C *	Eu-152	γ	9×10^4	2/87	1.1
4915D *	Co-60	γ	3×10^5	2/84	0.8
4919F *	Sr-90	β	4×10^3	5/88	1.2
4926C	H-3 Δ				
4927D	H-3	β	6×10^5	1/89	0.8
4929D	Fe-55	Low photon	1×10^4	8/85	2.6
4940C	Pm-147	β	1×10^5	8/85	0.4
4943 *	Cl-36	β	1×10^4	12/84	0.8
4947C	H-3	β	3×10^5	3/87	1.2
4949B	I-129	β	7×10^3	1/82	1.9

Order information:

These SRMs can be purchsed for the prices and quantities listed below. Price subject to change without notice. Please contact NIST at the address shown above.

SRM	Unit	Cost (US$)	SRM	Unit	Cost (US$)
4226B	4.1 g	407	4332B	Out of stock	
4233B	Out of stock		4334C	Out of stock	
4251B	5 g	439	4338	5 g	572
4276C	5 mL	579	4361B	490 g	433
4288	5 mL	412	4915D	5 g	435
4321	5 mL	476	4919F	5 g	413
4322	5 mL	476	4926C	Out of stock	
4323	5 mL	476	4927D	3 mL	493
4324	5 mL	382	4929D	5 mL	398
4327	1.1 g	311	4940C	3 g	378
4328	2 mL	311	4943	3 mL	313
4329	5.1 g	319	4947C	4 g	421
			4949B	1.1 g	472

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* License certification is required by NIST.

Δ Temporarily out of stock.

Reference:

National Bureau of Standards (1979) SRM 4926C. Radioactivity standard. Hydrogen-3. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1979) SRM 4233B. Radioactivity standard. Cesium-137. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1980) SRM 4338. Alpha particle emission rate solution standard. Plutonium-240. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1981) SRM 4251B. Radioactivity standard. Barium-133. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1982) SRM 4288. Radioactivity standard. Technetium-99. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1982) SRM 4949B. Radioactivity standard. Iodine-129. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 4226B. Radioactivity standard. Nickel-63. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 4324. Radioactivity standard. Uranium-232. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 4332B. Radioactivity standard. Americium-243. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 4943. Radioactivity standard. Chlorine-36. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 4915D. Radioactivity standard. Cobalt-60. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1985) SRM 4327. Radioactivity standard. Polonium-208. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1985) SRM 4328. Radioactivity standard. Thorium-229. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1985) SRM 4329. Radioactivity standard. Curium-243. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1985) SRM 4940C. Radioactivity standard. Promethium-147. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 4321. Alpha particle solution standard. Natural uranium. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 4322. Alpha particle solution standard. Americium-241. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 4323. Alpha particle solution standard. Plutonium-238. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1986) SRM 4929D. Radioactivity standard. X-Ray emission rate standard. Iron-55. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 4334C. Alpha particle solution standard. Plutonium-242. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 4361B. Radioactivity standard. Hydrogen-3. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 4370C. Radioactivity solution standard. Europium-152. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 4947C. Tritiated toluene radioactivity standard for liquid scintillating counting. Hydrogen-3. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1988) SRM 4276C. Radioactivity standard. Mixed radionuclide solution standard for the efficient calibration of germanium spectrometry systems. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1988) SRM 4919F. Radioactivity standard. Strontium-90. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1989) SRM 4927D. Radioactivity standard. Hydrogen-3. Certificate. National Bureau of Standards, Gaithersburg, MD, USA.

OILS

CRM 349

PCBs in Cod Liver Oil

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of cod liver oil with endogeneous chlorobiphenyls in a sealed argon filled ampoule. The oil was stabilized by the addition of 2mg/g butyl hydroxo toluene.

Certified concentration (µg/kg):

PCB congener	Concentration	Uncertainty (±)
2,4,4'-Trichlorobiphenyl	68	7
2,2',5,5'-Tetrachlorobiphenyl	149	20
2,2',4,5,5'-Pentachlorobiphenyl	370	17
2,3',4,4',5-Pentachlorobiphenyl	456	31
2,2',3,4,4',5'-Hexachlorobiphenyl	765	45
2,2',4,4',5,5'-Hexachlorobiphenyl	938	40
2,2',3,4,4',5,5'-Heptachlorobiphenyl	282	22

Order information:

CRM 349 can be purchased for 3000 per unit (2-g vial) respectively. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

CRM 350

PCBs in Mackerel Oil

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

This material consists of mackerel oil with endogeneous chlorobiphenyls in a sealed argon filled ampoule. The oil was stabilized by the addition of 2mg/g butyl hydroxo toluene.

Certified concentration (µg/kg):

PCB congener	Concentration	Uncertainty (±)
2,4,4'-Trichlorobiphenyl	22.5	4.0
2,2',5,5'-Tetrachlorobiphenyl	62	9
2,2',4,5,5'-Pentachlorobiphenyl	165	9
2,3',4,4',5-Pentachlorobiphenyl	143	20
2,2',3,4,4',5'-Hexachlorobiphenyl	274	27
2,2',4,4',5,5'-Hexachlorobiphenyl	318	20
2,2',3,4,4',5,5'-Heptachlorobiphenyl	73	13

Order information:

CRM 350 can be purchased for 3000 per unit (2-g vial) respectively. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

EPA QC - Oils

EPA Quality Control Samples

Source:

US Environmental Protection Agency
Quality Assurance Branch
EMSL - Cincinnati
Cincinnati, OH 45268
USA

Description:

These samples are prepared, verified, and distributed by EPA as part of their quality assurance program. Component mix and concentration ranges reflect their use in standard EPA analytical procedures. Updates on the availability of these materials can be obtained through the EPA Quality Assurance Newsletter. Contact the Technical Editor of the Newsletter at the address shown above.

Quality control samples:

Polychlorinated biphenyls (PCBs) in transformer, hydraulic, and capacitor oils (specify Aroclor and oil) (10-500 µg/L)

Aroclor 1016
Aroclor 1242
Aroclor 1254
Aroclor 1260

EPA/API Standard reference oils (neat oils) (specify oil when ordering)

Arabian light crude oil
Prudhoe Bay crude oil
South Louisiana crude oil
No. 2 fuel oil (high aromatics)
No. 6 fuel oil (high viscosity) Bunker C

Oil and grease (20 mg/L)

Analyzable by infrared and gravimetric procedures.

Order Information:

At this time (Summer 1989), the solutions are available free of charge. Please contact EPA at the address shown above. The EPA requires that requests for these materials be signed by the laboratory director.

Reference:

Environmental Protection Agency (1989) EPA Newsletter Quality Assurance, 11(1). US Environmental Protection Agency, Cincinnati, OH, USA.

SRM 1581

Polychlorinated Biphenyls in Oils

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended primarily for calibrating instrumentation and validating methodology used in the determination of polychlorinated biphenyl mixtures (PCBs) in motor and transformer oils. These PCBs are present at Aroclor 1242 and 1260.

Certified concentrations (µg/g):

Matrix	Aroclor type	Value	Uncertainty (±)
Motor oil	1242	100	1
Motor oil	1260	100	2
Transformer oil	1242	100	1
Transformer oil	1260	100	3

Order information:

SRM 1581 can be purchased for US$176 per unit (4 ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1982) SRM 1581. Polychlorinated biphenyls in oils. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

Comments:

Materials containing PCBs are toxic and should be handled with care. Please dispose of this material in a safe manner.

SRM 1582

Petroleum Crude Oil

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Petroleum crude oil from the US Environmental Protection Agency's repository at the Oak Ridge National Laboratory, Oak Ridge, TN, USA, was homogenized and transferred to amber glass ampoules.

Certified concentrations (µg/g):

Compound	Value	Uncertainty (±)
Benz[a]anthracene	3.0	0.3
Benzo[a]pyrene	1.1	0.3
Dibenzothiophene	33	2
Fluoranthene	2.5	0.3
Phenanthrene	101	5
Perylene	31	3

Noncertified concentrations (µg/g):

Compound	Value
Benzo[e]pyrene	3.5
Benzo[ghi]perylene	1.7
Carbazole	3.4
o-Cresol	0.5
Indeno[1,2,3-cd]pyrene	0.17
Phenol	0.3
Pyrene	7

Order information:

SRM 1582 can be purchased for US$229 per unit (5 2-mL ampoules). Price subject to change without notice. Please contact NIST at the address shown above.

SRM 1582 (cont.)

Reference:

National Bureau of Standards (1984) SRM 1582. Petroleum crude oil. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1634b

Trace Elements in Fuel Oil

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 634b is a commercial "No. 6" residual fuel oil as defined by the American Society for Testing and Materials (ASTM). This SRM is intended for use in the evaluation of methods used in the analysis of fuel oils and other materials with similar matrices. The certified values are based on at least 1 g sample which is the minimum amount that should be used for analysis. Supplemental information on the physical properties of this SRM can be found on the certificate of analysis.

Certified concentrations (µg/g unless noted):

Element	Value	Uncertainty (±)
S (%)	2.80	0.05
V	55.4	1.1
Mn	0.23	0.03
Fe	31.6	2.0
Co	0.32	0.04
Ni	28	2
Zn	3.0	0.2
As	0.12	0.02
Se	0.18	0.04

Noncertified concentrations (µg/g unless noted):

Element	Value
Na	90
Al	16
Ca	15
Cr	0.7
Ba	1.3
Hg	<0.001
Pb	2.8

Order information:

SRM 1634b can be purchased for US$157 per unit (100-mL bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1986) SRM 1634b. Trace elements in fuel oil. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 8505

Vanadium in Crude Oil

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM-8505 was developed primarily to further scientific and technical research on analytical methods related to the accurate determination of V in crude oils. This material is Venezuelan crude oil and contains water that can be centrifuged with approximately 99% separation. The separated water contains less than 25 ng/g V. The physical properties of SRM 8505 are listed in the description sheet (NBS, 1986).

Certified concentration (µg/g):

Value	Uncertainty (±)
390	10

Order information:

SRM 8505 can be purchased for US$64 per unit (275 mL). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1986) SRM 8505. Vanadium in crude oil. Report of investigation. National Bureau of Standards, Gaithersburg, MD, USA.

PHYSICAL PROPERTIES

CRM 066 through 132

Particle Size Distribution

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

For each reference material, the distribution is expressed as the curve of the cumulative mass of particles undersize versus particle size. For sieves, for example, this is the mass fraction of particles which passes through a particular sieve. In the case of particles less than 90μm diameter, the particle size is expressed as the equivalent Stokes diameter determined from the settling rate of particles in a viscous fluid. For larger particles, the equivalent volume diameter determined by sieving was preferred.

Certified diameter (μm):

Standard	Material	Property	Size range
CRM 066	Quartz powder	Stokes diameter	0.35 - 3.50
CRM 067	Quartz powder	Stokes diameter	2.4 - 32.0
CRM 068	Quartz sand	Volume diameter	160 - 630
CRM 069	Quartz powder	Stokes diameter	14 - 90
CRM 070	Quartz powder	Stokes diameter	1.2 - 20
CRM 130	Quartz powder	Volume diameter	50 - 220
CRM 131	Quartz powder	Volume diameter	480 - 1800
CRM 132	Quartz gravel	Volume diameter	1400 - 5000

Order Information:

CRM 066, 967, 069 and 070 are available in 10-g bottles, CRM 068, 130, 131 and 132 are available in 100-, 200-, 450- and 700-g bottles respectively. All these CRMs can be purchased for 2500 BFR per unit. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp, Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

CRM 165 - 167

Latex Spheres of Certified Size

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

These standards are suspensions of latex spheres in aqueous solutions of stabilizers. Each standard has a very narrow size distribution of spheres, approximately 99% of the spheres are within ±2% of the certified diameter.

Certified diameter (µm):

Standard	Diameter	Uncertainty (±)
CRM 165	2.223	0.013
CRM 166	4.821	0.019
CRM 167	9.475	0.018

Order information:

CRM 165 through CRM 167 can be purchased for 1500, 2000, and 2500 BFR per unit (1 vial) respectively. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

CRM 169 - 175

Certified Surface Area

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

These standards are mineral particulate material with certified surface area determined using the Nitrogen BET Method.

Surface area (m^2/g):

Standard	Material	Specific surface area	Uncertainty (±)	Unit size
CRM 169	Alpha alumina	0.104	0.012	60
CRM 170	Alpha alumina	1.05	0.05	60
CRM 171	Alumina	2.95	0.13	50
CRM 172	Quartz	2.56	0.10	10
CRM 173	Rutile titania	8.23	0.21	46
CRM 175	Tungsten	0.181	0.013	200

Order information:

CRM 169 through CRM 175 can be purchased for 2500 BFR per unit. Price includes handling and normal postage and it is subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

SRM 475 - 476

Linewidth Measurement

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are for use in calibrating optical microscopes used to measure the widths of opaque lines and clear spaces on integrated circuit photomasks. They can also be used to calibrate line spacings and line-to-space ratios. The accuracy of a measured linewidth or line spacing is ±0.5 µm or better. They are not for use with partialy transmitting materials, in reflected light with opaque materials, or in a scanning electron microscope. SRM 475 is made with anti-reflective chromium on a borosilicate glass substrate. SRM 476 is made with bright chromium. Spacings in both SRMs range from 0.5 to 12 µm.

Order information:

SRM 475 can each be purchased for US$3772 per unit. Price for SRM 476 is not available at this time. Both SRMs are 6.35x6.35x0.15 cm in size. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 484e

Scanning Electron Microscope Magnification Standard

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended for use in calibrating the scanning electron microscope magnification scale to an accuracy of 5% or better within the range of 1000X to 20,000X. Each SRM bears an identification number and has been individually measured. SRM 484d consists of thin gold layers separated by layers of nickel of nominal thicknesses of 1, 2, 5, 10, 30 and 50 µm mounted such that the layers are viewed in cross-section. The gold layers appear as thin gold lines in a nickel substrate. The certified distances between the centers of specific lines opposite the Knoop indentation are provided with each SRM, together with a photomicrograph that shows the area used in the measurement. A diagram of this SRM is included in the certificate of analysis.

Certified distances (µm):

Nominal distance	Uncertainty (±)
1	0.058
2	0.056
5	0.061
10	0.079
30	0.102
50	0.251

Order information:

SRM 484e can be purchased for US$755 per unit. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Institute of Standards and Technology (1988) SRM 484e. Scanning electron microscope magnification standard. Certificate of analysis. National Institute of Standards and Technology, Gaithersburg, MD, USA.

SRM 1003a through 1019a

Glass Spheres and Beads

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for use in calibrating equipment and in evaluating methods for measuring particle size.

Diameter (μm):

SRM	Diameter	Sieve No.	Cost (US$)	Wt./unit (g)
1003a	8-58	-	113	25
1004	34-120	-	103	63
1017a	100-310	140-50	98	84
1018a	225-780	60-25	97	74
1019a	760-2160	20-10	135	200

Order information:

Cost and unit size are listed above. Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1971) SRM 1017a. Calibrated glass beads. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1972) SRM 1004. Calibrated glass beads. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1973) SRM 1018a. Calibrated glass beads. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 1003a. Calibrated glass spheres (8-58 micrometers). Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 1019a. Glass spheres for calibrating test sieves. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1690 through 1965

Polystyrene Spheres

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

These SRMs are intended for use as a primary particle size reference standard for the calibration of particle size measuring instruments including optical and electron microscopes. They are suspensions of polystyrene spheres in water at a weight concentration of 0.4-5% with 50 µg/g sodium azide (NaN_3) added as a biocide. SRM 1965 is a microscope slide with two different groupings of SRM 1960 spheres permanently deposited on the surface and sealed in an air chamber. The groupings are a hexagonal array and unordered clusters.

SRM 1690 was manufactured aboard the NASA orbiter CHALLENGER during the STS-6 mission in 1983. It is the first space-manufactured material made available for sale.

Diameter (µm):

SRM	Diameter	Uncertainty (±)
1690	0.895	0.008
1691	0.269	0.007
1960	9.89	0.04
1961	29.64	0.06
1965 (hexagonal)	9.94	0.04

Order Information:

SRM 1690 and 1691 can be purchased for US$281 per unit (5-mL vial); SRM 1960 and 1961 for US$663 per unit; and SRM 1965 for US$105 per unit (slide). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1982) SRM 1690. Nominal 1-µm diameter polystyrene spheres. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1984) SRM 1691. Nominal 0.3-µm diameter polystyrene spheres. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1985) SRM 1960. Nominal 10-µm diameter polystyrene spheres. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 1961. Nominal 30-µm diameter polystyrene spheres. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

National Bureau of Standards (1987) SRM 1965. Microsphere slide (10-µm polystyrene spheres). Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2106

Color

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM-2106 is available to illustrate a characteristic color for each of the ISCC-NBS color-name blocks in NBS Special Publication 440 (1976). It consists of 251 color chips on 18 constant-hue centroid color charts, and constitutes a supplement to Special Publication 440. The centroid colors represent a systematic sampling of the whole color solid. The color chips were measured in 1984 and are issued with the new data as an addendum available upon request.

Order information:

SRM 2106 can be purchased for US$38 per unit (18 charts). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Kelly, K. L. (1976) Color: the universal language and dictionary of names. NBS Special Publication 440, 189pp. National Bureau of Standards, Gaithersburg, MD, USA.

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 2135b

Depth Profiling

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM is intended for use in calibrating equipment used to measure sputtered depth and erosion rates in surface analysis. It consists of nine alternating metal thin-film layers - five layers of pure chromium and four of pure nickel - on a substrate of pure polished silicon. It is certified for total chromium and total nickel thickness, for individual layer uniformity, for Ni/Cr bi-layer uniformity, and for individual layer thickness.

Order Information:

As of this time (Summer 1989), no price has been set for SRM 2135b. Please contact NIST at the address shown above.

Reference:

Seward, R. W. (ed.) (1988) NBS Standard Reference Materials Catalog 1988-89. NBS Spec. Pub. 260-11988-89, 148pp. National Bureau of Standards, Gaithersburg, MD, USA.

ROCKS

AGV-1

Andesite

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

AGV-1 is an andesite from the east wall of Guano Valley, Lake County, Oregon, USA. (Flanagan, 1967). AGV-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1983) and Gladney et al. (1983) using the results of various analysts. Those calculated by Gladney et al. (1983) are listed below.

Available concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)
Li	12	2
Be	2.0	0.4
B	7	4
O (%)	47.23	0.35
F	420	50
Na (%)	3.15	0.09
Mg (%)	0.922	0.058
Al (%)	9.07	0.18
Si (%)	27.67	0.27
P	2100	120
Cl	120	26
K (%)	2.41	0.80
Ca (%)	3.53	0.10
Sc	12.1	0.9
Ti	6340	300
V	123	12
Cr	12	3
Mn	740	60
Fe (%)	4.73	0.13
Co	15.1	1.2
Ni	17	4

AGV-1 (cont.)

Element	Mean	Uncertainty (±)
Cu	60	6
Zn	88	2
Ga	20	3
Ge	1.25	0.13
As	0.84	0.27
Br (ng/g)	340	170
Rb	67	1
Sr	662	9
Y	21	6
Zr	225	18
Nb	15	3
Mo	3	1
Ru (ng/g)	<4000	-
Rh (ng/g)	<5	-
Ag (ng/g)	104	30
Cd (ng/g)	61	8
In (ng/g)	41	6
Sn	4.2	1.1
Sb	4.4	0.4
I (ng/g)	260	30
Te (ng/g)	2.2	0.3
Cs	1.26	0.12
Ba	1221	16
La	38	3
Ce	66	6
Pr	6.5	0.9
Nd	34	5
Sm	5.9	0.5
Eu	1.66	0.11
Gd	5.2	0.6
Tb	0.71	0.10
Dy	3.8	0.4
Ho	0.73	0.08
Er	1.61	0.22
Tm	320	50
Yb	1.67	0.17
Lu (ng/g)	280	30
Hf	5.1	0.4
Ta	0.92	0.12
W	0.53	0.09
Re (ng/g)	0.38	-
Os (ng/g)	<0.02	-
Au (ng/g)	0.62	0.11
Hg (ng/g)	20	9
Tl	0.7	0.5
Pb	36	5
Bi (ng/g)	54	4
Th	6.50	0.37
U	1.89	0.25

Major and minor oxide concentrations (%):

Oxide	Mean	Uncertainty (±)
H_2O^+	0.80	0.18
H_2O^-	1.01	0.21
FeO	2.06	0.11
Fe_2O_3	4.47	0.22

Order information:

AGV-1 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Flanagan, F. J. (1967) US Geological Survey silicate rock standards. Geochim. Cosmochim. A., 31:289-308.

Gladney, E.S., C.E. Burns, and I. Roelandts (1983) 1982 Compilation of elemental concentrations in eleven United States Geological Survey rock standards. Geostands. Newsletter, 7(1):3-226.

ASK-2

Schist

Source:

Analytisk Sporelement Komité
Stokkabrautene 20A
N-4000 Stavanger
NORWAY

Available from:

Referencematerial AB
Lobeliav. 3
S-523 00 Ulrichehamn
SWEDEN

Description:

ASK-2 is one of three reference materials analyzed as part of cooperative work among the Nordic countries. The material for ASK-2 was obtained from the Upper Tremadoc Ceratopyge schist [3b of the Oslo region Arenigan (Lower Ordovician)] in the underground of St. Olavs Pass, Oslo, Norway. The sample was washed with pure water and cut into pieces with a hydraulic rock cutter. The pieces were then crushed in a steel ring eccentric mill and homogenized. A more detailed description of the preparation and analysis of this material can be found in Christie (1975). ASK-2 is not a certified reference material.

Available concentrations (μg/g unless noted):

Element	Mean
Li	30
Be	4
B	153
C (%)	8.5
Cl	14
V	220
Cr	90
Mn	280
Co	27
Ni	148
Cu	120
Zn	166
Ga	25

ASK-2 (cont.)

Element	Mean
Rb	175
Sr	100
Zr	168
Mo	60
Ag (ng/g)	0.4
Cs	11
La	46
Ce	91
Pr	26
Nd	30
Sm	12.6
Eu	3.5
Tb	1
Yb	3.3
Lu	0.6

Major and minor oxide concentrations (%):

Na_2O	0.8
MgO	2.0
Al_2O_3	18.8
SiO_2	54.2
K_2O	5.3
CaO	0.75
TiO_2	0.92
MnO	0.036
Fe_2O_3	6.9

Order information:

ASK-2 is available for SEK600 per unit (75 g). Please contact Referensmaterial AB at the address shown above. Price subject to change without notice.

References:

Christie, O. H. J. (1975) Three trace element geological materials certified as a result of a co-operative investigation. Talanta, 22:1048-50.

Referensmaterial AB (1989) Reported values for ASK reference materials. Main values from participating laboratories. Referensmaterial AB, Lobeliav. 6, S-523 00 Ulrichehamm, Sweden.

BHVO-1

Basalt

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

A basaltic lava from Kilauea caldera, Kilauea volcano, Hawaii, USA, was collected from the surface layer of the pahoehoe lava that flowed from Halemaumau in the fall of 1919 (19° 25'N, 155° 17.5' W). A complete mineralogical description of this material can be found in Flanagan *et al.* (1976). BHVO-1 is not a certified reference material. Values for elemental concentrations have been calculated by Gladney and Goode (1981), Abbey (1982, 1983) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Available concentrations (μg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values
Li	4.6	1.5	10
Be	1.1	0.3	7
B	2.5	0.6	8
C	98	51	7
N	22.6	-	1
F	385	31	11
Na (%)	1.68	0.05	38
Mg (%)	4.36	0.13	33
Al (%)	7.30	0.11	33
Si (%)	23.32	0.25	26
P	1190	110	23
S	102	7	4
Cl	92	8	12
K (%)	0.43	0.029	37
Ca (%)	8.15	0.12	32
Sc	31.8	1.3	36
Ti	16220	380	31

BHVO-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
V	317	12	26
Cr	289	22	36
Mn	1300	62	43
Fe (%)	8.55	0.15	39
Co	45	2	33
Ni	121	2	29
Cu	136	6	15
Zn	105	5	15
Ga	21	2	6
Ge	1.64	-	2
As	0.40	0.22	6
Se (ng/g)	74	44	6
Br	0.71	-	2
Rb	11	2	27
Sr	403	25	32
Y	27.6	1.7	22
Zr	179	21	27
Nb	19	2	19
Mo	1.02	0.10	9
Ru	<0.46	-	-
Rh (ng/g)	0.2	-	-
Pd (ng/g)	3.0	0.4	3
Ag (ng/g)	55	7	5
Cd (ng/g)	69	11	5
In (ng/g)	180	-	1
Sn	2.1	0.5	8
Sb	0.159	0.036	12
Te (ng/g)	6.4	1.6	3
Cs	0.13	0.06	8
Ba	139	14	37
La	15.8	1.3	53
Ce	39	4	56
Pr	5.7	0.4	9
Nd	25.2	2.0	45
Sm	6. 2	0.3	53
Eu	2.06	0.08	50
Gd	6.4	0.5	31
Tb	0.96	0.08	35
Dy	5.2	0.3	28
Ho	0.99	0.08	16
Er	2.4	0.2	18
Tm (ng/g)	330	40	16
Yb	2.02	0.20	57
Lu (ng/g)	291	26	32
Hf	4.38	0.22	30
Ta	1.23	0.13	26
W	0.27	0.06	5
Re	<10	-	-
Os	<22	-	-
Ir (ng/g)	4.4	-	1

Element	Mean	Uncertainty (±)	Number of values
Pt (ng/g)	2.2	-	1
Au (ng/g)	1.6	0.5	10
Hg (ng/g)	5.6	-	2
Tl (ng/g)	58	12	5
Pb	2.6	0.9	7
Bi (ng/g)	18	4	9
Th	1.08	0.15	32
U	0.42	0.06	15

Major and minor oxide concentrations (%):

H_2O^+	0.16	0.06	10
H_2O^-	0.05	0.01	3
CO_2	0.036	0.019	7
Na_2O	2.26	0.07	38
MgO	7.23	0.22	33
Al_2O_3	13.80	0.21	33
SiO_2	49.94	0.54	26
P_2O_5	0.273	0.025	23
K_2O	0.520	0.035	37
CaO	11.40	0.17	32
TiO_2	2.71	0.06	31
MnO	0.168	0.008	43
FeO	8.58	0.09	12
Fe_2O_3	2.82	0.24	8
Cl	0.009	0.001	12
F	0.038	0.003	11
S	0.010	0.001	4

Order information:

BHVO-1 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Flanagan, F. J., T. L. Wright, S. R. Taylor, C. S. Annell, R. C. Christian, and J. I. Dinnin (1976) Basalt, BHVO-1, from Kilauea crater, Hawaii. In: F.J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, p. 33-9. US Government Printing Office, Washington, DC, USA.

Gladney, E.S., and W.E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

BIR-1

Icelandic Basalt

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

This material is basalt from one of the interglacial lava flows known as Reykjavik dolerites. The rock is a coarse-grained olivine tholeiite. Original concentration values for various elements were initially provided by Flanagan (1984). BIR-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1983), Gladney *et al.* (1983), Flanagan (1986) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values
Li	3.4	0.4	7
Be	0.58	0.07	3
B	0.33	0.16	3
C	66	24	5
F	44	13	6
Na (%)	1.30	0.08	38
Mg (%)	5.84	0.17	28
Al (%)	8.12	0.27	32
Si (%)	22.31	0.24	26
P	200	120	21
Cl	26	6	5
K	220	80	25
Ca (%)	9.47	0.21	34
Sc	44	4	19
Ti	5720	200	36
V	313	23	24
Cr	382	38	32
Mn	1320	80	36
Fe (%)	7.87	0.16	36

BIR-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Co	51.4	3.4	30
Ni	166	16	25
Cu	126	5	23
Zn	71	9	23
Ga	16	2	8
Ge	1.45	-	1
As	0.44	0.48	3
Se (ng/g)	18	-	2
Br	<2	-	-
Rb	1.0	0.9	9
Sr	108	14	28
Y	16	2	20
Zr	22	7	14
Nb	2.0	0.5	10
Mo	0.5	0.8	3
Pd (ng/g)	5.6	0.6	3
Rh (ng/g)	0.35	-	1
Ag (ng/g)	36	-	2
Cd (ng/g)	114	38	4
Sn	0.69	-	2
Sb	0.58	0.16	11
Te (ng/g)	7	-	1
Cs	0.45	0.06	4
Ba	7.7	2.2	12
La	0.88	0.33	18
Ce	2.5	1.1	15
Pr	0.5	0.4	4
Nd	2.5	0.7	12
Sm	1.08	0.09	25
Eu	0.54	0.04	25
Gd	1.9	0.4	14
Tb (ng/g)	410	50	10
Dy	2.4	0.3	10
Ho (ng/g)	500	80	6
Er	1.8	0.3	6
Tm (ng/g)	270	70	8
Yb	1.70	0.19	22
Lu (ng/g)	260	40	15
Hf	0.58	0.06	12
Ta (ng/g)	62	36	5
W (ng/g)	0.22	-	1
Ir (ng/g)	0.15	-	1
Pt (ng/g)	2.8	-	1
Au (ng/g)	1.56	-	2
Hg (ng/g)	7.3	-	1
Tl (ng/g)	10	-	1
Pb	3.2	0.8	6
Bi (ng/g)	20	-	1
Th	0.89	0.70	9
U (ng/g)	25	-	2

BIR-1 (cont.)

Major and minor oxide concentrations (%):

Oxide	Mean	Uncertainty (±)	Number of values
H_2O^+	0.010	0.03	9
H_2O^-	0.07	0.02	5
Na_2O	1.75	0.11	38
MgO	9.68	0.28	28
Al_2O_3	15.35	0.51	32
SiO_2	47.77	0.51	26
P_2O_5	0.046	0.028	21
K_2O	0.027	0.010	25
CaO	13.24	0.29	34
TiO_2	0.96	0.03	36
MnO	0.171	0.010	36
FeO	8.38	0.11	9
Fe_2O_3	2.08	0.08	7
CO_2	0.02	0.01	5

Order information:

BIR-1 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Flanagan, F.J. (1984) Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. U.S. Geol. Survey Prof. Bull. 1623:1-12. U.S. Geological Survey, Reston, VA, USA.

Flanagan, F.J. (1986) Additions and corrections for USGS Bulletin 1623, Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. Open file report 86-220. U.S. Geological Survey, Reston, VA, USA.

Gladney, E.S., C.E. Burns, and I. Roelandts (1983) 1982 Compilation of elemental concentrations in eleven United States Geological Survey rock standards. Geostands. Newsletter, 7(1):3-226.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BIR-1, DNC-1 and W-2. Geostand. Newsletter, 12(1):63-118.

DNC-1

Dolerite

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

DNC-1 is a Triassic-Jurasic olivine-normative dolerite and it is known locally as Braggtown dolerite. Five hundred pounds of this material was collected from the Braggtown Quarry, near Chapel Hill, NC, USA, and processed for this standard (Flanagan, 1984). The complete petrology of the material can be found in Ragland *et al.* (1968). DNC-1 is not a certified reference material. Original concentration values for various elements were initially provided by Flanagan (1984). Values for elemental concentrations have been calculated by Abbey (1983), Gladney *et al.* (1983), Flanagan (1986) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values
Li	5.1	0.5	8
Be	1.0	0.4	4
B	0.90	0.28	4
C	125	67	4
F	66	10	7
Na (%)	1.39	0.07	38
Mg (%)	6.06	0.20	32
Al (%)	9.68	0.26	38
Si (%)	21.97	0.30	28
P	370	90	21
S	392	-	2
Cl	37	8	7
K	1900	130	32
Ca (%)	8.06	0.16	33
Sc	31.0	1.4	17
Ti	2880	100	33
V	148	9	20

DNC-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Cr	285	32	32
Mn	1150	70	39
Fe (%)	6.94	0.10	35
Co	54.7	3.7	32
Ni	247	18	24
Cu	96	9	20
Zn	66	5	22
Se (ng/g)	200	-	2
Ga	15	2	7
Ge	1.26	-	1
As	0.2	-	2
Rb	4.5	2.2	20
Sr	145	6	23
Y	18	3	19
Zr	41	7	15
Nb	3.0	0.7	11
Mo	0.7	-	2
Rh (ng/g)	0.35	-	1
Pd (ng/g)	16	4	3
Ag (ng/g)	27	-	2
Cd (ng/g)	182	108	4
Sb	0.96	0.15	9
Te (ng/g)	21	-	1
Cs	0.34	0.14	5
Ba	114	16	26
La	3.8	0.4	19
Ce	10.6	2.4	25
Pr	1.3	0.6	3
Nd	4.9	0.2	9
Sm	1.38	0.15	22
Eu	0.59	0.03	20
Gd	2.0	0.4	11
Tb (ng/g)	410	30	9
Dy	2.7	0.4	9
Ho (ng/g)	620	140	7
Er	2.0	0.2	5
Tm (ng/g)	330	50	7
Yb	2.01	0.10	18
Lu (ng/g)	320	40	15
Hf	1.01	0.07	12
Ta (ng/g)	98	13	5
W (ng/g)	190	-	1
Ir (ng/g)	0.52	-	1
Pt (ng/g)	36	-	2
Au (ng/g)	1.99	-	2
Hg (ng/g)	6.2	-	1
Tl (ng/g)	26	-	1
Pb	6.3	1.0	4
Bi (ng/g)	20	-	1
Th	0.20	0.09	7
U (ng/g)	100	-	2

Major and minor oxide concentrations (%):

Oxide	Mean	Uncertainty (±)	Number of values
H_2O^+	0.68	0.07	11
H_2O^-	0.33	0.07	7
Na_2O	1.87	0.09	38
MgO	10.05	0.33	32
Al_2O_3	18.30	0.49	38
SiO_2	47.04	0.64	28
P_2O_5	0.085	0.021	21
K_2O	0.229	0.016	32
CaO	11.27	0.22	33
TiO_2	0.48	0.02	33
MnO	0.149	0.009	39
FeO	7.39	0.14	8
Fe_2O_3	1.76	0.14	7
CO_2	0.046	0.02	4

Order information:

DNC-1 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Flanagan, F.J. (1984) Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. U.S. Geol. Survey Prof. Bull. 1623:1-12. U.S. Geological Survey, Reston, VA, USA.

Flanagan, F.J. (1986) Additions and corrections for USGS Bulletin 1623, Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. Open file report 86-220. U.S. Geological Survey, Reston, VA, USA.

Gladney, E.S., C.E. Burns, and I. Roelandts (1983) 1982 Compilation of elemental concentrations in eleven United States Geological Survey rock standards. Geostands. Newsletter, 7(1):3-226.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BIR-1, DNC-1 and W-2. Geostand. Newsletter, 12(1):63-118.

DNC-1 (cont.)

Ragland, P.C., J. J. W. Rogers, and P. S. Justus (1968) Origin and differentiation of Triassic dolerite magmas, North Carolina, USA. Contributions to Mineralogy and Petrology, 20(1):57-80.

G-2

Granite

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

This material is composed of Westerly granite collected from the Sullivan Quarry, Bradford, Long Island, USA (Flanagan 1967). G-2 is not a certified reference material. Values for elemental concentrations calculated by Abbey (1983) and Gladney *et al.* (1983) using the results of various analysts. Those calculated by Gladney *et al.* (1983) are listed below.

Available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)
Li	36	5
Be	2.4	0.5
B	2.2	0.2
C	230	50
N	41	13
O (%)	48.12	0.21
F	1260	90
Na (%)	3.02	0.09
Mg (%)	0.460	0.040
Al (%)	8.15	0.12
Si (%)	32.24	0.28
P	600	40
Cl	69	25
K (%)	3.73	0.12
Ca (%)	1.41	0.07
Sc	3.5	0.4
Ti (%)	0.295	0.022
V	36	5
Cr	9	2
Mn	260	40
Fe (%)	1.87	0.07

G-2 (cont.)

Element	Mean	Uncertainty (±)
Co	4.6	0.4
Ni	4.9	2.3
Cu	11	3
Zn	85	7
Ga	22	2
Ge	1.14	0.15
As	0.27	0.12
Br (ng/g)	230	150
Rb	170	3
Sr	478	3
Y	11.4	2.3
Zr	300	30
Nb	13	4
Mo	1.0	0.6
Ru	<4	-
Rh (ng/g)	<5	-
Ag (ng/g)	45	6
Cd (ng/g)	25	11
In	30	2
Sn	1.6	0.5
Sb	0.078	0.032
Te (ng/g)	3.9	1.4
I (ng/g)	310	-
Cs	1.33	0.14
Ba	1880	20
La	86	5
Ce	159	11
Pr	19	2
Nd	53	8
Sm	7.2	0.6
Eu	1.41	0.12
Gd	4.1	0.8
Tb	0.48	0.07
Dy	2.5	0.5
Ho	0.37	0.02
Er	1.2	0.3
Tm (ng/g)	170	70
Yb	0.78	0.14
Lu (ng/g)	113	24
Ta	0.88	0.12
W	0.15	0.06
Re (ng/g)	<7	-
Os (ng/g)	<100	-
Pt (ng/g)	5.9	-
Au (ng/g)	1.0	0.2
Hg (ng/g)	49	13
Tl	1.02	0.08
Pb	31	4
Bi (ng/g)	41	10
Ra (PCi/g)	0.71	-
Th	24.6	1.5
U	2.04	0.17

Major and minor oxide concentrations (%):

Element	Mean	Uncertainty (±)
H_2O^+	0.51	0.09
H_2O^-	0.10	0.04
FeO	1.45	0.08
Fe_2O_3	1.07	0.12

Order information:

G-2 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Abbey, S. (1983). Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Flanagan, F. J. (1967) U.S. Geological Survey silicate rock standards. Geochim. Cosmochim. Acta, 31:289-308.

Gladney, E.S., C.E. Burns, and I. Roelandts (1983) 1982 Compilation of elemental concentrations in eleven United States Geological Survey rock standards. Geostands. Newsletter, 7(1):3-226.

IPT 28

Clay (Pára)

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materiais de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 28 was provided by Celite S/A Indústria e Comércio. It was ground and passed through a 0.074 mm sieve. The material was dried at 140° C.

Certified concentrations (percent dry weight):

Oxide	Value
Na_2O	0.02
MgO	0.04
Al_2O_3	37.6
SiO_2	45.1
P_2O_5	0.15
K_2O	0.03
CaO	0.09
TiO_2	2.04
Fe_2O_3	0.83

Order Information:

IPT 28 can be purchased for US$180 per unit (50-gram bottle). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1979) Amostra padrão 28. Argila Pará. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

IPT 32

Plastic Clay (Saracuruna)

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materiais de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 32 was provided by Klabin Cerâmica S/A. It was ground and passed through a 0.074 mm sieve. The material was dried at 140° C.

Certified concentrations (percent dry weight):

Oxide	Value
Na_2O	0.16
MgO	0.39
Al_2O_3	28.5
SiO_2	51.8
P_2O_5	0.13
K_2O	0.80
CaO	0.17
TiO_2	1.49
Fe_2O_3	3.46

Order Information:

IPT 32 can be purchased for US$180 per unit (50-gram bottle). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1980) Amostra padrão 32. Argila plastica Saracuruna. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

IPT 35

Calcitic Limestone

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materiais de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 35 was provided by S/A Indústrias Votorantim. It was ground and passed through a 0.074 mm sieve. The material was dried at 110° C.

Certified concentrations (percent dry weight):

Oxide	Value
Na_2O	0.004
MgO	0.70
Al_2O_3	0.24
SiO_2	1.98
P_2O_5	0.008
K_2O	0.10
CaO	53.8
TiO_2	0.013
MnO	0.012
Fe_2O_3	0.14
SrO	0.04

Order Information:

IPT 35 can be purchased for US$160 per unit (80-gram bottle). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1980) Amostra padrão 35. Calcário calcítico. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

IPT 42

Clay (São Simão)

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materiais de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 42 was provided by Celite S/A Indústria e Comércio. It was ground and passed through a 0.074 mm sieve. The material was dried at 140° C.

Certified concentrations (percent dry weight):

Oxide	Value	Uncertainty (±)
Na_2O	0.02	0.005
MgO	0.19	0.02
Al_2O_3	32.2	0.1
SiO_2	51.9	0.1
P_2O_5	0.07	0.01
K_2O	0.47	0.80
CaO	0.05	0.01
TiO_2	0.96	0.04
Fe_2O_3	1.09	0.05

Order Information:

IPT 42 can be purchased for US$180 per unit (50-gram bottle). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1981) Amostra padrão 42. Argila São Simão. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

IPT 44

Limestone

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materiais de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 44 was provided by Indústrias Votorantim. It was ground and passed through a 0.074 mm sieve. The material was dried at 110° C.

Certified concentrations (percent dry weight):

Oxide	Value	Uncertainty (±)
Na_2O	0.002	0.001
MgO	2.93	0.07
Al_2O_3	0.33	0.02
SiO_2	2.69	0.03
P_2O_5	0.013	0.001
K_2O	0.12	0.01
CaO	50.5	0.1
TiO_2	0.019	0.001
MnO	0.015	0.001
Fe_2O_3	0.30	0.02
SrO	0.04	0.005

Order Information:

IPT 44 can be purchased for US$160 per unit (80-gram bottle). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1981) Amostra padrão 44. Calcário. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo, Brazil.

IPT 48

Dolomitic Limestone

Source:

Instituto de Pesquisas Tecnológicas
Agrupamento de Materiais de Referência
Cidade Universitária Armando de Salles Oliveira
05508 São Paulo - SP
BRAZIL

Description:

Material for IPT 48 was provided by Indústria Mineradora Pagliato Ltda. It was ground and passed through a 0.074 mm sieve. The material was dried at 110° C.

Certified concentrations (percent dry weight):

Oxide	Value	Uncertainty (±)
Na_2O	0.013	0.003
MgO	21.2	0.1
Al_2O_3	0.17	0.02
SiO_2	0.45	0.02
P_2O_5	0.022	0.002
K_2O	0.026	0.003
CaO	31.0	0.1
TiO_2	0.006	0.001
MnO	0.014	0.002
Fe_2O_3	0.17	0.01
SrO	0.009	0.001

Order Information:

IPT 48 can be purchased for US$160 per unit (80-gram bottle). Price subject to change without notice. Please contact IPT at the address shown above.

Reference:

Instituto de Pesquisas Tecnológicas (1982) Amostra padrão 48. Calcário dolomitico. Certificate of analysis. Instituto de Pesquisas Tecnológicas, São Paulo Brazil.

Nod-A-1

Manganese Nodule

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

This reference material was collected in the Blake Plateau (31° 02' N, 78° 22' W) in the Atlantic Ocean (Flanagan and Gottfried, 1980). The material was processed through a roller crusher, dried overnight at about 65°C, and processed in a ball mill. Washing with water did not remove all the soluble sea salt present in the material. During processing, the cover of the mill was not secured in place until the following day. The partly powdered material absorbed sufficient moisture to form a cement-like mixture, which was deposited as layers in the mill as it operated. The layers were removed, broken, redried and re-milled. The material in these layers showed variegated colors from black to purple to dark brown, characteristic of manganese oxides. Nod-A-1 can absorb up to 10% by weight of moisture when exposed overnight to air. Nod-A-1 is not a certified reference material. The original estimates for elemental concentrations by Flanagan and Gottfried (1980) using the results of various analysts are listed below.

Best available concentrations (µg/g unless noted):

Element	Mean	Uncertainty (±)
Na (%)	0.775	0.0056
Mg (%)	2.87	0.0099
Al (%)	2.05	0.032
Si (%)	1.775	0.022
P (%)	0.60	0.007
K (%)	0.50	0.0086
Ca (%)	11.03	0.039
Ti (%)	0.32	0.004
V	770	6.2
Mn (%)	18.545	0.050
Fe (%)	10.932	0.042
Co (%)	0.311	0.0011
Ni (%)	0.636	0.0024
Cu (%)	0.1099	0.0010

Nod-A-1 (cont.)

Element	Mean	Uncertainty (±)
Zn	587	4.6
Sr	1748	13.7
Mo	448	8.7
Ru	18	-
Ba	1670	30.8
Pd (ng/g)	2.5	-
Pt (ng/g)	453	-
Pb	846	8.2

Order Information:

Nod-A-1 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Flanagan, F. J., and D. Gottfried (1980) USGS Rock Standards, III: Manganese-nodule reference samples USGS-Nod-A-1 and USGS-Nod-P-1. Geological Survey Professional Paper 1155, 39pp. U.S. Geological Survey, Reston, VA, USA.

Nod-P-1

Manganese Nodule

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

This reference material was collected in the Pacific Ocean (14° 50' N, 124° 28' W) (Flanagan and Gottfried, 1980). The material was processed through a roller crusher, dried overnight at about 65°C, and processed in a ball mill. Washing with water did not remove all the soluble sea salt present in the material. During processing, the cover of the mill was not secured in place until the following day. The partly powdered material absorbed sufficient moisture to form a cement-like mixture, which was deposited as layers in the mill as it operated. The layers were removed, broken, redried and re-milled. The material in these layers showed variegated colors from black to purple to dark brown, characteristic of manganese oxides. Nod-P-1 can absorb up to 10% by weight of moisture when exposed overnight to air. Nod-P-1 is not a certified reference material. The original estimates for elemental concentrations by Flanagan and Gottfried (1980) using the results of various analysts are listed below.

Best available concentrations (µg/g unless noted):

Element	Mean	Uncertainty (±)
Na (%)	1.64	0.0043
Mg (%)	1.990	0.0085
Al (%)	2.55	0.049
Si (%)	6.508	0.016
P (%)	0.203	0.002
K (%)	1.05	0.012
Ca (%)	2.187	0.012
Ti (%)	0.30	0.002
V	567	10.3
Mn (%)	29.14	0.080
Fe (%)	5.78	0.031
Co (%)	0.224	0.0011
Ni (%)	1.337	0.0064
Cu (%)	1.151	0.0049

Nod-P-1 (cont.)

Element	Mean	Uncertainty (±)
Zn	1595	5.9
Sr	682	3.3
Mo	762	4.1
Ru	4.7	-
Ba	3350	27.7
Pd (ng/g)	5.6	-
Pt (ng/g)	123	-
Pb	555	5.8

Order information:

Nod-P-1 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Flanagan, F. J., and D. Gottfried (1980) USGS Rock Standards, III: Manganese-nodule reference samples USGS-Nod-A-1 and USGS-Nod-P-1. Geological Survey Professional Paper 1155, 39pp. U.S. Geological Survey, Reston, VA, USA.

QLO-1

Quartz Latite

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

This reference material is composed of dense black volcanic rock collected in Lake County, Oregon, USA (42° 44.8' N, 119° 58' W). A complete description of QLO-1, including mineralogical information, can be found in Walker *et al.* (1976). QLO-1 is not a certified reference material. Values for elemental concentrations have been calculated by Gladney and Goode (1981), Abbey (1982, 1983) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values
Li	25	2	6
Be	1.89	0.17	11
B	36	3	12
C	27	2	5
O (%)	47.83	-	2
F	280	20	13
Na (%)	3.12	0.10	23
Mg (%)	0.60	0.04	16
Al (%)	8.56	0.10	18
Si (%)	30.61	0.22	16
P	1110	70	15
S	30	15	3
Cl	219	18	13
K (%)	2.99	0.10	24
Ca (%)	2.27	0.06	22
Sc	8.9	1.3	18
Ti	3740	200	25
V	54	6	16

QLO-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Cr	3.2	1.7	15
Mn	721	49	30
Fe (%)	3.04	0.10	25
Co	7.2	0.5	17
Ni	5.8	3.6	11
Cu	29	3	16
Zn	61	3	14
Ga	17	2	7
Ge	1.34	-	2
As	3.5	1.8	6
Se (ng/g)	9	2	4
Br	2.07	-	2
Rb	74	3	14
Sr	336	12	19
Y	24	3	11
Zr	185	16	13
Nb	10.3	1.3	10
Mo	2.6	0.3	12
Ru	<0.46	-	-
Rh (ng/g)	<0.1	-	-
Pd (ng/g)	0.1	-	1
Ag (ng/g)	64	5	3
Cd (ng/g)	50	-	2
In (ng/g)	180	-	1
Sn	2.31	0.09	6
Sb	2.1	0.4	12
Te (ng/g)	<5	-	-
Cs	1.75	0.19	9
Ba	1370	80	21
La	27	2	15
Ce	54	6	18
Pr	6.01	0.11	6
Nd	26	6	18
Sm	4.88	0.16	13
Eu	1.43	0.12	12
Gd	4.7	0.8	15
Tb	0.71	0.07	12
Dy	3.8	0.3	8
Ho	0.86	0.22	6
Er	2.3	0.1	5
Tm (ng/g)	370	40	8
Yb	2.32	0.24	19
Lu (ng/g)	370	40	10
Hf	4.6	0.3	9
Ta	0.82	0.10	10
W	0.58	0.05	7
Re	<10	-	-
Os	<22	-	-
Ir	<6.8	-	-
Pt (ng/g)	<1	-	-

QLO-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Au (ng/g)	1.2	0.3	4
Hg (ng/g)	6.79	-	1
Tl (ng/g)	220	40	3
Pb	20.4	0.8	8
Bi (ng/g)	63	3	5
Th	4.5	0.5	13
U	1.94	0.12	11

Major and minor oxide concentrations (%):

H_2O^+	0.37	0.11	7
H_2O^-	0.18	0.06	5
CO_2	0.010	0.001	5
Na_2O	4.20	0.13	23
MgO	1.00	0.07	16
Al_2O_3	16.18	0.19	18
SiO_2	65.55	0.47	16
P_2O_5	0.254	0.016	15
K_2O	3.60	0.12	24
CaO	3.17	0.08	22
TiO_2	0.624	0.033	25
MnO	0.093	0.006	30
FeO	2.97	0.05	8
Fe_2O_3	1.02	0.13	6
Cl	0.022	0.002	13
F	0.028	0.002	13
S	0.003	0.002	3

Order information:

QLO-1 is available free of charge from the US Geological Survey. Please contact Ms. Jean Kane at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Gladney, E. S., and W. E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

Walker, G. W., F. J. Flanagan, A. L. Sutton, H. Bastron, S. Berman, J. I. Dinnin, and L. B. Jenkins (1976) Quartz latite (dellenite), QLO-1, from southeastern Oregon. In: F.J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, p.15-20. US Government Printing Office, Washington, DC, USA.

RGM-1

Rhyolite

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

The material for RGM-1 was collected from a single block of obsidian (41° 37.2'N, 121° 29.0'W) near the terminal front of a Holocene obsidian flow near Glass Mountain, which is northeast of Mount Shasta in California, USA. A complete mineralogical description of this material can be found in Tatlock *et al.* (1976). RGM-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values
Li	57	8	9
Be	2.37	0.17	11
B	28	3	12
C	38	11	5
O (%)	49.18	-	2
F	342	30	15
Na (%)	3.02	0.11	26
Mg (%)	0.166	0.016	19
Al (%)	7.26	0.10	22
Si (%)	34.30	0.25	17
P	210	15	14
S	54	32	4
Cl	510	50	20
K (%)	3.57	0.08	24
Ca (%)	0.82	0.05	28
Sc	4.4	0.3	14
Ti	1600	150	26

Element	Mean	Uncertainty (±)	Number of values
V	13	2	14
Cr	3.7	1.2	15
Mn	282	30	30
Fe (%)	1.30	0.04	27
Co	2.0	0.2	14
Ni	4.4	2.0	10
Cu	11.6	1.4	16
Zn	32	6	16
Ga	15	2	6
Ge	1.26	-	2
As	3.0	0.4	6
Se (ng/g)	6	3	3
Br	1.34	0.12	3
Rb	149	8	15
Sr	108	10	19
Y	25	4	13
Zr	219	20	17
Nb	8.9	0.6	11
Mo	2.3	0.5	12
Ru	<0.46	-	-
Rh (ng/g)	<0.1	-	-
Pd (ng/g)	0.2	-	1
Ag (ng/g)	108	8	4
Cd (ng/g)	65	10	4
In (ng/g)	150	-	1
Sn	4.1	0.4	10
Sb	1.26	0.07	12
Te (ng/g)	<5	-	-
Cs	9.6	0.6	10
Ba	807	46	24
La	24.0	1.1	15
Ce	47	4	19
Pr	4.7	0.5	6
Nd	19	1	15
Sm	4.3	0.3	19
Eu	0.66	0.08	15
Gd	3.7	0.4	14
Tb	0.66	0.06	10
Dy	4.08	0.12	7
Ho	0.95	0.22	5
Er	2.6	0.3	5
Tm (ng/g)	370	40	7
Yb	2.6	0.3	22
Lu (ng/g)	410	30	10
Hf	6.2	0.3	11
Ta	0.95	0.10	11
W	1.50	0.18	8
Re	<10	-	-
Os	<22	-	-
Ir	<6.8	-	-

RGM-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Pt (ng/g)	<1	-	-
Au (ng/g)	0.33	-	2
Hg (ng/g)	21.6	-	1
Tl (ng/g)	930	220	4
Pb	24	3	10
Bi (ng/g)	274	19	6
Th	15.1	1.3	14
U	5.8	0.5	11

Major and minor oxide concentrations (%):

H_2O^+	0.59	0.26	8
H_2O^-	0.11	0.02	4
CO_2	0.014	0.004	5
Na_2O	4.07	0.15	26
MgO	0.275	0.026	19
Al_2O_3	13.72	0.19	22
SiO_2	73.45	0.54	17
P_2O_5	0.048	0.034	14
K_2O	4.30	0.10	24
CaO	1.15	0.07	28
TiO_2	0.267	0.025	26
MnO	0.036	0.004	30
FeO	1.27	0.05	8
Fe_2O_3	0.50	0.01	6
Cl	0.051	0.005	20
F	0.034	0.003	15
S	0.005	0.003	4

Order information:

RGM-1 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Gladney, E. S., and W. E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

Tatlock, D. B., F. J. Flanagan, H. Bastron, S. Berman, and A. L. Sutton (1976) Rhyolite, RGM-1, from Glass Mountain, California. In: F.J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, p. 11-14. US Government Printing Office, Washington, DC.

SCo-1

Cody Shale

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

The material for SCo-1 was collected in 1963 from a bulldozer cut in an abandoned road on the west side of Teapot Dome in Natrona County, Wyoming, USA. It is from the upper part of the Cody Shale, typical of Upper Cretaceous silty marine shales, intermediate between fine-grained offshore marine shales common farther to the east and the coarser nearshore marine siltstones and sandstone. A complete mineralogical description of this material can be found in Schultz *et al.* (1976). SCo-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values
Li	45	3	5
Be	1.84	0.20	7
B	72	6	15
C	8100	1200	7
O (%)	50.77	-	2
F	770	60	10
Na (%)	0.667	0.046	21
Mg (%)	1.64	0.11	19
Al (%)	7.23	0.11	15
Si (%)	29.32	0.31	16
P	900	90	15
S	630	90	10
Cl	51	10	12
K (%)	2.30	0.07	21
Ca (%)	1.87	0.14	24

SCo-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Sc	10.8	1.1	16
Ti	3760	390	22
V	131	13	18
Cr	68	5	17
Mn	408	30	22
Fe (%)	3.59	0.13	22
Co	10.5	0.8	18
Ni	27	4	17
Cu	28.7	1.9	16
Zn	103	8	15
Ga	15	3	9
Ge	1.21	-	1
As	12.4	1.4	13
Se (ng/g)	890	60	7
Br	1.03	-	2
Rb	112	4	12
Sr	174	16	20
Y	26	4	13
Zr	160	30	16
Nb	11	3	8
Mo	1.37	0.16	9
Ru	<0.46	-	-
Rh (ng/g)	<1.0	-	-
Pd (ng/g)	1.0	0.3	3
Ag (ng/g)	134	7	3
Cd (ng/g)	140	12	5
In (ng/g)	110	-	1
Sn	3.7	0.8	10
Sb	2.50	0.13	14
Te (ng/g)	77	-	1
Cs	7.8	0.7	11
Ba	570	30	19
La	29.5	1.1	19
Ce	62	6	22
Pr	6.6	0.9	9
Nd	26	2	21
Sm	5.3	0.3	21
Eu	1.19	0.12	22
Gd	4.6	0.7	19
Tb	0.70	0.06	13
Dy	4.2	0.5	14
Ho	0.97	0.06	8
Er	2.5	0.4	11
Tm (ng/g)	420	100	12
Yb	2.27	0.24	21
Lu (ng/g)	338	33	13
Hf	4.6	0.3	12
Ta	0.92	0.09	10
W	1.4	0.2	5
Re	<10	-	-
Os	<22	-	-

SCo-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Ir	<6.8	-	-
Pt (ng/g)	<1	-	-
Au (ng/g)	2.1	0.4	4
Hg (ng/g)	52.3	-	1
Tl (ng/g)	720	130	3
Pb	31	3	9
Bi (ng/g)	370	70	5
Th	9.7	0.5	10
U	3.0	0.2	11

Major and minor oxide concentrations (%):

H_2O^+	3.69	0.60	4
H_2O^-	2.11	0.44	4
CO_2	2.97	0.44	7
Na_2O	0.899	0.062	21
MgO	2.72	0.18	19
Al_2O_3	13.67	0.21	15
SiO_2	62.78	0.66	16
P_2O_5	0.206	0.021	15
K_2O	2.77	0.08	21
CaO	2.62	0.20	24
TiO_2	0.628	0.065	22
MnO	0.053	0.004	22
FeO	0.90	0.16	8
Fe_2O_3	4.19	0.19	7
Cl	0.005	0.001	12
F	0.077	0.006	10
S	0.063	0.009	10

Order information:

SCo-1 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada,114pp.

Gladney, E.S., and W.E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

Schultz, L.G., H.A. Tourtelot, and F.J. Flanagan (1976) Cody Shale, SCo-1, from Natrona County, Wyoming. In: F.J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, US Government Printing Office, Washington, DC, USA, pp. 21-23.

SDC-1

Mica Schist

Source:

Geologic Division Reference Materials
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

Mica schist was excavated from a sewer tunnel at an estimated depth of 80 ft in the northern part of Rock Creek Park in Washington, DC, USA. A more complete description of SDC-1, including mineralogical information, can be found in Flanagan and Carroll (1976). SDC-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Available concentrations (µg/g unless noted):

Element	Mean	Uncertainty (±)	Number of values
Li	34	3	5
Be	3.0	0.5	11
B	12.8	1.8	10
C	270	90	6
F	595	27	11
Na (%)	1.52	0.07	23
Mg (%)	1.02	0.06	17
Al (%)	8.33	0.18	17
Si (%)	30.75	0.20	16
P	690	110	15
S	650	110	8
Cl	32	9	12
K (%)	2.72	0.08	22
Ca (%)	1.00	0.05	21
Sc	17	2	15
Ti	6050	220	20
V	102	12	13
Cr	64	7	18
Mn	880	60	28

SDC-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Fe (%)	4.82	0.16	25
Co	17.9	1.2	16
Ni	38	8	18
Cu	30	3	15
Zn	103	8	15
Ga	21.2	1.4	5
Ge	1.54	-	2
As	0.218	0.012	4
Se (ng/g)	32	6	4
Br	0.097	-	1
Rb	127	7	12
Sr	183	9	15
Y	40	6	12
Zr	290	30	9
Nb	18	3	9
Mo	0.25	0.14	6
Ru	<0.46	-	-
Rh (ng/g)	<0.1	-	-
Pd (ng/g)	1.1	-	2
Ag (ng/g)	41	6	4
Cd (ng/g)	80	50	4
In (ng/g)	120	-	1
Sn	2.98	0.18	7
Sb	0.54	0.05	10
Te (ng/g)	6.2	-	2
Cs	4.0	0.2	9
Ba	630	60	19
La	42	3	19
Ce	93	7	19
Pr	9.8	1.1	7
Nd	40	4	19
Sm	8.2	0.5	20
Eu	1.71	0.12	16
Gd	7.2	0.4	14
Tb	1.18	0.14	11
Dy	6.7	0.9	10
Ho	1.5	0.3	6
Er	4.1	0.7	6
Tm (ng/g)	650	100	9
Yb	4.0	0.7	18
Lu (ng/g)	530	110	11
Hf	8.3	0.2	8
Ta	1.21	0.19	9
W	0.80	0.06	6
Re	<10	-	-
Os	<22	-	-
Ir	<6.8	-	-
Pt (ng/g)	1.1	-	1
Au (ng/g)	1.2	0.6	4
Tl (ng/g)	700	150	3

III.6.43

SDC-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Hg (ng/g)	22.7	-	1
Pb	25	2	8
Bi (ng/g)	260	40	6
Th	12.1	0.9	11
U	3.14	0.20	8

Major and minor oxide concentrations (%):

H_2O^+	1.81	0.14	7
H_2O^-	0.10	0.06	3
CO_2	0.099	0.033	6
Na_2O	2.05	0.09	23
MgO	1.69	0.10	17
Al_2O_3	15.75	0.34	17
SiO_2	65.85	0.43	16
P_2O_5	0.158	0.025	15
K_2O	3.28	0.10	22
CaO	1.40	0.07	21
TiO_2	1.01	0.04	20
MnO	0.114	0.008	28
FeO	3.93	0.15	8
Fe_2O_3	2.62	0.15	6
Cl	0.003	0.001	12
F	0.060	0.003	11
S	0.065	0.011	8

Order information:

SDC-1 is available free of charge from the US Geological Survey. Please contact them at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada,114pp.

Flanagan, F.J., and G.V. Carroll (1976) Mica schist, SDC-1, from Rock Creek Park, Washington, D.C. In: F.J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, US Government Printing Office, Washington, DC, USA, pp. 29-32.

Gladney, E.S., and W.E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

SGR-1

Green River Shale

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

SGR-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values
H (%)	3.04	-	2
Li	147	26	5
Be	1.06	0.16	6
B	54	3	11
C	31600	3000	5
F	1960	240	9
Na (%)	2.22	0.10	14
Mg (%)	2.68	0.12	17
Al (%)	3.45	0.11	17
Si (%)	13.19	0.10	13
P	1430	290	16
S	15300	1100	9
Cl	32	12	7
K (%)	1.38	0.08	15
Ca (%)	5.99	0.12	13
Sc	4.6	0.7	12
Ti	1520	150	20
V	128	6	19
Cr	30	3	17
Mn	267	34	26

SGR-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Fe (%)	2.12	0.10	20
Co	11.8	1.5	19
Ni	29	5	21
Cu	60	9	18
Zn	74	9	12
Ga	11	2	5
Ge	1.57	-	1
As	67	5	9
Se (ng/g)	3500	280	8
Rb	83	6	9
Sr	420	30	18
Y	13.0	1.7	7
Zr	53	12	12
Nb	5.2	1.5	6
Mo	35.1	0.9	11
Ru	<0.46	-	-
Rh (ng/g)	<0.1	-	-
Pd (ng/g)	5.2	2.4	3
Ag (ng/g)	16-184	-	3
Cd (ng/g)	930	140	4
In (ng/g)	96	-	1
Sn	1.9	0.6	6
Sb	3.4	0.5	13
Te (ng/g)	248	-	1
Cs	5.2	0.3	9
Ba	290	40	22
La	20.3	1.8	14
Ce	36	4	14
Pr	3.9	0.3	5
Nd	15.5	1.7	15
Sm	2.7	0.3	16
Eu	0.56	0.09	13
Gd	2.0	0.4	11
Tb	0.36	0.04	9
Dy	1.9	0.3	7
Ho	0.38	0.05	4
Er	1.11	0.14	5
Tm (ng/g)	170	30	7
Yb	0.94	0.16	13
Lu (ng/g)	140	30	8
Hf	1.39	0.14	9
Ta	0.42	0.12	8
W	2.57	0.06	5
Re	<10	-	-
Os	<22	-	-
Ir	<6.8	-	-
Pt (ng/g)	3.0	-	1
Au (ng/g)	8.9	2.1	4
Hg (ng/g)	313	-	2
Tl (ng/g)	330	-	2
Pb	38	4	8

SGR-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Bi (ng/g)	940	80	4
Th	4.78	0.21	10
U	5.4	0.4	10

Major and minor oxide concentrations (%):

H_2O^-	0.45	-	1
H_2O^+	19.37	-	1
CO_2	11.58	1.10	5
Na_2O	2.99	0.13	14
MgO	4.44	0.20	17
Al_2O_3	6.52	0.21	17
SiO_2	28.24	0.21	13
P_2O_5	0.328	0.066	16
K_2O	1.66	0.10	15
CaO	8.38	0.17	13
TiO_2	0.264	0.025	20
MnO	0.034	0.004	26
FeO	1.41	-	2
Fe_2O_3	1.46	-	2
Cl	0.003	1.10	7
F	0.196	0.024	9
S	1.53	0.11	9

Order information:

SGR-1 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Gladney, E. S., and W. E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

SRM 88b

Dolomitic Limestone

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 88b is a powdered dolomitic limestone that has been crushed and passed through a No. 60 sieve (nominal sieve opening of 250 μm). This material was collected near Skokie, Illinois, USA.

Certified concentrations (percent dry weight):

Oxide	Value	Uncertainty (±)
CO_2	46.37	0.12
Na_2O	0.0290	0.0007
MgO	21.03	0.07
Al_2O_3	0.336	0.013
SiO_2	1.13	0.02
P_2O_5	0.0044	0.0003
K_2O	0.1030	0.0024
CaO	29.95	0.05
MnO	0.0160	0.0012
Fe_2O_3	0.277	0.002
SrO	0.0076	0.0003

Noncertified concentrations (µg/g dry weight unless noted):

Oxide	Value
Sc_2O_3	0.56
TiO_2 (%)	0.016
Cr_2O_3	3.4
CoO	1.3
Cs_2O	0.17
CeO_2	4.7
Eu_2O_3	0.15
HfO_2	0.16
ThO_2	0.35

Order Information:

SRM 88b can be purchased for US$149 per unit (75-grams bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1986) SRM 88b. Dolomitic limestone. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 97b

Flint Clay

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 97b is a finely powdered flint clay obtained from a stock pile near the Harbison-Walker Refractories Co. Mine on Anderson Creek, Pike Township, Clearfield County, Pennsylvania, USA. Approximately 220 kg of flint clay were air dried and processed by the same method used to prepare US Geological Survey rock standards (Flanagan, 1986). After processing, the material was delivered to NIST where it was again mixed and bottled.

Certified concentrations (percent dry weight):

Element	Value	Uncertainty (±)
Li	0.055	0.001
Na	0.0492	0.0023
Mg	0.113	0.002
Al	20.76	0.15
Si	19.81	0.04
K	0.513	0.023
Ca	0.0249	0.0026
Ti	1.43	0.04
Cr	0.0227	0.0012
Mn	0.0047	0.0005
Fe	0.831	0.008
Sr	0.0084	0.0002

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value
P (%)	0.02
Sc	22
Co	3.8
Zn	87
Rb	33
Zr (%)	0.05
Cs	3.4
Ba (%)	0.018
Sb	2.2
Eu	0.84
Hf	13
Th	36

Order information:

SRM 97b can be purchased for US$185 per unit (60-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

Flanagan (1986)

National Bureau of Standards (1988) SRM 97b. Flint clay. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 98b

Plastic Clay

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 98b is a finely powdered clay obtained from the underclay of the Clarion coal bed at the Harbison-Walker Refractories Co. plant at Clearfield, Clearfield County, Pennsylvania, USA. Approximately 220 kg of plastic clay were air dried and processed by the same method used to prepare US Geological Survey rock standards. After processing, the material was delivered to NIST where it was again mixed and bottled.

Certified concentrations (percent dry weight):

Element	Value	Uncertainty (±)
Li	0.0215	0.0003
Na	0.1496	0.0066
Mg	0.358	0.012
Al	14.30	0.20
Si	26.65	0.16
K	2.81	0.07
Ca	0.0759	0.0035
Ti	0.809	0.012
Cr	0.0119	0.0005
Mn	0.0116	0.0005
Fe	1.18	0.01
Sr	0.0189	0.0008

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value
P (%)	0.03
Sc	22
Co	16.3
Zn (%)	0.011
Rb (%)	0.018
Zr (%)	0.022
Sb	1.6
Cs	16.5
Ba (%)	0.07
Eu	1.3
Hf	7.2
Th	21

Order information:

SRM 98b can be purchased for US$185 per unit (60-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1988) SRM 98b. Plastic clay. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 278

Obsidian Rock

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 278, a natural glass, is hydroscopic and contains water that cannot be driven off by drying at low temperatures. It will pick up additional water when exposed to the atmosphere. Approximately 350 lbs. of obsidian rock were obtained from Clear Lake, Newberry Crater, Oregon, USA, crushed, ground and sieved to <200 mesh. The material was mixed in a cone blender to ensuro homogeneity.

Certified concentrations (µg/g dry weight unless noted):

Element	Value	Uncertainty (±)
Na_2O (%)	4.84	0.05
Al_2O_3 (%)	14.15	0.15
SiO_2 (%)	73.05	0.13
P_2O_5 (%)	0.036	0.003
K_2O (%)	4.16	0.02
CaO (%)	0.983	0.002
TiO_2 (%)	0.245	0.007
MnO (%)	0.052	0.002
Fe_2O_3 (%)	2.04	0.02
Ni	3.6	0.3
Cu	5.9	0.2
Rb	127.5	0.3
Sr	63.5	0.1
Pb	16.4	0.2
Tl	0.54	0.04
Th	12.4	0.3
U	4.58	0.04

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value
B	25
F (%)	0.05
C (%)	0.05
MgO (%)	0.23
Sc	5.1
Cr	6.1
Co	1.5
Zn	55
Sb	1.5
Cs	5.5
Ba	1140
Ce	62.2
Sm	5.7
Eu	0.84
Gd	5.3
Tb	1.0
Yb	4.5
Lu	0.73
Hf	8.4
Ta	1.2

Order information:

SRM 278 can be purchased for US$169 per unit (35-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1981) SRM 278. Obsidian rock. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 688

Basalt Rock

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

SRM 278 is a finely powdered basalt rock obtained from a Cenozoic basalt flow near Jackpot, Nevada, USA. Approximately 600 lbs. of basalt rock were crushed, ground and sieved to <200 mesh. The material was mixed in a cone blender to ensure homogeneity.

Certified concentrations (µg/g dry weight unless noted):

Element	Value	Uncertainty (±)
Na_2O (%)	2.15	0.03
Al_2O_3 (%)	17.36	0.09
SiO_2 (%)	48.4	0.1
P_2O_5 (%)	0.134	0.003
K_2O (%)	0.187	0.008
TiO_2 (%)	1.17	0.01
Cr	332	9
MnO (%)	0.167	0.002
Fe_2O_3 (%)	10.35	0.04
Rb	1.91	0.01
Sr	169.2	0.7
Pb	3.3	0.2
Th	0.33	0.02

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value
F (%)	0.02
CO_2 (%)	0.05
MgO (%)	8.4
CaO (%)	12.17
Sc	38.1
V	250
Co	49.7
Ni	150
Cu	96
Zn	58.0
Ba	200
Ce	13.3
Sm	2.79
Eu	1.07
Tb	0.448
Yb	2.09
Lu	0.34
Hf	1.6
U	0.37

Order information:

SRM 688 can be purchased for US$169 per unit (60-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1981) SRM 688. Basalt rock. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

STM-1

Nepheline Syenite

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

The sample of peralkaline nepheline syenite was collected from a sill that underlies Table Mountain (44° 28.6' N, 123° 50.2' W) in the Oregon Coast Range, USA. A complete mineralogical description of this material can be found in Snavely *et al.* (1976). STM-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values
Li	32	8	10
Be	9.6	0.6	13
B	6.4	1.7	7
C	70	40	6
F	910	50	13
Na (%)	6.63	0.15	23
Mg (%)	0.061	0.012	18
Al (%)	9.73	0.12	20
Si (%)	27.85	0.23	16
P	690	60	19
S	43	20	3
Cl	460	40	16
K (%)	3.55	0.06	20
Ca (%)	0.780	0.042	21
Sc	0.61	0.07	11
Ti	810	70	20
V	8.7	5.2	5
Cr	4.3	2.6	15

STM-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Mn	1700	120	32
Fe (%)	3.65	0.07	22
Co	0.90	0.15	9
Ni	3.0	1.6	9
Cu	4.6	2.0	17
Zn	235	22	17
Ga	36	5	8
Ge	1.38	-	2
As	4.6	0.6	5
Se (ng/g)	7.7	2.0	4
Br	2.3	1.5	3
Rb	118	6	13
Sr	700	30	17
Y	46	5	13
Zr	1210	120	14
Nb	268	12	9
Mo	5.2	0.9	16
Ru	<0.46	-	-
Rh (ng/g)	<0.1	-	-
Pd (ng/g)	0.4	-	2
Ag (ng/g)	79	8	5
Cd (ng/g)	270	60	3
In (ng/g)	120	-	2
Sn	6.8	1.2	10
Sb	1.66	0.15	13
Te (ng/g)	6.0	-	1
Cs	1.54	0.08	7
Ba	560	60	23
La	150	6	20
Ce	259	18	17
Pr	19.0	1.4	4
Nd	79	7	16
Sm	12.6	1.0	18
Eu	3.6	0.3	18
Gd	9.5	0.8	13
Tb	1.55	0.16	11
Dy	8.1	0.5	7
Ho	1.9	0.4	8
Er	4.2	0.4	6
Tm (ng/g)	690	160	6
Yb	4.4	0.4	19
Lu (ng/g)	600	100	10
Hf	28	2	11
Ta	18.6	1.2	10
W	3.6	0.4	8
Re	<10	-	-
Os	<22	-	-
Ir	<6.8	-	-
Pt (ng/g)	<1	-	-
Au (ng/g)	0.40	-	2
Tl (ng/g)	260	50	3

Element	Mean	Uncertainty (±)	Number of values
Hg (ng/g)	15.3	-	1
Pb	17.7	1.8	8
Bi (ng/g)	130	30	5
Th	31	3	13
U	9.06	0.13	9

Major and minor oxide concentrations (%):

H_2O^+	1.50	0.11	10
H_2O^-	0.19	0.04	4
CO_2	0.026	0.015	6
Na_2O	8.94	0.20	23
MgO	0.101	0.020	18
Al_2O_3	18.39	0.23	20
SiO_2	59.64	0.49	16
P_2O_5	0.158	0.014	19
K_2O	4.28	0.07	20
CaO	1.09	0.06	21
TiO_2	0.135	0.012	20
MnO	0.220	0.015	32
FeO	2.09	0.03	9
Fe_2O_3	2.87	0.02	5
Cl	0.046	0.004	16
F	0.091	0.005	13
S	0.004	0.002	3

Order information:

STM-1 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Gladney, E. S., and W. E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

Snavely, P. D., N. S. MacLeod, F. J. Flanagan, S. Berman, H. G. Neiman, and H. Bastron (1976) Nepheline syenite, STM-1, from Table Mountain, Oregon. In: F. J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, p. 7-10. US Government Printing Office, Washington, DC.

W-2

Diabase

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

Eight hundred pounds of material was collected from Bull Run Quarry, near Centreville, VA, USA, at the same site that the earlier W-1 reference material was obtained and processed for this standard (Flanagan, 1984). The complete petrology of the material can be found in Chayes (1951). W-2 is not a certified reference material. Original concentration values for various elements was initially provided by Flanagan (1984). Values for elemental concentrations using the results of various analysts have been calculated by Abbey (1983), Gladney *et al.* (1983), Flanagan (1986) and Gladney and Roelandts (1988). Those calculated by Gladney and Roelandts (1988) are listed below.

Available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values
Li	9.3	0.7	8
Be	1.3	0.2	4
B	12.0	1.30	4
C	151	80	6
F	205	39	7
Na (%)	1.59	0.09	38
Mg (%)	3.84	0.11	31
Al (%)	8.12	0.12	33
Si (%)	24.49	0.30	28
P	570	70	21
S	79	28	3
Cl	190	40	9
K	5200	210	34
Ca (%)	7.77	0.21	37
Sc	35	3	21
Ti	6350	180	35
V	262	14	23
Cr	93	6	30

W-2 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Mn	1260	70	38
Fe (%)	7.51	0.16	38
Co	44	6	38
Ni	70	8	29
Cu	103	12	24
Zn	77	5	24
Ga	20	3	10
Ge	1.04	-	1
As	1.24	0.36	6
Se (ng/g)	102	-	2
Br	<2	-	-
Rb	20	3	30
Sr	194	17	28
Y	24	3	21
Zr	94	9	17
Nb	7.9	1.4	14
Mo	0.6	0.4	3
Pd (ng/g)	11	-	2
Ag (ng/g)	46	-	2
Cd (ng/g)	104	27	4
Sb	0.79	0.17	10
Te (ng/g)	2.1	-	1
Cs	0.99	0.08	8
Ba	182	23	26
La	11.4	1.8	25
Ce	24	2	23
Pr	5.9	5.2	3
Nd	14	5	15
Sm	3.25	0.23	22
Eu	1.10	0.08	22
Gd	3.6	0.5	10
Tb (ng/g)	630	120	11
Dy	3.8	0.4	10
Ho (ng/g)	760	90	6
Er	2.5	0.6	5
Tm (ng/g)	380	70	7
Yb	2.05	0.12	20
Lu (ng/g)	330	70	15
Hf	2.56	0.14	14
Ta (ng/g)	500	70	11
W (ng/g)	263	-	1
Au (ng/g)	1.2	-	1
Hg (ng/g)	7.9	-	1
Tl (ng/g)	200	-	1
Pb	9.3	3.1	6
Bi (ng/g)	30	-	1
Th	2.2	0.4	17
U (ng/g)	530	80	9

Major and minor oxide concentrations (%):

Oxide	Mean	Uncertainty (±)	Number of values
H_2O^+	0.55	0.04	11
H_2O^-	0.23	0.05	7
Na_2O	2.14	0.12	38
MgO	6.37	0.18	31
Al_2O_3	15.35	0.23	33
SiO_2	52.44	0.64	28
P_2O_5	0.131	0.016	21
K_2O	0.627	0.025	34
CaO	10.87	0.29	37
TiO_2	1.06	0.03	35
MnO	0.163	0.009	38
FeO	8.31	0.09	8
Fe_2O_3	1.52	0.14	8
CO_2	0.055	0.029	6

Order information:

W-2 is available free of charge from the US Geological Survey. Please contact Ms. J. Kane at the address above.

References:

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Chayes, F. (1951) Modal analyses of the granite and diabase test rocks. U.S. Geol. Survey Prof. Bull. 980:59-68. U.S. Geological Survey, Reston, VA, USA.

Flanagan, F. J. (1984) Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. U.S. Geol. Survey Prof. Bull. 1623:1-12. U.S. Geological Survey, Reston, VA, USA.

Flanagan, F. J. (1986) Additions and corrections for USGS Bulletin 1623, Three USGS mafic rock reference samples, W-2, DNC-1, and BIR-1. Open file report 86-220. U.S. Geological Survey, Reston, VA, USA.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BIR-1, DNC-1 and W-2. Geostand. Newsletter, 12(1):63-118.

Gladney, E. S., C. E. Burns, and I. Roelandts (1983) 1982 Compilation of elemental concentrations in eleven United States Geological Survey rock standards. Geostands. Newsletter, 7(1):3-226.

SEDIMENTS

BCSS-1, MESS-1 and PACS-1

Marine Sediments

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, Ontario K1A OR9
CANADA

Description:

Sediment for BCSS-1 was collected in the Baie des Chaleurs, Gulf of St. Lawrence; for MESS-1 in the Miramichi Estuary, Gulf of St. Lawrence; and for PACS-1 in Esquimalt Harbour, British Columbia. The sediments were freeze-dried, screened to pass through a 125-µm screen, blended, bottled, and radiation-sterilized. The materials may contain sea salt. Semiquantitative analysis results for MESS-1 and BCSS-1 are available in the NRCC description sheet (1987).

Certified concentrations (µg/g dry weight unless noted):

Element	BCSS-1		MESS-1		PACS-1	
	Value	Uncertainty (±)	Value	Uncertainty (±)	Value	Uncertainty (±)
Be	1.3	0.3	1.9	0.2	-	-
V	93.4	4.9	72.4	5.3	127	5
Cr	123	14	71	11	113	8
Mn	229	15	513	25	470	12
Co	11.4	2.1	10.8	1.9	17.5	1.1
Ni	55.3	3.6	29.5	2.7	44.1	2.0
Cu	18.5	2.7	25.1	3.8	452	16
Zn	119	12	191	17	824	22
As	11.1	1.4	10.6	1.2	211	11
Se	0.43	0.06	0.34	0.06	1.09	0.11
Sr	-	-	-	-	277	-
Mo	-	-	-	-	12.3	-
Cd	0.25	0.04	0.59	0.10	2.38	0.20
Sn	1.85	0.20	3.98	0.44	41.1	3.1
Sb	0.59	0.06	0.73	0.08	171	14
Hg	0.129	0.012	0.171	0.014	4.57	0.16
Pb	22.7	3.4	34.0	6.1	404	20

Element	BCSS-1 Value	BCSS-1 Uncertainty (±)	MESS-1 Value	MESS-1 Uncertainty (±)	PACS-1 Value	PACS-1 Uncertainty (±)
Tributyl Sn *	-	-	-	-	1.27	0.22
Dibutyl Sn	-	-	-	-	1.16	0.18
Monobutyl Sn	-	-	-	-	0.28	0.17

Certified matrix concentraions (%)

Element	BCSS-1 Value	BCSS-1 Uncertainty (±)	MESS-1 Value	MESS-1 Uncertainty (±)	PACS-1 Value	PACS-1 Uncertainty (±)
C	2.19	0.09	2.99	0.09	3.69	0.11
Na_2O	2.72	0.21	2.50	0.15	4.40	0.11
MgO	2.44	0.23	1.44	0.09	2.41	0.09
Al_2O_3	11.83	0.41	11.03	0.38	12.23	0.22
SiO_2	66.1	1.0	67.5	1.9	55.7	0.5
P_2O_5	0.154	0.016	0.146	0.014	0.253	0.018
S	0.36	0.05	0.72	0.05	1.32	0.08
Cl	1.12	0.05	0.82	0.07	2.39	0.09
K_2O	2.17	0.04	2.24	0.04	1.50	0.09
CaO	0.760	0.074	0.674	0.064	2.92	0.13
TiO_2	0.734	0.024	0.905	0.028	0.703	0.011
Fe_2O_3	4.70	0.14	4.36	0.25	6.96	0.12

Information values only (µg/g):

Element	BCSS-1 Value	BCSS-1 Uncertainty (±)	MESS-1 Value	MESS-1 Uncertainty (±)
Cs	4	-	4	-
Ge	1.7	-	1.5	-
Mo	2.2	-	1.9	-
Sr	89	-	96	-
Tl	0.7	-	0.6	-

Order information:

BCSS-1, MESS-1 and PCSS-1 can be purchased for US$90 per unit (80 g, 65 g and 60 g respectively). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1987) MESS-1. BCSS-1. PACS-1. Marine sediment reference materials for trace metals and other constituents. Description sheet (rev. 1987). National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

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* Butyltin values are reported as Sn concentrations.

National Research Council Canada (1988) MACSP Update. Estuarine reference material for trace metals SLEW-1, and MACSP biological tissue reference materials certified for methyl mercury. Information sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

CS-1, HS-1 and HS-2

Polychlorinated Biphenyls in Coastal Sediments

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Atlantic Research Laboratory
1411 Oxford Street
Halifax, Nova Scotia B3H 3Z1
CANADA

Description:

Sediment for CS-1 was collected in the Laurentian Channel midway between Nova Scotia and Newfoundland, Canada. The material is a clean carbonaceous clay. Sediment for HS-1 and HS-2 was collected in a Nova Scotia harbor in Canada. The material is an organic and sulfur rich sediment from an active harbor. The sediments were freeze-dried, homogenized in a modified cement mixer, and subsampled into solvent-rinsed quart-sized steel cans that contain about 200 g of material. A description of the preparation and analysis of these materials can be found in the NRCC description sheets (1982).

Certified concentrations (µg/kg):

CRM	Compound	Value	Uncertainty (±)
CS-1	PCB (as Aroclor 1254)	1.15	0.60
HS-1	PCB (as Aroclor 1254)	21.8	1.1
HS-2	PCB (as Aroclor 1254)	111.8	2.5

Order information:

These CRMs can be purchased for US$115 per unit (200-g can). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1982) Marine sediments reference materials, polychlorinated biphenyls, description sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

EPA QC - Sediment

EPA Quality Control Samples

Source:

US Environmental Protection Agency
Quality Assurance Branch
EMSL - Cincinnati
Cincinnati, OH 45268
USA

Description:

This sample is part of the quality control samples prepared, verified, and distributed by EPA as part of their quality assurance program. Component mix and concentration ranges reflect its use in standard EPA analytical procedures. Updates on the availability of these materials can be obtained through the EPA Quality Assurance Newsletter. Contact the Technical Editor of the Newsletter at the address shown above.

Quality control sample:

Polychlorinated biphenyls (5-10 mg/kg)

Aroclor 1242
Aroclor 1254

Order Information:

At this time (Summer 1989), the solutions are available free of charge. Please contact EPA at the address shown above. The EPA requires that requests for these materials be signed by the laboratory director.

Reference:

Environmental Protection Agency (1989) EPA Newsletter Quality Assurance, 11(1). US Environmental Protection Agency, Cincinnati, OH, USA.

HS-3 - HS-6

Polycyclic Aromatic Hydrocarbons in Marine Sediments

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, Ontario K1A OR9
CANADA

Description:

Sediment was collected in four harbors in Nova Scotia, reflecting varying degrees of commercial and industrial activities. The sediments were freeze dried, sieved to pass a 125-µm sieve, homogenized in a modified cement mixer, and stored in solvent-rinsed pint-sized cans holding approximately 200 g of sediment.

Concentrations (µg/g dry weight unless noted):

Compound	Concentration	Uncertainty (±)	Concentration	Uncertainty (±)
	HS-3		HS-4	
Naphthalene	9.0	0.7	0.15 *	
Acenaphthylene	0.3	0.1	0.15 *	
Acenaphthene	4.5	1.5	0.15 *	
Fluorene	13.6	3.1	0.15	
Phenanthrene	85	20	0.68	0.08
Anthracene	13.4	0.5	0.14	0.07
Fluoranthene	60	9	1.25	0.10
Pyrene	39	9	0.94	0.12
Benz[a]anthracene	14.6	2.0	0.53	0.05
Chrysene	14.1	2.0	0.65	0.08
Benzo[a]pyrene	7.4	3.6	0.65	0.08
Benzo[b]fluoranthene	7.7	1.2	0.70	0.15
Benzo[k]fluoranthene	2.8	2.0	0.36	0.05
Benzo[ghi]perylene	5.0	2.0	0.58	0.22
Dibenz[a,h]anthracene	1.3	0.5	0.12	0.05
Indeno[1,2,3-cd]pyrene	5.4	1.3	0.51	0.15

* Upper limit - amount present is not greater than 0.15 µg/g.

H-3 - H-6 (cont.)

Compound	Concentration (HS-5)	Uncertainty (±) (HS-5)	Concentration (HS-6)	Uncertainty (±) (HS-6)
Naphthalene	0.25	0.07	4.1	1.1
Acenaphthylene	0.15 *		0.19	0.05
Acenaphthene	0.23	0.10	0.23	0.07
Fluorene	0.4	0.1	0.47	0.12
Phenanthrene	5.2	1.0	3.0	0.6
Anthracene	0.38	0.15	1.1	0.4
Fluoranthene	8.4	2.6	3.54	0.65
Pyrene	5.8	1.8	3.0	0.6
Benz[a]anthracene	2.9	1.2	1.8	0.3
Chrysene	2.8	0.9	2.0	0.3
Benzo[a]pyrene	1.7	0.8	2.2	0.4
Benzo[b]fluoranthene	2.0	1.0	2.8	0.6
Benzo[k]fluoranthene	1.0	0.4	1.43	0.15
Benzo[ghi]perylene	1.3	0.3	1.78	0.72
Dibenz[a,h]anthracene	0.2	0.1	0.49	0.16
Indeno[1,2,3-cd]pyrene	1.3	0.7	1.95	0.58

Order Information:

These materials can be purchased for US$115 per unit (200 g). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1981) Marine sediment reference materials, MESS-1 and BCSS-1, description sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

MAG-1

Marine Mud

Source:

Branch of Geochemistry
US Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092
USA

Description:

MAG-1 is a fine-grained gray-brown clayey mud from the Wilkinson Basin of the Gulf of Maine, USA. The sample was obtained using a 125-liter Campbell grab sampler from a depth of 282 m at 42° 34.6' N, 69° 32.6' W from the research vessel GOSNOLD. This mud has a very low carbonate content. More than 60% of the sediment weight was seawater of 33-34 ‰ salinity, resulting in approximately 4% evaporate sea water salts in the final material. A more complete description of MAG-1, including mineralogical information, can be found in Manheim *et al.* (1976). MAG-1 is not a certified reference material. Values for elemental concentrations have been calculated by Abbey (1982, 1983), Gladney and Goode (1981) and Gladney and Roelandts (1988) using the results of various analysts. Those calculated by Gladney and Roelandts (1988) are listed below.

Available concentrations (µg/g dry weight unless noted):

Element	Mean	Uncertainty (±)	Number of values
H	8660	-	2
Li	79	4	8
Be	3.2	0.4	9
B	136	6	13
C	21500	4000	4
N	800	-	1
O (%)	46.10	-	2
F	770	80	10
Na (%)	2.84	0.08	16
Mg (%)	1.81	0.06	16
Al (%)	8.66	0.16	20
Si (%)	23.52	0.45	17
P	710	90	12
S	3900	660	12

MAG-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Cl	31000	600	11
K (%)	2.95	0.14	19
Ca (%)	0.98	0.07	21
Sc	17.2	1.0	18
Ti	4500	400	19
V	140	6	16
Cr	97	8	18
Mn	760	70	23
Fe (%)	4.75	0.21	22
Co	20.4	1.6	19
Ni	53	8	21
Cu	30	3	17
Zn	130	6	17
Ga	20.4	1.5	5
Ge	<1	-	-
As	9.2	1.2	11
Se (ng/g)	1160	120	8
Br	252	66	4
Rb	149	6	13
Sr	146	15	19
Y	28	3	15
Zr	126	13	14
Nb	12	2	7
Mo	1.6	0.6	8
Ru	<0.46	-	-
Rh (ng/g)	<0.1	-	-
Pd (ng/g)	1.7	0.8	3
Ag (ng/g)	80	21	4
Cd (ng/g)	202	29	7
In (ng/g)	180	-	1
Sn	3.6	1.0	9
Sb	0.96	0.10	13
Te (ng/g)	66	-	1
I	380	-	1
Cs	8.6	0.7	12
Ba	479	41	20
La	43	4	21
Ce	88	9	20
Pr	9.3	1.3	8
Nd	38	5	22
Sm	7.5	0.6	21
Eu	1.55	0.14	20
Gd	5.8	0.7	16
Tb	0.96	0.09	12
Dy	5.2	0.3	11
Ho	1.02	0.10	8
Er	3.0	0.5	9
Tm (ng/g)	429	23	9
Yb	2.61	0.27	22
Lu (ng/g)	400	40	10

MAG-1 (cont.)

Element	Mean	Uncertainty (±)	Number of values
Hf	3.7	0.5	12
Ta	1.11	0.22	11
W	1.4	0.2	5
Re	<10	-	-
Os	<22	-	-
Ir	<6.8	-	-
Pt (ng/g)	1.0	-	1
Au (ng/g)	2.4	0.6	5
Hg (ng/g)	17.9	-	1
Tl (ng/g)	590	-	2
Pb	24	3	15
Bi (ng/g)	340	80	7
Th	11.9	1.0	13
U	2.7	0.3	10

Major and minor oxide concentrations (%):

H_2O^+	5.6	1.1	3
H_2O^-	2.39	0.16	3
CO_2	7.88	1.45	4
Na_2O	3.83	0.11	16
MgO	3.00	0.10	16
Al_2O_3	16.37	0.3	20
SiO_2	50.36	0.96	17
P_2O_5	0.163	0.021	12
K_2O	3.55	0.17	19
CaO	1.37	0.10	21
TiO_2	0.751	0.067	19
MnO	0.098	0.009	23
FeO	3.06	0.42	6
Fe_2O_3	3.49	0.64	5
Cl	3.10	0.06	11
F	0.077	0.008	10
S	0.39	0.07	12

Order information:

MAG-1 is available free of charge from the US Geological Survey. Please contact Ms. Jean Kane at the address above.

References:

Abbey, S. (1982) An evaluation of USGS III. Geostand. Newsletter, 6(1):47-76.

Abbey, S. (1983) Studies in "standard samples" of silicate rocks and minerals 1969-1982. Paper 83-15, 114pp. Geological Survey of Canada, Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, Canada.

Gladney, E. S., and W. E. Goode (1981) Elemental concentrations in eight new United States Geological Survey rock standards: a review. Geostand. Newsletter, 5(1):31-64.

Gladney, E. S., and I. Roelandts (1988) 1987 Compilation of elemental concentration data for USGS BHVO-1, MAG-1, QLO-1, RGM-1, SCo-1, SDC-1, SGR-1 and STM-1. Geostand. Newsletter, 12(2):253-362.

Manheim, F. T., J. C. Hathaway, F. J. Flanagan, and J. D. Fletcher (1976) Marine mud, MAG-1, from the Gulf of Maine. In: F. J. Flanagan (ed.), Description and analyses of eight new USGS rock standards, USGS Prof. paper 840, pp. 25-28. US Government Printing Office, Washington, DC, USA.

NIES No. 2

Pond Sediment

Source:

National Institute for Environmental Studies
Yatabe-machi
Tsukuba, Ibaraki, 305
JAPAN

Description:

The sediment used for this material was collected in 1977 from the surface layers of the bottom of Sanshiro Pond located within the grounds of the University of Tokyo. The sediment was sieved through a nylon sieve (2 mm) to remove gravel and leaves, filtered under suction with a Buchner funnel to remove the interstitial water, and air-dried on filter paper for two weeks. The dried sediment was ball-milled, sieved to pass through a 200-mesh sieve, homogenized and packaged in acid-washed glass bottles. The bottled samples were radiation sterilized. A complete mineralogical description of NIES No. 2 can be found in Iwata *et al.* (1983a and b).

Certified concentrations (µg/g dry weight unless noted):

Element	Value	Uncertainty (±)
Na (%)	0.57	0.04
Al (%)	10.6	0.5
K (%)	0.68	0.06
Ca (%)	0.81	0.06
Fe (%)	6.53	0.35
Cr	75	5
Co	27	3
Ni	40	3
Cu	210	12
Zn	343	17
As	12	2
Cd	0.82	0.06
Pb	105	6

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value
Si (%)	21
P (%)	0.14
Ti (%)	0.64
Sc	28
V	250
Mn	770
Br	17
Rb	42
Sr	110
Sb	2.0
La	17
Hg	1.3

Order information:

NIES No. 2 (20-g bottles) can be obtained free of charge. Please contact Dr. K. Okamoto at the address shown above.

Reference:

Iwata, Y., H. Haraguchi, J. C. Van Loon, and K. Fuwa (1983a) Mineralogical characterization of the reference material of "pond sediment." Bull. Chem. Soc. Japan, 56(2):434-8.

Iwata, Y., K. Matsumoto, H. Haraguchi, K. Notsu, K. Okamoto and K. Fuwa (1983b) Preparation and evaluation of certified reference "pond sediment (NIES no. 2)." Quarterly J. Plasma Spec., 3(2):72-85.

National Institute for Environmental Studies (1981) NIES certified material, pond sediment. Information sheet. National Institute for Environmental Studies, Yatabe-machi,Tsukuba, Ibaraki, 305, Japan.

SARM 46 through 52

Stream Sediments

Source:

South Africa Bureau of Standards
Private Bag X191
Pretoria, Transvaal 0001
REPUBLIC OF SOUTH AFRICA

Description:

No information available.

Certified concentrations (µg/g dry weight unless noted):

	SARM 46	SARM 51	SARM 52
Element	Value	Value	Value
Na_2O (%)	0.28	0.07	(0.1)*
MgO (%)	3.16	0.92	0.60
SiO_2 (%)	35.90	33.81	57.81
Al_2O_3 (%)	6.71	11.87	9.38
P_2O_5 (%)	0.11	0.21	0.09
S (%)	(0.17)	(0.24)	(0.02)
K_2O (%)	0.35	0.33	0.25
CaO (%)	1.32	0.86	0.37
TiO_2 (%)	0.60	0.82	1.30
V	225	181	346
Cr	559	509	-
MnO (%)	1.14	0.21	0.27
Fe_2O_3 (%)	28.16	18.36	19.71
Co	56	60	81
Ni	(125)	178	182
Cu	566	268	219
Zn (%)	0.59	0.22	0.0264
Ga	-	(20)	(15)
Sr	25	44	25
Y	(20)	21	20
Zr	101	121	250

* Information value only.

SARM 46 - 52 (cont.)

Element	SARM 46 Value	SARM 51 Value	SARM 52 Value
Nb	-	(9)	11
Rb	(20)	37	20
Ba	(180)	(335)	(410)
Ce	(110)	(120)	(210)
Pb	(1.3)	5200	1200
Th	-	(10)	(11)

Order information:

No price information is available. Please contact SABS at the address shown above.

Reference:

Viljoen, A. J. (1989) Private communication.

SD-A-1

Deep Sea Sediment

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

NOT AVAILABLE.

Activities (mBq/g):

Radionuclide	Activity	Range
^{40}K	235	220 - 252
^{210}Pb	70	58 - 88
^{210}Po	72	70 - 75
^{226}Ra	74.9	55 - 85
^{228}Ra	12.3	10.9 - 15.6
^{228}Th	12.3	10.2 - 12.9
^{230}Th	101.4	92 - 106
^{232}Th	12.2	10.5 - 13.8
^{234}U	7.3	7.0 - 7.7
^{235}U	1.0	0.3 - 2.3
^{238}U	7.3	6.3 - 9.5

Order information:

SD-A-1 can be purchased for US$40 per unit (100 g). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SD-M-1/OC

Marine Sediment

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

NOT AVAILABLE.

Concentrations (ng/g dry weight):

Compound	Value	Range
Aroclor 1254	320	50 - 590
Aroclor 1260	170	113 - 227
HCB	1.2	0.6 - 1.8
Dieldrin	1.5	0 - 3.4
alpha-HCH	0.93	0.26 - 1.60
gamma-HCH	0.48	0.38 - 0.58
p,p'-DDD	5.6	4.6 - 7.6
p,p'-DDE	5.7	3.0 - 8.4
p,p'-DDT	10.2	5.1 - 15.3

Order information:

SD-M-1/OC can be purchased for US$40 per unit (35 g). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SD-N-2

Marine Sediment

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

SD-N-2 is composed of natural marine sediment collected near shore in the North Sea in 1979. The sediment was dried at 105°C, ground to powder, homogenized, and packaged in polyethylene bottles with double closures. The sediment is composed of 85% quartz, 2% calcite, and 3% seasalts (mainly NaCl). It contains 0.1% organic C and <0.002% organic N.

Activities (mBq/g unless noted):

Radionuclide	Activity	Range
^{40}K	220	189 - 226
^{137}Cs	0.8	0.5 - 1.0
^{232}Th	4.9	4.5 - 5.4
$^{239+240}Pu$ (mBq/kg)	8.8	6.5 - 14.0

Order information:

SD-N-2 can be purchased for US$40 per unit (100 g). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1985) Analytical Quality Control Service Programme. Intercomparison runs, certified reference materials, reference materials. 1986-87. LAB/243. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria, June 1985.

International Atomic Energy Agency (1985) Information sheet, Intercalibration material SD-N-2. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria, June 1985.

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SES-1

Polycyclic Aromatic Hydrocarbons in Estuarine Sediment

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, Ontario K1A OR9
CANADA

Description:

SES-1 is a spiked natural estuarine sediment. The sediment was collected in the estuary of a Nova Scotia river, at a site free of commercial or industrial activity. The sediment was freeze dried, sieved to pass a 125-µm sieve and homogenized in a modified cement mixer. A subsample was taken and spiked with a solution of polycyclic aromatic hydrocarbons. The subsample was then returned to the bulk sample and homogenized. The material was stored in solvent-rinsed pint-sized cans holding approximately 200 g of sediment. The material was characterized by Soxhlet extraction with either hexane or dichloromethane and the concentrations of polycyclic aromatic hydrocarbons determined. No differences were observed between results ontained using the two different extraction solvents when analyzed by the same technique. Biases between different analytical techniques were apparent.

Average* concentrations (µg/g dry weight):

Compound	Analytical technique				
	Spike	HPLC/ FL	HPLC/ MS	GC/MS	GC/FID
Naphthalene	3.62	1.6	2.16	1.7	0.57
Acenaphthene	7.21	2,9	0.69	0.59	0.67
Fluorene	1.42	1.6	0.64	0.55	0.57
Phenanthrene	1.37	1.0	1.47	1.05	1.14
Anthracene	1.63	0.9	0.02	0.02	0.06
Fluoranthene	1.58	1.1	1.94	1.35	1.40
Pyrene	4.09	3.5	2.79	2.4	2.72
Benz[a]anthracene	1.31	0.8	0.68	0.5	1.00

* Based on 6-12 determinations.

SES-1 (cont.)

	Spike	HPLC/ FL	HPLC/ MS	GC/MS	GC/FID
Chrysene	1.32	1.4	1.14	1.1	1.19
Benzo[a]pyrene	1.21	0.8	0.29	0.15	0.34
Benzo[b]fluoranthene		1.2	1.46	ND[Δ]	ND
Benzo[k]fluoranthene		1.0	1.27	ND	ND
Benzo[ghi]perylene	1.21	0.8	1.39	0.69	1.10
Dibenz[a,h]anthracene	1.30	1.0	1.04	0.6	0.94
Indeno[1,2,3-cd]pyrene	1.28	1.0	1.42	0.8	1.20

Order information:

SES-1 can be purchased for US$115 per unit (200 g). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1988) SES-1, Estuarine sediment reference material for polycyclic aromatic hydrocarbons, description sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

[Δ] Not determined.

SL-1

Lake Sediment

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

The lake sediment sample at a water depth of 15 m was collected by the US Department of Agriculture at the Sardis Reservoir, Panola County, Mississippi, USA, and donated to the IAEA. The material was dried at 50°C for 7 days, ground and sieved, and the 0.10-mm fraction collected. This fraction was further homogenized in a rotating plastic drum and 25-gram portions stored in plastic bottles. The homogeneity of the sample was tested by determining the content of several elements by NAA in samples taken from several bottles. By applying F and t tests, it was found that the results do not differ significantly and the material can be considered homogeneous at least for sample weights ≥100 mg. The content of hydroscopic moisture as determined by drying at constant weight was rather small (≈2.7%), but it may vary with a change in ambient humidity. The results of an intercomparison exercise that resulted in the recommended values for SL-1 can be found in Dybczynski and Suschny (1979).

Concentrations (μg/g dry weight unless noted):

Element	Value	Range
Na (mg/g)	1.72	1.60 - 1.84
Sc	17.3	16.2 - 18.4
Ti (mg/g)	5.17	4.80 - 5.54
V	170	155 - 185
Cr	104	95.0 - 113
Mn (mg/g)	3.46	3.30 - 3.62
Fe (mg/g)	67.4	65.7 - 69.1
Co	19.8	18.3 - 21.3
Ni	44.9	36.9 - 52.9
Cu	30.0	24.1 - 35.6
Zn	223	213 - 233
As	27.5	24.6 - 30.4

SL-1 (cont.)

Element	Value	Range
Br	6.82	5.09 - 8.55
Rb	113	102 - 124
Cd	0.26	0.21 - 0.31
Sb	1.31	1.19 - 1.43
Cs	7.01	6.13 - 7.89
Ba	639	586 - 692
La	52.6	49.5 - 55.7
Ce	117	100 - 134
Nd	43.8	41.0 - 46.6
Sm	9.25	8.74 - 9.76
Dy	7.46	5.34 - 9.58
Yb	3.42	2.78 - 4.06
Hf	4.16	3.58 - 4.74
Pb	37.7	30.3 - 45.1
Th	14	13 - 15
U	4..02	3.70 - 4.34

Noncertified concentrations (Dybczynski and Suschny, 1979) (µg/g dry weight unless noted):

Element	Value
Li	29
B	39
Mg (%)	2.9
Al (%)	8.9
P	831
S (%)	1.2
Cl	10
K (%)	1.5
Ca (%)	0.25
Ga	24
Ge	25
Se	2.9
Sr	80
Y	85
Zr	241
Nb	17
Mo	1.3
Ru	0.13
Ag (ng/g)	82
In	0.20
Sn	4
Te	2
I	28
Eu	1.6
Gd	12
Tb	1.4
Ho	1.3
Tm	0.66

Element	Value
Lu	0.54
Ta	1.6
W	6
Au (ng/g)	10
Ir (ng/g)	8.3
Pt	0.36
Hg	0.13
Bi	1

Order information:

SL-1 can be purchased for US$80 per unit (25-g bottle). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

Dybczynski, R., and O. Suschny (1979) Final report on the intercomparison run SL-1 for the determination of trace elements in a lake sediment sample. IAEA/RL/64, International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SL-2

Lake Sediment

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

NOT AVAILABLE.

Activities (mBq/g):

Radionuclide	Activity	Range
^{40}K	240	211 - 269
^{137}Cs	2.4	2.2 - 2.6

Order information:

SL-2 can be purchased for US$80 per unit (25-g bottle). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SL-3

Lake Sediment

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

NOT AVAILABLE.

Concentrations (µg/g dry weight unless noted):

Element	Value	Range		
Na (mg/g)	6.69	6.29	-	7.09
Mg (mg/g)	27.0	24.6	-	29.4
Al (mg/g)	24.5	23.4	-	25.7
K (mg/g)	8.74	7.92	-	9.57
Ca (mg/g)	111.1	107.2	-	115.0
Sc	3.91	3.64	-	4.18
Ti (mg/g)	2.61	2.30	-	2.92
As	3.2	3.0	-	3.4
Br	5.63	4.84	-	6.42
Rb	38.8	36.9	-	40.6
Sr (mg/g)	0.47	0.46	-	0.49
Sb	0.56	0.44	-	0.67
Cs	1.38	1.24	-	1.51
La	22.5	21.6	-	23.5
Ce	45.5	43.9	-	47.2
Nd	21.5	20.0	-	23.0
Sm	3.83	3.53	-	4.13
Eu	0.66	0.64	-	0.67
Tb	0.49	0.44	-	0.54
Dy	2.22	1.65	-	2.78
Yb	1.89	1.77	-	2.01
Lu	0.30	0.27	-	0.33
Hf	9.10	8.51	-	9.69

SL-3 (cont.)

Element	Value	Range		
Ta	0.70	0.66	-	0.75
Th	7.02	6.54	-	7.50
U	2.30	2.08	-	2.52

Order information:

SL-3 can be purchased for US$80 per unit (25-g bottle). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SRM 1646

Estuarine Sediment

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

The estuarine sediment sample was dredged from the Chesapeake Bay, USA, and supplied to the NBS by R. Huggett of the Virginia Institute of Marine Science. The material was freeze-dried, radiation-sterilized, sieved through screen openings of 1.00 mm to remove coarse materials, ball-milled to pass through a 150 µm sieve, mixed in a blender, placed in polyethylene bags and bottled. The homogeneity of the bulk material was tested by determining the content of several elements by neutron activation analysis.

Certified concentrations (µg/g dry weight unless noted):

Element	Value	Uncertainty (±)
Mg (%)	1.09	0.08
Al (%)	6.25	0.20
P (%)	0.054	0.005
Ca (%)	0.83	0.03
V	94	1
Cr	76	3
Mn	375	20
Fe (%)	3.35	0.10
Co	10.5	1.3
Ni	32	3
Cu	18	3
Zn	138	6
As	11.6	1.3
Cd	0.36	0.07
Hg	0.063	0.012
Pb	28.2	1.8

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value
Li	49
Be	1.5
Na (%)	2.0
Si (%)	31
K (%)	1.4
S (%)	0.96
Ti (%)	0.51
Sc	10.8
Ge	1.4
Se	0.6
Rb	87
Mo	2.0
Sb	0.4
Te	0.5
Cs	3.7
Ce	80
Eu	1.5
Tl	0.5
Th	10

Order information:

SRM 1646 can be purchased for US$145 per unit (75-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1982) SRM 1646. Estuarine sediment. Certificate of analysis (revised). National Bureau of Standards, Gaithersburg, MD, USA.

SLUDGES

CRM 144 - 146

Sewage Sludges

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

CRM 144 is composed of sewage sludge of domestic origin, and CRM 146 of sewage sludge of industrial origin. The source of CRM 145 sludge has not been specified.

Certified concentrations (µg/g)* :

	CRM 144		CRM 145		CRM 146	
Element	Value	Uncertainty (±)	Value	Uncertainty (±)	Value	Uncertainty (±)
Cr	(485.4)		(105.5)		(784)	
Mn	449	13	241	12	588	24
Co	9.06	0.60	8.38	0.71	11.8	0.7
Ni	942	22	41.4	2.4	280	18
Cu	713	26	429	10	934	24
Zn	3143	103	2843	64	4059	90
As	(6.7)		-		-	
Se	(2.3)		(3.3)		(1.7)	
Cd	4.82	0.97	18.0	1.2	77.7	2.6
Hg	1.49	0.22	8.82	0.88	9.49	0.76
Pb	495	19	349	15	1270	28
Aqua regia soluble						
Cr	(494)		(85.2)		(769)	
Mn	(436)		(219.6)		(555)	
Co	(8.6)		(6.8)		(9.9)	
Ni	(947)		(38.5)		(269)	

* Values in parenthesis not certified.

	CRM 144		CRM 145		CRM 146	
Element	Value	Uncertainty (±)	Value	Uncertainty (±)	Value	Uncertainty (±)
Cu	(694)		(415.9)		(921)	
Zn	(3090)		(2772)		(4002)	
Cd	(3.6)		(16.8)		(76.5)	
Pb	(479)		(332)		(1255)	
Matrix (mg/g)						
SiO_2	(136.4)		(217.0)		(228.0)	
CaO	(56.8)		(153.5)		(142.0)	
MgO	(9.2)		(31.0)		(33.0)	
Al_2O_3	(45.8)		(34.4)		(90.0)	
TiO_2	(1.9)		(3.2)		(29.1)	
Fe_2O_3	(63.4)		(13.0)		(26.5)	
P_2O_5	(50.8)		(75.3)		(59.0)	
Na_2O	(4.6)		(2.7)		(3.0)	
K_2O	(7.8)		(4.9)		(5.8)	
Loss at 900°C	0.620		0.451	0.377		

Order information:

These CRMs can each be purchased for 2500 BFR per unit (50-g bottle). Price includes handling and normal postage. Price subject to change without notice. Please contact BCR at the address shown above.

Reference:

Community Bureau of Reference (BCR) (1988) BCR Reference Materials Catalog, 47pp. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium.

TISSUES

AG-B-1

Marine Alga

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Specimens of brown algae (*Fucus vesiculosus*) were hand-picked from the coastal area of the Southwest Baltic Sea in the vicinity of a nuclear power plant. After washing with clean seawater and freshwater, the algae were air-dried and ground to pass through a 0.84-mm sieve. The material was then homogenized and bottled in polyethylene containers. AG-B-1 is intended for use as a reference material in measurements of radionuclides in environmental samples of marine plants and other matrices similar to that of the sample.

Activities (mBq/g):

Radionuclide	Activity	Range
^{40}K	798	710 - 832
^{54}Mn	19.7	18.0 - 22.0
^{60}Co	1360	1327 - 1376
^{90}Sr	10.2	9.7 - 11.5
^{99}Tc	11.5	11.1 - 14.7
^{137}Cs	16.7	15.3 - 20.0
^{226}Ra	16.5	15.9 - 19.4
$^{239+240}Pu$	0.066	0.052 - 0.070

Other activities (mBq/g) * :

Radionuclide	Activity	Range
^{228}Ra	16.9	15.5 - 18.3
^{228}Th	7.6	6.7 - 8.6
^{238}Pu	0.0034	0.0030 - 0.0075

Order information:

AG-B-1 can be purchased for US$40 per unit (50 g). Price subject to change after December 1985. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1985) Certified reference material IAEA/Marine alga AG-B-1, information sheet. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

* Values reported in 1985 information sheet. No current information as to validity.

CRM 279

Sea Lettuce

Source:

Community Bureau of Reference
Commission of the European Communities
Directorate General for Science
Research and Development
200 rue de la Loi
B-1049 Brussels
BELGIUM

Description:

Sea lettuce (*ulva lactuca*) collected in saline water is the first of a series of materials of marine origin. Others are scheduled to follow in 1989-1990.

Certified concentrations (µg/g unless noted)* :

Element	Value	Uncertainty (±)
N (mg/g)	(20.8)	
P (mg/g)	(1.80)	
K (mg/g)	(13)	
Cu	13.14	0.37
Zn	51.3	1.2
As	3.09	20
Se	0.593	0.032
Cd	0.274	0.022
I	(154)	
Hg	(0.05)	
Pb	13.48	0.36

Order information:

CRM 279 can be purchased for 1500 BFR per unit (35-g bottle). Price includes handling and normal postage. Price subject to change without notice. Please contact BCR at the address shown above.

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* Values in parenthesis not certified.

Reference:

Community Bureau of Reference (BCR) (1988) Catalogue of BCR reference materials. Community Bureau of Reference, Commission of the European Communities, Directorate General for Science, Research and Development, 200 rue de la Loi, B-1049 Brussels, Belgium. 47pp.

DOLT-1

Dogfish Liver

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

This CRM contains dogfish (*Squalus acanthias*) liver containing 5 % fat. The livers were cleaned and frozen for storage, thawed, homogenized and extracted with acetone to produce a partially defatted protein powder. This powder was screened through a 24 mesh nylon screen, mixed, bottled, and radiation sterilized. A more complete description of the preparation and analysis of DOLT-1 can be found in the NRCC description sheet (1986).

Certified concentrations (μg/g unless noted):

Element	Value	Uncertainty (±)
Na (%)	0.726	0.073
Mg (%)	0.110	0.015
Cl (%)	0.688	0.022
K (%)	1.01	0.10
Cr	0.40	0.07
Mn	8.72	0.53
Fe	712	49
Co	0.157	0.037
Ni	0.26	0.06
Cu	20.8	1.2
Zn	92.5	2.3
As	10.1	1.4

DOLT-1 (cont.)

Element	Value	Uncertainty (±)
Se	7.34	0.42
Cd	4.18	0.28
Hg	0.225	0.037
Pb	1.36	0.29
Methyl Hg	0.080	0.011

Order information:

DOLT-1 can be purchased for US$85 per unit (25 g). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1986) DORM-1 and DOLT-1. Dogfish muscle and liver reference materials for trace metals. Description sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

National Research Council Canada (1988) MACSP Update. Estuarine reference material for trace metals SLEW-1, and MACSP biological tissue reference materials certified for methyl mercury. Information sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

DORM-1

Dogfish Muscle

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

This CRM contains dogfish (*Squalus acanthias*) muscle containing 5 % fat. The muscle was frozen for storage, thawed, homogenized, dried and extracted with acetone to produce a partially defatted protein powder. This powder was screened through a 24 mesh nylon screen, mixed, bottled, and radiation sterilized. A more complete description of the preparation and analysis of DOLT-1 can be found in the NRCC description sheet (1986).

Certified concentrations (μg/g unless noted):

Element	Value	Uncertainty (±)
Na (%)	0.800	0.060
Mg (%)	0.121	0.013
Cl (%)	1.13	0.03
K (%)	1.59	0.10
Cr	3.60	0.40
Mn	1.32	0.26
Fe	63.6	5.3
Co	0.049	0.014
Ni	1.20	0.30
Cu	5.22	0.33
Zn	21.3	1.0
As	17.7	2.1

Element	Value	Uncertainty (±)
Se	1.62	0.12
Cd	0.086	0.012
Hg	0.798	0.074
Pb	0.40	0.12
Methyl Hg	0.731	0.060

Order information:

DORM-1 can be purchased for US$85 per unit (40 g). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1986) DORM-1 and DOLT-1. Dogfish muscle and liver reference materials for trace metals. Description sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

National Research Council Canada (1988) MACSP Update. Estuarine reference material for trace metals SLEW-1, and MACSP biological tissue reference materials certified for methyl mercury. Information sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

EPA QC - FISH

EPA Quality Control Samples

Source:

US Environmental Protection Agency
Quality Assurance Branch
EMSL - Cincinnati
Cincinnati, OH 45268
USA

Description:

This sample is part of the quality control samples prepared, verified, and distributed by EPA as part of their quality assurance program. Component mix and concentration ranges reflect its use in standard EPA analytical procedures. Updates on the availability of these materials can be obtained through the EPA Quality Assurance Newsletter. Contact the Technical Editor of the Newsletter at the address shown above.

Quality control samples:

Pesticides (0.01-3 mg/kg)

- DDD
- DDE
- DDT
- alpha-BHC
- Endrin

Order Information:

At this time (Summer 1989), the solutions are available free of charge. Please contact EPA at the address shown above. The EPA requires that requests for these materials be signed by the laboratory director.

Reference:

Environmental Protection Agency (1989) EPA Newsletter Quality Assurance, 11(1). US Environmental Protection Agency, Cincinnati, OH, USA.

LUTS-1

Non Defatted Lobster Hepatopancreas

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

Freshly frozen "edible grade" lobster tomalley was thawed, homogenized by comminution, and an antioxidant added. The water content was increased and the slurry processed through a high pressure homogenizer. The material was bottled, heat sealed and sterilized. LUTS-1 contains 55 % lipids by weight. A more complete description of the material can be found in Berman and Sturgeon (1988).

Certified concentrations (µg/g unless noted):

Element	As Bottled		Dry Weight	
	Value	Uncertainty (±)	Value	Uncertainty (±)
Mg	89.5	4.1	601	28
K	948	72	6360	480
Ca	203	33	1360	220
Cr	0.079	0.012	0.53	0.08
Mn	1.20	0.13	8.02	0.86
Fe	11.6	0.9	77.8	6.0
Co	0.051	0.006	0.34	0.04
Ni	0.200	0.034	1.34	0.23
Cu	15.9	1.2	107	8
Zn	12.4	0.8	82.9	5.4
As	2.83	0.13	19.0	0.9

Element	As Bottled Value	As Bottled Uncertainty (±)	Dry Weight Value	Dry Weight Uncertainty (±)
Se	0.641	0.054	4.30	0.36
Sr	2.46	0.28	16.5	1.9
Ag	0.580	0.049	3.89	0.33
Cd	2.12	0.15	14.2	1.0
Hg	0.0167	0.0022	0.112	0.015
Pb	0.010	0.002	0.069	0.011
Methyl Hg (as Hg)	0.0094	0.0006	0.063	0.004

Order information:

LUTS-1 can be purchased for US$100 per unit (6 10-g vials). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

Berman, S. S., and R. E. Sturgeon (1988) A new approach to the preparation of biological reference materials for trace metals. Fresenius Z. Anal. Chem., 332(6):546-8.

National Research Council Canada (1989) LUTS-1. Non defatted lobster hepatopancreas reference material for trace metals. Description sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

MA-A-1/OC

Copepod Homogenate

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

MA-A-1/OC is composed of homogenized copepods *(Calanus cristatus)* collected in the Norwegian Sea.

Concentrations (ng/g dry weight):

Compound	Value	Range		
Aldrin	15	0	-	35
Aroclor 1242	120	70	-	170
Aroclor 1254	140	70	-	210
Dieldrin	7	4	-	10
alpha-HCH	10	2.0	-	18
gamma-HCH	8	2	-	14
p,p'-DDD	6	0	-	12
p,p'-DDE	6	1	-	11
p,p'-DDT	8	3	-	13

Order information:

MA-A-1/OC can be purchased for US$40 per unit (30-g bottle). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1982) Final report on intercalibration of organochlorine compound measurements in marine environmental samples. Intercalibration exercises on oyster (MA-M-1/OC), copepod (MA-A-1/OC), and fish (MA-A-2/OC) samples. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-A-1/TM

Copepod Homogenate

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

MA-A-1/TM is composed of homogenized copepods *(Calanus cristatus)* collected in the Norwegian Sea.

Concentrations (µg/g dry weight):

Element	Value	Range
Cr	1.1	0.9 - 1.3
Mn	2.9	2.7 - 3.1
Fe	60	58 - 62
Co	0.12	0.11 - 0.13
Ni	1.9	1.7 - 2.1
Cu	7.6	7.4 - 7.8
Zn	158	156 - 160
As	6.7	6.1 - 7.3
Se	3.0	2.8 - 3.2
Ag	0.33	0.27 - 0.39
Cd	0.75	0.72 - 0.78
Sb	0.07	0.04 - 0.10
Hg	0.28	0.27 - 0.29
Pb	2.1	1.8 - 2.4

Order information:

MA-A-1/TM can be purchased for US$40 per unit (30-g bottle). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1985) Certificate of analysis, reference material MA-A-1/TM (copepod homogenate). International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-A-2/TM

Fish Flesh Homogenate

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

NOT AVAILABLE

Concentrations (µg/g dry weight):

Element	Value	Range		
Cr	1.3	1.2	-	1.4
Mn	0.81	0.77	-	0.85
Fe	54	53	-	55
Co	0.08	0.07	-	0.09
Ni	1.1	0.90	-	1.3
Cu	4.0	3.9	-	4.1
Zn	33	32	-	34
As	2.6	2.5	-	2.7
Se	1.7	1.4	-	2.0
Ag	0.10	0.09	-	0.11
Cd	0.066	0.062	-	0.070
Sb	0.005	0.004	-	0.006
Hg	0.47	0.45	-	0.49
Pb	0.58	0.51	-	0.65

Order information:

MA-A-2/TM can be purchased for US$40 per unit (30 g). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1985) Certificate of analysis, reference material MA-A-2/TM (fish flesh homogenate). International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-A-3/OC

Shrimp Homogenate

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Deep-frozen shrimps (*Penaeus duorarum*) imported from Senegal were collected from a local supplier. The abdomen of each animal was separated from the cephalothorax which was discarded. The cuticle was then removed and only the muscle retained. The soft tissues were frozen and lyophilized. This material was then ground and sieved, to pass through a 150-µm sieve, and homogenized. The material was packaged in glass bottles with aluminum screw caps. A more complete description of this material can be found in the information sheet (IAEA, 1985).

Concentrations (ng/g dry weight):

Compound	Value	Range
Aldrin	0.7	0.2 - 1.2
Aroclor 1254	33	0 - 67
Aroclor 1260	5	2 - 8
HCB	0.32	0.20 - 0.44
Heptachlor	2.4	0.6 - 4.2
alpha-HCH	15	0 - 31
gamma-HCH	3.2	0 - 6.7
p,p'-DDD	0.81	0.05 - 1.57
p,p'-DDE	4.7	1.3 - 8.1
p,p'-DDT	3.2	0 - 6.7

Order information:

MA-A-3/OC can be purchased for US$40 per unit (30-g bottle). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1985) IAEA Intercomparison run MA-A-3/OC, 1985, for the determination of organochlorine compounds in shrimp tissue. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-B-3/OC

Fish

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Garpike fish (*Belone belone*) were collected in the Baltic Sea and filleted. The fillets were frozen and lyophilized. This material was ground and sieved using a 300-µm screen. The fine material was homogenized and packaged in glass bottles with aluminum screw caps. Teflon tape was wound around the cap to minimize contact of the sample with the atmosphere. A more complete description of this material can be found in the information sheet (IAEA, 1985).

Concentrations (ng/g dry weight):

Compound	Value	Range
Aldrin	1.8	0.1 - 3.5
Aroclor 1254	400	170 - 630
Aroclor 1260	390	140 - 640
HCB	1.5	0.9 - 2.1
Dieldrin	5.3	0.5 - 10.1
PCB 101	61	27 - 94
PCB 138	170	124 - 216
PCB 153	130	80 - 180
PCB 180	35	30 - 40
alpha-HCH	10	0 - 24
gamma-HCH	3.4	0 - 7.2
p,p'-DDD	46	13 - 79
p,p'-DDE	160	50 - 270
p,p'-DDT	65	16 - 114

Order information:

MA-B-3/OC can be purchased for US$40 per unit (30-g bottle). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1985) IAEA intercomparison run MA-B-3/OC, 1985, for the determination of chlorinated hydrocarbons in fish tissue. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-B-3/RN

Fish

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Garpike fish (*Belone belone*) were collected in the Baltic Sea and filleted. The fillets were frozen and lyophilized. This material was ground and sieved using a 300-µm screen. The fine material was homogenized and packaged in glass bottles with aluminum screw caps. Teflon tape was wound around the cap to minimize contact of the sample with the atmosphere. A more complete description of this material can be found in the information sheet (IAEA, 1985).

Activities (mBq/g):

Radionuclide	Activity	Range
^{40}K	272	252 - 299
^{137}Cs	14.2	13.7 - 15.3

Order information:

MA-B-3/RN can be purchased for US$40 per unit (30-g bottle). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1985) IAEA intercomparison run MA-B-3/OC, 1985, for the determination of chlorinated hydrocarbons in fish tissue. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-B-3/TM

Fish

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Descripticn:

Garpike fish (*Belone belone*) were collected in the Baltic Sea and filleted. The fillets were frozen and lyophilized. This material was ground and sieved using a 300-µm screen. The fine material was homogenized and packaged in glass bottles with aluminum screw caps. Teflon tape was wound around the cap to minimize contact of the sample with the atmosphere. A more complete description of this material can be found in the information sheet (IAEA, 1985).

Concentrations (µg/g dry weight):

Element	Value	Range
Na	2.16	2.00 - 2.31
Mg	1.13	1.04 - 1.20
P	8.53	7.53 - 9.20
Cl	2.54	2.33 - 2.77
K	9.32	9.00 - 10.0
Ca	3.49	3.18 - 3.60
Mn	2.62	2.22 - 3.03
Fe	95.4	87.3 - 107.2
Cu	3.08	2.85 - 3.57
Zn	109.2	106.4 - 111.9
As	2.11	1.42 - 2.51
Se	1.46	1.35 - 1.70
Br	12.8	10.8 - 15.0
Rb	1.49	1.34 - 2.00
Sr	29.9	24.9 - 37.9
Hg	0.51	0.47 - 0.61
Pb	4.62	3.85 - 5.13

Order information:

MA-B-3/TM can be purchased for US$40 per unit (30-g bottle). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1985) IAEA intercomparison run MA-B-3/OC, 1985, for the determination of chlorinated hydrocarbons in fish tissue. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

MA-M-2/OC

Mussel Tissue

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

Mediterranean mussels (*Mytilus galloprovincialis*) were collected from a local supplier and the soft tissues separated from the shells. The soft tissues were frozen and lyophilized under vacuum (0.1 Torr). The lyophilized tissues were ground, and the fraction of the material that passed through a 150-µm sieve was collected. The residue was reground and sieved, and the resulting powder was combined with the previous fraction and homogenized. This material was packaged in glass bottles with aluminum screw caps. Teflon tape was wound around the seal to minimize contact with the outside atmosphere. A more complete description of this material can be found in the information sheet (IAEA, 1983).

Concentrations (ng/g dry weight):

Compound	Value	Range
Aroclor 1254	590	210 - 970
Aroclor 1260	180	127 - 233
HCB	1	0.4 - 1.6
Dieldrin	2.3	0.8 - 3.8
alpha-HCH	1.6	0.7 - 2.5
gamma-HCH	2.1	1.0 - 3.2
p,p'-DDD	36	21 - 51
p,p'-DDE	37	17 - 57
p,p'-DDT	33	14 - 52

Order information:

MA-M-2/OC can be purchased for US$40 per unit (35 g). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1983) IAEA Intercomparison run MA-M-2/OC, 1983 for determination of chlorinated hydrocarbons in mussel tissue. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

NIES No. 6

Mussel

Source:

National Institute for Environmental Studies
Yatabe-machi
Tsukuba, Ibaraki, 305
JAPAN

Description:

The material was prepared from whole soft parts of reared common mussels (*Mytilus edulis*) (shell length 6-8 cm, average weight 22 g) obtained from Matoya Bay, Mie Prefecture, Japan. The mussels were shucked at the collection site and the soft parts iced and transported to the laboratory. The tissues were washed in distilled water and frozen in a liquid nitrogen bath. The frozen tissue was cryogenically ground, freeze-dried, sieved to pass through a 177-µm screen, blended, bottled in acid-washed glass bottles, and radiation-sterilized. A complete description of the preparation and analysis of this standard can be found in Okamoto and Fuwa (1985).

Certified concentrations (µg/g dry weight unless noted):

Element	Value	Uncertainty (±)
Na (%)	1.00	0.03
Mg (%)	0.21	0.01
K (%)	0.54	0.02
Ca (%)	0.13	0.01
Cr	0.63	0.07
Mn	16.3	1.2
Fe	158	8
Ni	0.93	0.06
Cu	4.9	0.3
Zn	106	6
As	9.2	0.5
Ag	0.027	0.003
Cd	0.82	0.03
Pb	0.91	0.04

Noncertified concentrations (μg/g dry weight unless noted):

Element	Value
Al	220
P (%)	0.77
Co	0.37
Se	1.5
Sr	17
Hg	0.05

Order information:

NIES No. 6 (10-g bottles) can be obtained free of charge. Please contact Dr. K. Okamoto at the address shown above.

Reference:

National Institute for Environmental Studies (1984) NIES certified material, mussel. Information sheet. National Institute for Environmental Studies, Yatabe-machi,Tsukuba, Ibaraki, 305, Japan.

Okamoto, K., and K. Fuwa (1985) Mussel tissue powder, a certified reference material. Analyst, 110:785-789.

NIES No. 9

Sargasso Seaweed

Source:

National Institute for Environmental Studies
Yatabe-machi
Tsukuba, Ibaraki, 305
JAPAN

Description:

This CRM was prepared from sargasso (*Sargassum fulvellum*) collected in Shimoda Bay, Shizouka Prefecture, Japan, in 1984. The sargasso was transported to the laboratory, washed in deionized water, and freeze-dried. This material was then ground, sieved to pass through an 80-mesh screen, blended, and bottled in glass bottles.

Certified concentrations (µg/g dry weight unless noted):

Element	Value	Uncertainty (±)
Na (%)	1.70	0.08
Mg (%)	0.65	0.03
K (%)	6.10	0.20
Ca (%)	1.34	0.05
V	1.0	0.1
Mn	21.2	1.0
Fe	187	6
Co	0.12	0.01
Cu	4.9	0.2
Zn	15.6	1.2
As	115	9
Rb	24	2
Sr (%)	0.100	0.003
Ag	0.31	0.02
Cd	0.15	0.02
Pb	1.35	0.05

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value
Al	215
P (%)	0.26
S (%)	1.2
Cl (%)	5.1
Sc	0.09
Ti	9
Cr	0.2
Se	0.05
Br	270
Sb	0.04
I	520
Cs	0.04
Hg	0.04
U	0.4

Order information:

NIES No. 9 (10-g bottles) can be obtained free of charge. Please contact Dr. K. Okamoto at the address shown above.

Reference:

National Institute for Environmental Studies (1986) NIES certified material, sargasso. Information sheet. National Institute for Environmental Studies, Yatabe-machi,Tsukuba, Ibaraki, 305, Japan.

Okamoto, K. (1988) Preparation and certification of Sargasso seaweed reference material. Mar. Environ. Res., 26:199-207.

NIES No. 11

Fish Tissue

Source:

National Institute for Environmental Studies
Yatabe-machi
Tsukuba, Ibaraki, 305
JAPAN

Description:

This material was prepared from fish fillets of sea bass (*Leteolabrax japonicus*, Cuvier). The fish used were 50-60 cm in length and were collected in Tokyo Bay, Japan. The fish tissue was homogenized, freeze dried and blended. This material was packaged in polyethylene laminate bags with an oxygen absorber and stored at -20°C.

Ongoing Analysis:

NIES No. 11 is currently undergoing certification. Since certification of reference materials requires analytical data obtained using various analytical techniques, NIES is seeking the cooperation of scientists from around the world. NIES is providing 20-g bottles of this material at no cost. This material will be certified for total Sn, tributyltin and triphenyltin.

Order Information:

NIES No. 11 (20-g bottles) can be obtained free of charge. Please contact Dr. K. Okamoto at the address shown above.

Reference:

Okamoto, K. (1989) Personal communication.

RM 50

Albacore Tuna

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description;

Tuna tissue was obtained from albacore tuna caught in the San Diego area in July 1971. The tuna was cleaned, filleted, frozen, and transported to a lyophilization facility. It was thawed, ground, and mixed using stainless-steel equipment. The material was then lyophilized in aluminum trays lined with polyethylene. After lyophilization, the material was ground, transferred to polyethylene bags, and canned under nitrogen for storage. Preliminary studies raised serious problems about homogeneity. Consequently, the material was reground, reblended, and recanned under the conditions described above. During the second regrinding, fibrous material tended to "float" to the top of the mixer. This material was discarded.

Concentrations (μg/g dry weight unless noted):

Element	Probable Value	Uncertainty (±)
Na (%) *	0.11	NA[Δ]
K (%) *	1.22	NA
Mn *	1.3	NA
Zn	13.6	1
As	3.3	0.4
Se	3.6	0.4
Hg[◊]	0.95	0.1
Pb	0.46	NA

* Value measured in the original lot of tuna.

[Δ] Not available.

[◊] One investigator reported a decrease of Hg content with time after the container of RM-50 was opened, approximately 0.1 μg/g over a period of 3 weeks while stored at -25°C. Other investigators suggest that 80-90% of the Hg is present as methylmercury.

Isotopic Pb composition:

Isotope	Percent
^{208}Pb	52.2
^{207}Pb	21.5
^{206}Pb	24.9
^{204}Pb	1.38

Identification and approximate quantitation of major isolated organic constituents (µg/g dry weight):

Compound [∞]	Amount present
Heptadiene (?)	0.6
Toluene	0.7
Limonene	0.4
2-Nonanone (?)	0.7
2-Undecanone (?)	0.1
2,6-di-*t*-butyl-*p*-cresol	1.0
Hexadecane	trace
Heptadecane	trace
Pristane	0.03

Order information:

RM 50 can be purchased for US$103 per unit (2 35-g cans of lyophilized tuna tissue in polyethylene bags). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1977) Research material 50. Albacore tuna. Report of investigation. National Bureau of Standards, Gaithersburg, MD.

[∞] Identification followed by a (?) is probable but not definite.

SP-M-1/OC

Sea Plant

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P.O. Box 100
A-1400 Vienna
AUSTRIA

Description:

This material is composed of homogenized sea plant (*Posidonia oceanica*) collected on the Mediterranean coast.

Concentrations (ng/g dry weight):

Compound	Value	Range
Aldrin	200	0 - 470
Aroclor 1254	170	80 - 260
Dieldrin	10	6 - 14
alpha-HCH	1.6	0 - 3.3
gamma-HCH	17	12.2 - 21.8
p,p'-DDD	5.8	3.4 - 8.2
p,p'-DDE	7.2	4.2 - 10.2
p,p'-DDT	20	7 - 33

Order information:

SP-M-1/OC can be purchased for US$40 per unit (30-g bottle). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1976) Intercalibration of organichlorine compound measurements in marine environmental samples. Progress report no. 1, Intercalibration of analytical methods on marine environmental samples. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

International Atomic Energy Agency (1978) Trace element measurements on sea plant (SP-M-1) and copepod (MA-A-1) (Supplement). Progress report no. 19, Intercalibration of analytical methods on marine environmental samples. November 1978. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

International Atomic Energy Agency (1989) AQCS (Analytical Quality Control Services) Intercomparison Runs Reference Materials 1989. Catalog, 68pp. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

SRM 1566a

Oyster Tissue

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Oysters were obtained by the Food and Drug Administration (USA) Bureau of Shellfish Sanitation from a commercial source. The oysters had been shucked, frozen, and packaged in sealed plastic bags. The oyster material was ground, freeze-dried, and powdered at the US Army Natick Research and Development Command, Natick, Massachusetts, USA. At NIST, preliminary material homogeneity analysis indicated that an improvement in homogeneity would be required. The material was freeze-dried a second time at Natick, and then cryogenically ground, blended, and bottled at NIST. Homogeneity of the material was assessed by analyzing various elements by NAA and AAS in samples taken from a random selection of bottles.

Certified concentrations (µg/g dry weight unless noted):

Element	Value	Uncertainty (±)
Na (%)	0.51	0.03
Mg (%)	0.128	0.009
K (%)	0.969	0.005
Ca (%)	0.15	0.02
V	2.3	0.1
Cr	0.69	0.27
Mn	17.5	1.2
Fe	195	34
Ni	1.03	0.19
Cu	63.0	3.5
Zn	852	14
As	13.4	1.9
Se	2.1	0.5
Rb	4.45	0.09
Sr	10.36	0.56
Ag	0.89	0.09
Cd	3.5	0.4
Hg	0.057	0.015
Pb	0.48	0.04
U	0.116	0.006

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value
F	5.2
P (%)	0.81
S (%)	0.76
Cl (%)	1.0
Co	0.4
Br	55
Mo	≤ 0.2
I	2.8
Tl	≤ 0.005
Th	0.1

Order information:

SRM 1566 can be purchased for US$112 per unit (30-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1983) SRM 1566. Oyster tissue. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD.

SRM 1572

Citrus Leaves

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Although this SRM is not of marine origin, it is one of the "classic" standards that has been used for many years, and is included here for reference purposes.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)
Na	160	20
Mg (%)	0.58	0.03
Al	92	15
P (%)	0.13	0.02
S (%)	0.407	0.009
K (%)	1.82	0.06
Ca (%)	3.15	0.10
Cr	0.8	0.2
Mn	23	2
Fe	90	10
Ni	0.6	0.3
Cu	16.5	1.0
Zn	29	2
As	3.1	0.3
Rb	4.84	0.06
Sr	100	2
Mo	0.17	0.09
Cd	0.03	0.01
I	1.84	0.03
Ba	21	3
Hg	0.08	0.02
Pb	13.3	2.4

Order information:

SRM 1572 can be purchased for US$126 per unit (70-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1985) SRM 1572. Citrus leaves. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD, USA.

SRM 1577a

Bovine Liver

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

Although this SRM is not of marine origin, it is one of the "classic" standards that has been used for many years and is included here for reference purposes. The livers for this SRM were obtained in Portland, Oregon, USA. The gross fat, major blood vessels, and "skin" were removed and the liver ground. This ground material was mixed, transferred to polyethylene-lined trays, and lyophilized. After lyophilization, the liver was powdered, packed in moisture-proof bags, and transported to the National Bureau of Standards.

Certified concentrations (μg/g dry weight unless noted):

Element	Value	Uncertainty (±)
Na (%)	0.243	0.013
Mg	600	15
P (%)	1.11	0.04
S (%)	0.78	0.01
Cl (%)	0.28	0.01
K (%)	0.996	0.007
Ca	120	7
V	0.099	0.008
Mn	9.9	0.8
Fe	194	20
Co	0.21	0.05
Cu	158	7
Zn	123	8
As	0.047	0.006
Se	0.71	0.07
Rb	12.5	0.1
Sr	0.138	0.003
Mo	3.5	0.5
Ag	0.04	0.01
Cd	0.44	0.006
Hg	0.004	0.002

Element	Value	Uncertainty (±)
Pb	0.135	0.015
U	0.00071	0.00003

Noncertified concentrations (µg/g dry weight unless noted):

Element	Value
N (%)	10.7
Al	2
Br	9
Sb	0.003
Tl	0.003

Order information:

SRM 1577a can be purchased for US$146 per unit (50-g bottle). Price subject to change without notice. Please contact NIST at the address shown above.

Reference:

National Bureau of Standards (1985) SRM 1577a. Bovine liver. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD.

TORT-1

Lobster Hepatopancreas

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

Freshly frozen "edible grade" lobster tomalley from Prince Edward Island, Canada, was purchased from a commercial source. The material was wrapped in plastic, packaged in waxed cardboard boxes, and stored at -30° C to inhibit degradation prior to processing. The tomalley was thawed, homogenized, and spray-dried. The oil was removed by extraction with acetone and vacuum-dried. The material was then mixed in a blender, screened to pass through a 1.4 mm polyethylene sieve, reblended and bottled. The bottled material was radiation-sterilized. A more complete description of the material can be found in NRCC description sheets (1983, 1987).

Certified concentrations (µg/g unless noted):

Element	Value	Uncertainty (±)
Na (%)	3.67	0.20
Mg (%)	0.255	0.025
P (%)	0.879	0.021
S (%)	1.22	0.10
Cl (%)	5.58	0.10
K (%)	1.041	0.040
Ca (%)	0.895	0.058
V	1.4	0.3
Cr	2.4	0.6
Mn	23.4	1.0
Fe	186	11
Co	0.42	0.05
Ni	2.3	0.3
Cu	439	22
Zn	177	10
As	24.6	2.2

TORT-1 (cont.)

Element	Value	Uncertainty (±)
Se	6.88	0.47
Sr	113	5
Mo	1.5	0.3
Cd	26.3	2.1
Sn	0.139	0.011
Hg	0.33	0.06
Pb	10.4	2.0
Methyl Hg	0.128	0.014

Order information:

TORT-1 can be purchased for US$65 per unit (35 g). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1983) Lobster hepatopancreas, marine reference material for trace metals and other elements, description sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

National Research Council Canada (1987) TORT-1. Lobster hepatopancreas marine reference material for trace metals and other elements. Description sheet (rev. 1987). National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

National Research Council Canada (1988) MACSP Update. Estuarine reference material for trace metals SLEW-1, and MACSP biological tissue reference materials certified for methyl mercury. Information sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

WATERS

CASS-2

Nearshore Seawater

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, Ontario K1A OR9
CANADA

Description:

Seawater was collected in the outer part of the Halifax Harbor, Canada, at a depth of 5 m in water 25-40 m deep, 400-800 meters offshore, using modified 12-liter Go-Flo bottles coated with Teflon. The salinity was 29.2 $^{o}/_{oo}$ and the total dissolved organic carbon content was 0.5 mg/L. The seawater was immediately filtered through 0.45-µm porosity filters, acidified to pH 1.6 with ultrapure nitric acid and transferred to 50-liter acid-leached polypropylene carboys previously conditioned with ultrapure water acidified to pH 1.6. The seawater was then homogenized in an acid-leached and pH-conditioned 800-liter polyethylene tank in a clean room at the NRCC Division of Chemistry facilities in Ottawa, Canada, and immediately bottled in acid-cleaned 2-liter polyethylene bottles. A more complete description of the preparation and analysis of CASS-2 can be found in the NRCC description sheet (1989). Seawater for CASS-2 was collected in the same location as that used for CASS-1.

Reliable concentrations (µg/L):

Element	Value	Uncertainty (±)
Cr	0.121	0.016
Mn	1.99	0.15
Fe	1.20	0.12
Co	0.025	0.006
Ni	0.298	0.036
Cu	0.675	0.039
Zn	1.97	0.12
As	1.01	0.07
Mo	9.01	0.28
Cd	0.019	0.004
Pb	0.019	0.006

Order information:

CASS-2 can be purchased for US$125 per unit (2-L bottle). Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1989) CASS-2. Nearshore seawater reference material for trace metals. Description sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

CSK-Nutrient Elements

Nutrient Elements

Source:

Sagami Chemical Research Center
Nishi-Ohnuma 4-4-1
Sagamihara-shi 229
JAPAN

Available from:

Wako Chamicals USA
1600 Bellwood Rd.
Richmond, VA 23237
USA

Wako Chemicals GmbH
Nissanstr. 2, 4040 Neuss 1
WEST GERMANY

Wako Pure Chemical Industries Ltd.
1-2, Doshomachi 3-Chome
Chuo-Ku, Osaka
JAPAN

Description:

The standard solutions of nutrient elements, phosphate-P, nitrite-N, nitrate-N, and silicate-Si, for chemical analysis by spectrophotometer were prepared by Wako under the supervision of the Sagami Chemical Research Center of Japan. The solutions have the highest accuracy and stability possible, and the concentrations cover the whole range of values found in seawater. The solutions were sealed in bottles or glass ampoules and sterilized. These standard solutions were used in the Cooperative Study of the Kuroshio and Adjacent Regions (CSK) Program of UNESCO/IOC, 1965-1979, and in other programs.

Concentrations (µg-at/L):

Element	Concentration	Solution
PO_4-P	0.00	30.5% NaCl
	0.05	
	1.00	
	2.00	
	3.00	

Element	Concentration	Solution
NO_2-N	0.00	Water
	0.25	
	0.50	
	1.00	
	2.00	
NO_3-N	0.0	30.5% NaCl
	5.0	
	10.0	
	15.0	
	20.0	
	30.0	
	40.0	
SiO_2-Si	0.0	30.5% NaCl
	5.0	(adjusted to pH 3 with H_2SO_4)
	10.0	
	25.0	
	50.0	
	100	
	150	
	200	

Order information:

The CSK nitrate, nitrite and silicate standard solutions can be purchased for US$34 per unit (50-mL bottle); and the silicate phosphate solution for US$30.50 per unit (50-mL bottle) from Wako USA. The silicate solution is bottled in high density polyethylene bottles. Price subject to change without notice. Prices from Wako West Germany and Wako Japan not available.

References:

Ambe, M., J. Kajiwara, T. Yoshihara, and K. Sugawara (1975) Preparation of the standard solutions of nitrate and their application to seawater and freshwater. J. Oceanogr. Soc. Japan, 31:85-92.

Ambe, M. (1978) Note of the experience in the preparation of CSK standard solutions and the ICES-SCOR Intercalibration Experiment, 1969-1970. Mar. Chem., 6:171-8.

Sagami Chemical Research Center (1988?) General guide to the use of CSK standard solutiona, No.1. Sagami Chemical Research Center, Sagamihara, Kanagawa Prefecture, Japan.

IAPSO Standard Seawater

Standard Seawater for Conductivity Measurements

Source:

Ocean Scientific International Ltd.
Brook Road, Wormley, Godalming
Surrey GU8 5UB
UNITED KINGDOM

Description:

The seawater for this reference material is collected from the North Atlantic in large quantities. It is transported and stored in polyethylene containers until it is filtered through 0.3-µm filters and transferred into PVC-lined tanks. Further filtration through activated carbon and irradiation with ultraviolet light reduce dissolved organic material and microbial degradation. The seawater is then slowly diluted with distilled water until a salinity of approximately 35 ‰ is achieved. The seawater is then sealed in 280-mL prewashed glass ampoules. Approximately 7,000 ampoules are produced in each batch. The seawater is then calibrated in accordance with the recommendations of the UNESCO, ICES, SCOR, IAPSO Joint Panel in Oceanographic Tables and Standards.

Certified values:

Conductivity ratios relative to a defined KC1 solution at 15°C are available for each batch of seawater. The conductivity ratios vary from lot to lot and are printed on the label of the ampoules.

Standard	Approx. salinity (‰)	Ampoule (mL)
Normal seawater (P-series)	35	280
Low salinity standard seawater (30L series)	30	280
Low salinity standard seawater (10L series)	10	280
Atlantic seawater (GP S1)	35	5000

Order Information:

The high salinity materials can be purchased from Ocean Scientific International Ltd., Wormley, for 7.5£ British Sterling, and the low salinity materials for 8.5£ British Sterling plus freight and packaging. Please contact Ocean International at the address shown above.

Reference:

Ridout, P (1989) Personal communication.

NASS-2

Open Ocean Seawater

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

Seawater (35.07 $^{o}/_{oo}$ salinity) for NASS-1 and NASS-2 was collected in the North Atlantic at a depth of 1300 m, southeast of Bermuda (32° 10' N, 64° 30' W) using acid-leached modified 12-liter Go-Flo bottles coated with Teflon and an unlubricated type 302 stainless-steel hydrowire from the research vessel PANULIRUS II. The sampling bottles proved to be a significant source of contamination. The seawater was acidified to pH 1.6 immediately after collection with ultrapure nitric acid and stored in acid-cleaned 50-liter polypropylene carboys previously conditioned with ultrapure water acidified to pH 1.6. The seawater was then homogenized in an acid-leached and pH-conditioned 800-liter polyethylene tank in a clean room at the NRCC Division of Chemistry facilities in Ottawa, Canada, and immediately bottled in acid-cleaned 2-liter polyethylene bottles. Within the precision of the measurements for 11 trace elements for NASS-1, no significant change in sample composition could be discerned over the 530-day storage period described in Berman *et al.* (1983). The effect of storage on the concentrations of the 11 elements will continue to be monitored until the supply of NASS-1 is exhausted. Further details of the handling, storage, and analytical procedures can be found in Berman *et al.* (1983).

Reliable concentrations (µg/L):

Element	Value	Uncertainty (±)
Cr	0.175	0.010
Mn	0.022	0.007
Fe	0.224	0.034
Co	0.004	0.001
Ni	0.257	0.027
Cu	0.109	0.011
Zn	0.178	0.025
As	1.65	0.19
Se (IV)	0.024	0.004

Element	Value	Uncertainty (±)
Mo	11.5	1.9
Cd	0.029	0.004
Pb	0.039	0.006
U	3.00	0.025

Order information:

NASS-2 can be purchased for US$125 per unit (2-L bottle). Price subject to change without notice. Please contact NRCC at the address above.

References:

Berman, S.S., R.E. Sturgeon, J.A.H. Desaulniers, and A.P. Mykytiuk (1983) Preparation of the sea water reference material for trace metals, NASS-1. Mar. Pollut. Bull., 14(2):69-73.

National Research Council Canada (1986) Seawater reference material for trace metals, NASS-2, description sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

SLEW-1

Estuarine Water

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, ON K1A OR9
CANADA

Description:

The water for SLEW-1 was collected in the St. Lawrence River estuary at 5 m depth, several kilometers upriver from Ole aux Coudres, and 50 km below the mixing zone. The salinity was 11.6 $^{o}/_{oo}$ and the total dissolved organic carbon content was 1.2 mg/L. The water was peristaltically pumped through cleaned polyethylene-lined ethyl vinyl acetate tubing and 0.45 µm porosity acrylic copolymer filters. It was immediately acidified to pH 1.6 with ultrapure nitric acid during transfer to 50-liter acid leached polypropylene carboys previously conditioned with pH 1.6 ultrapure water. The estuarine water was later refiltered through 0.2 µm porosity acrylic copolymer filters into an 800-liter polyethylene tank in a clean room at the Division of Chemistry in Ottawa. A more complete description of the preparation and analysis of SLEW-1 can be found in the NRCC description sheet (1989).

Reliable concentrations (µg/L):

Element	Value	Uncertainty (±)
Cr	0.139	0.016
Mn	13.1	0.8
Fe	2.08	0.34
Co	0.046	0.007
Ni	0.743	0.078
Cu	1.76	0.09
Zn	0.86	0.15
As	0.765	0.093
Cd	0.018	0.003
Pb	0.028	0.007

Order information:

SLEW-1 can be purchased for US$125 per unit (2-L bottle). Price subject to change without notice. Please contact NRCC at the address above.

References:

National Research Council Canada (1982) Seawater reference material for trace metals, NASS-1, description sheet. National Research Council Canada, Division of Chemistry, Ottawa, K1A 0R6, Canada.

SLRS-1

River Water

Source:

National Research Council of Canada
Marine Analytical Chemistry Standards Program
Division of Chemistry
Montreal Road
Ottawa, Ontario K1A OR9
CANADA

Description:

Riverine water was collected in the St. Lawrence River at the 2-3 meter level, several kilometers upstream of Quebec City, and about 30-40 kilometers upriver of the mixing zone. The dissolved organic carbon content is 4.6 mg/L. The water was filtered through a 0.45-µm porosity filter during collection and acidified immediately with nitric acid to pH 1.6. The water was later refiltered through 0.2-µm porosity filters, blended and bottled in 2-liter polyethylene bottles. A more complete description of the preparation and analysis of SLRS-1 can be found in the NRCC description sheet (1986).

Reliable concentrations (µg/L unless noted):

Element	Value	Uncertainty (+)
Na (mg/L)	10.4	0.6
Mg (mg/L)	5.99	0.28
Al	23.5	1.2
K (mg/L)	1.30	0.20
Ca (mg/L)	25.1	0.9
V	0.66	0.09
Cr	0.36	0.04
Mn	1.77	0.23
Fe	31.5	2.1
Co	0.043	0.010
Ni	1.07	0.06
Cu	3.58	0.30
Zn	1.34	0.20
As	0.55	0.08
Sr	136	3
Mo	0.78	0.04
Cd	0.015	0.002
Sb	0.63	0.05

SLRS-1 (cont.)

Element	Value	Uncertainty (+)
Ba	22.2	1.7
Pb	0.106	0.011
U	0.28	0.03

Order Information:

SLRS-1 can be purchased for US$125 per unit (1-liter bottle), or $285 per three units. Price subject to change without notice. Please contact NRCC at the address above.

Reference:

National Research Council Canada (1986) SLRS-1. Riverine water reference material for trace metals. Description sheet. National Research Council Canada, Marine Analytical Standards Program, Ottawa, Canada.

SRM 2694

Simulated Rainwater

Source:

National Institute of Standards and Technology
Office of Standard Reference Materials
Gaithersburg, MD 20899
USA

Description:

This SRM was prepared by dissolution of high-purity salts and acids in high-purity distilled deionized water. Two pH levels are provided. Further information on the preparation and analysis of this SRM can be found in Koch, 1986.

Certified values/concentrations (mg/L unless noted):

	pH 4.3		pH 3.59	
Elements/Parameters	Value	Uncertainty (±)	Value	Uncertainty (±)
pH at 25°C	4.3	0.02	3.59	0.02
Specific conductance (µS/cm at 25°C)	26	2	130	2
Acidity (meq/L)	0.050	0.002	0.284	0.005
Flouride	0.054	0.002	0.098	0.007
Chloride	0.24	NA*	1.0	NA
Nitrate	0.501	0.026	7 06	0.15
Sulfate	2.69	0.03	10.8	0.1
Sodium	0.205	0.009	0.419	0.015
Potassium	0.052	0.007	0.106	0.008
Ammonium	NA	NA	1.0	NA
Calcium	0.014	0.003	0.049	0.011
Magnesium	0.024	0.002	0.051	0.003

Order information:

SRM 2694 can be purchased for US$196 per unit (set of 4 5-ml vials). Price subject to change without notice. Please contact NIST at the address shown above.

* Not available.

Reference:

National Bureau of Standards (1985) SRM 2694. Simulated rainwater. Certificate of analysis. National Bureau of Standards, Gaithersburg, MD.

Koch, W. F. (1986) Standard refenrence materials: methods and procedures used at the National Bureau of Standards to prepare, analyze, and certify SRM 2694, simulated rainwater, and recommendations for use. NBS Spec. Pub. 260-106, PB-86-247483. 66pp. National Bureau of Standards, Gaithersburg, MD.

V-SMOW

Water

Source:

International Atomic Energy Agency
Analytical Quality Control Service
Laboratory Seibersdorf
P. O. Box 100
A-1400 Vienna
AUSTRIA

Description:

This is an international stable isotope reference material for mass spectrometric determination of isotope ratios in natural waters.

Certified values:

Values are available for $^{18}O/^{16}O$ and $^{2}H/^{1}H$ ratios at natural levels.

Order information:

V-SMOW can be purchased for US$40 per unit (30 mL). Price subject to change after Summer 1989. The price includes handling, postage (surface mail in Europe, airmail elsewhere), and insurance. Please contact IAEA at the address shown above.

Reference:

International Atomic Energy Agency (1985) Analytical Quality control Service Programme. Intercomparison runs, certified reference materials, reference materials. 1986-87. LAB/243. International Atomic Energy Agency, Laboratory Seibersdorf, P.O. Box 100, A-1400 Vienna, Austria.

INDICES

Index of elements with associated reference materials and matrices

ASH	- Ashes
INST	- Instrument performance
OIL	- Oils
ROCK	- Rocks
SED	- Sediments
SLUD	- Sludges
TISS	- Tissues
WAT	- Waters

Ag	ASH	NIES No. 8
		SRM 1648
		SRM 1649
	INST	EPA QC - ELEM
		SRM 610
		SRM 611
		SRM 612
		SRM 613
		SRM 614
		SRM 615
		SRM 1643b
		SRM 3151
		SRM 3172
	TISS	LUTS-1
		MA-A-1/TM
		MA-A-2/TM
		NIES No. 6
		NIES Nc. 9
		SRM 1566a
		SRM 1577a
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	MAG-1
		SL-1
Al	ASH	CRM 176
		NIES No. 8
		SRM 1633a
		SRM 1648
		SRM 2689
		SRM 2690
		SRM 2691
	INST	EPA QC - ELEM
		SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
		SRM 3101
		SRM 3171
		SRM 3174
	OIL	SRM 1634b
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		IPT 28
		IPT 32
		IPT 35
		IPT 42
		IPT 44
		IPT 48
		Nod-A-1
		Nod-P-1
		QLO-1
		RGM-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SL-3
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	NIES No. 6
		NIES No. 9
		SRM 1572
		SRM 1577a
	WAT	SLRS-1
As	ASH	CRM 038
		CRM 176
		NIES No. 8
		SRM 1633a
		SRM 1648
		SRM 1649
	INST	EPA QC - ELEM
		SRM 1643b
		SRM 3103
		SRM 3172
		SRM 3175
	OIL	SRM 1634b
	ROCK	AGV-1
		BHVO-1

		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SL-3
		SRM 1646
	SLUD	CRM 144
	TISS	CRM 279
		DOLT-1
		DORM-1
		LUTS-1
		MA-A-1/TM
		MA-A-2/TM
		MA-B-3/TM
		NIES No. 6
		NIES No. 9
		RM50
		SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
	WAT	CASS-2
		NASS-2
		SLEW-1
		SLRS-1
Au	INST	SRM 610
		SRM 611
		SRM 612
		SRM 613
		SRM 614
		SRM 615
		SRM 616
		SRM 617
		SRM 3121
		SRM 3174
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	MAG-1
		SL-1
B	INST	CRM 127
		EPA QC - ELEM
		SRM 610
		SRM 611
		SRM 612
		SRM 613
		SRM 614
		SRM 615
		SRM 616
		SRM 617
		SRM 1643b
		SRM 1875
		SRM 3107
		SRM 3173
		SRM 3174
		SRM 3176
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		SRM 278
		STM-1
		W-2
	SED	MAG-1
		SL-1
Ba	ASH	SRM 1633a
		SRM 1648
		SRM 1649
		SRM 2689
		SRM 2690
		SRM 2691
	INST	EPA QC - ELEM
		SRM 1643b
		SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
		SRM 3104
		SRM 3172
	OIL	SRM 1634b
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		Nod-A-1
		Nod-P-1
		QLO-1
		RGM-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	MAG-1
		SL-1
	TISS	SRM 1572
	WAT	SLRS-1
Be	ASH	SRM 1633a
	INST	EPA QC - ELEM
		SRM 1643b
		SRM 3105
		SRM 3171
		SRM 3174
		SRM 3175
		SRM 3176
	ROCK	AGV-1
		ASK-2

		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		SRM 1646
Bi	INST	SRM 1643b
		SRM 3106
		SRM 3173
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	MAG-1
		SL-1
Br	ASH	NIES No. 8
		SRM 1648
		SRM 1649
	INST	CRM 071
		CRM 073
	ROCK	AGV-1
		BHVO-1
		BIR-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		STM-1
		W-2
	SED	MAG-1
		NIES No. 2
		SL-1
		SL-3
	TISS	MA-B-3/TM
		NIES No. 9
		SRM 1566a
		SRM 1577a
C	INST	CRM 034
		CRM 035
		CRM 036
		CRM 071
		CRM 072
		CRM 073
		CRM 127
		CRM 183
	ROCK	ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		PACS-1
	ROCK	SRM 88b
		SRM 278
		SRM 688
Ca	ASH	CRM 176
		NIES No. 8
		SRM 1633a
		SRM 2689
		SRM 2690
		SRM 2691
	INST	EPA QC - ELEM
		SRM 3109
		SRM 3172
	OIL	SRM 1634b
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		IPT 28
		IPT 32
		IPT 35
		IPT 42
		IPT 44
		IPT 48
		Nod-A-1
		Nod-P-1
		QLO-1
		RGM-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SL-3
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	LUTS-1
		MA-B-3/TM
		NIES No. 6
		NIES No. 9
		SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
	WAT	SLRS-1

Cd	ASH	CRM 038
		CRM 176
		NIES No. 8
		SRM 1633a
		SRM 1648
		SRM 1649
	INST	EPA QC - ELEM
		SRM 1643b
		SRM 3108
		SRM 3171
		SRM 3174
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	CRM 279
		DOLT-1
		DORM-1
		LUTS-1
		MA-A-1/TM
		MA-A-2/TM
		NIES No. 6
		NIES No. 9
		SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
	WAT	CASS-2
		NASS-2
		SLEW-1
		SLRS-1
Ce	ASH	NIES No. 8
		SRM 1633a
		SRM 1648
		SRM 1649
	INST	SRM 612
		SRM 613
		SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
		SRM 3110
		SRM 3173
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	MAG-1
		SL-1
		SL-3
		SRM 1646
Cl	ASH	SRM 1648
		SRM 1649
	INST	CRM 034
		CRM 071
		CRM 072
		CRM 073
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		PACS-1
		SL-1
	TISS	DOLT-1
		DORM-1
		MA-B-3/TM
		NIES No. 9
		SRM 1566a
		SRM 1577a
		TORT-1
Co	ASH	CRM 038
		CRM 176
		NIES No. 8
		SRM 1633a
		SRM 1648
		SRM 1649
	INST	EPA QC - ELEM
		SRM 610
		SRM 611
		SRM 612
		SRM 613
		SRM 614
		SRM 615
		SRM 1643b
		SRM 3113
		SRM 3172
	OIL	SRM 1634b
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		Nod-A-1
		Nod-P-1
		QLO-1
		RGM-1
		SARM 46
		SARM 51

		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	DOLT-1
		DORM-1
		LUTS-1
		MA-A-1/TM
		MA-A-2/TM
		NIES No. 6
		NIES No. 9
		SRM 1566a
		SRM 1577a
		TORT-1
	WAT	CASS-2
		NASS-2
		SLEW-1
		SLRS-1
Cr	ASH	CRM 038
		CRM 176
		NIES No. 8
		SRM 1633a
		SRM 1648
		SRM 1649
	INST	EPA QC - ELEM
		SRM 1643b
		SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
		SRM 3112
		SRM 3171
	OIL	SRM 1634b
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		G-2
		QLO-1
		RGM-1
		SARM 46
		SARM 51
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	DOLT-1
		DORM-1
		LUTS-1
		MA-A-1/TM
		MA-A-2/TM
		NIES No. 6
		NIES No. 9
		SRM 1566a
		SRM 1572
		TORT-1
	WAT	CASS-2
		NASS-2
		SLEW-1
		SLRS-1
Cs	ASH	NIES No. 8
		SRM 1633a
		SRM 1648
		SRM 1649
	INST	SRM 3111
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		SL-1
		SL-3
		SRM 1646
	TISS	NIES No. 9
Cu	ASH	CRM 038
		CRM 176
		NIES No. 8
		SRM 1633a
		SRM 1648
	INST	CRM 183
		EPA QC - ELEM
		SRM 610
		SRM 611
		SRM 612
		SRM 613
		SRM 614
		SRM 615
		SRM 616
		SRM 617
		SRM 1643b
		SRM 3114
		SRM 3172
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2

		Nod-A-1
		Nod-P-1
		RGM-1
		QLO-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	CRM 279
		DOLT-1
		DORM-1
		LUTS-1
		MA-A-1/TM
		MA-A-2/TM
		MA-B-3/TM
		NIES No. 6
		NIES No. 9
		SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
	WAT	CASS-2
		NASS-2
		SLEW-1
		SLRS-1
Dy	INST	SRM 3115
		SRM 3176
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	MAG-1
		SL-1
		SL-3
Er	INST	SRM 3116
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	MAG-1
Eu	ASH	NIES No. 8
		SRM 1633a
		SRM 1648
		SRM 1649
	INST	SRM 612
		SRM 613
		SRM 614
		SRM 615
		SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
		SRM 3117
		SRM 3176
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	MAG-1
		SL-1
		SL-3
		SRM 1646
F	INST	CRM 073
		CRM 183
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	MAG-1
	TISS	SRM 1566a
Fe	ASH	CRM 038
		CRM 176
		SRM 1633a
		SRM 1648
		SRM 1649
		SRM 2689
		SRM 2690
		SRM 2691
	INST	EPA QC - ELEM
		SRM 610
		SRM 611
		SRM 612
		SRM 613
		SRM 614
		SRM 615
		SRM 616

		SRM 617
		SRM 1643b
		SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
		SRM 3126
		SRM 3171
		SRM 3174
	OIL	SRM 1634b
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		IPT 28
		IPT 32
		IPT 35
		IPT 42
		IPT 44
		IPT 48
		Nod-A-1
		Nod-P-1
		QLO-1
		RGM-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	DOLT-1
		DORM-1
		LUTS-1
		MA-A-1/TM
		MA-A-2/TM
		MA-B-3/TM
		NIES No. 6
		NIES No. 9
		SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
	WAT	CASS-2
		NASS-2
		SLEW-1
		SLRS-1
Ga	ASH	SRM 1633a
	INST	SRM 614
		SRM 615
		SRM 616
		SRM 617
		SRM 3119
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	MAG-1
		SL-1
Gd	INST	SRM 612
		SRM 613
		SRM 3118
		SRM 3176
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		SRM 278
		STM-1
		W-2
	SED	MAG-1
		SL-1
Ge	INST	SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
		SRM 3120
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		SRM 1646
H	INST	CRM 034
		CRM 035
		CRM 036
		CRM 071
		CRM 072
		CRM 073
		CRM 127
		CRM 183
	ROCK	SGR-1
	SED	MAG-1
Hf	ASH	SRM 1633a
		SRM 1648
		SRM 1649

	INST	SRM 3122
		SRM 3174
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	MAG-1
		SL-1
		SL-3

Hg	ASH	CRM 038
		CRM 176
		SRM 1633a
	INST	CRM 036
		EPA QC - ELEM
		SRM 1641b
		SRM 1642b
		SRM 3133
		SRM 3173
	OIL	SRM 1634b
	SED	BCSS-1
		MESS-1
		NIES No. 2
		PACS-1
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	CRM 279
		DOLT-1
		DORM-1
		LUTS-1
		MA-A-1/TM
		MA-A-2/TM
		MA-B-3/TM
		NIES No. 6
		NIES No. 9
		RM50
		SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	MAG-1
		SL-1

Ho	INST	SRM 3123
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	MAG-1
		SL-1

I	ASH	SRM 1648
	INST	CRM 072
	ROCK	AGV-1
		G-2
	SED	MAG-1
		SL-1
	TISS	CRM 279
		NIES No. 9
		SRM 1566a
		SRM 1572

In	ASH	SRM 1648
	INST	SRM 3124
	ROCK	AGV-1
		BHVO-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
	SED	MAG-1
		SL-1

Ir	ROCK	BHVO-1
		BIR-1
		DNC-1
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
	SED	MAG-1
		SL-1

K	ASH	CRM 176
		NIES No. 8
		SRM 1633a
		SRM 1648
		SRM 2689
		SRM 2690
		SRM 2691
	INST	EPA QC - ELEM
		SRM 610
		SRM 611
		SRM 612
		SRM 613
		SRM 614
		SRM 615
		SRM 616
		SRM 617
		SRM 3141
		SRM 3171
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2

		IPT 28
		IPT 32
		IPT 35
		IPT 42
		IPT 44
		IPT 48
		Nod-A-1
		Nod-P-1
		QLO-1
		RGM-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SL-3
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	CRM 279
		DOLT-1
		DORM-1
		LUTS-1
		MA-B-3/TM
		NIES No. 6
		NIES No. 9
		RM50
		SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
	WAT	SLRS-1
La	ASH	NIES No. 8
		SRM 1648
		SRM 1649
	INST	SRM 612
		SRM 613
		SRM 614
		SRM 615
		SRM 616
		SRM 617
		SRM 3127
		SRM 3175
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	MAG-1
		NIES No. 2
		SL-1
		SL-3
Li	INST	SRM 1875
		SRM 3129
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		SRM 97b
		SRM 98b
		STM-1
		W-2
	SED	MAG-1
		SL-1
		SRM 1646
Lu	ASH	NIES No. 8
	INST	SRM 3130
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	MAG-1
		SL-1
		SL-3
Mg	ASH	CRM 176
		NIES No. 8
		SRM 1633a
		SRM 1648
		SRM 2689
		SRM 2690
		SRM 2691
	INST	EPA QC - ELEM
		SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
		SRM 3131
		SRM 3171
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		IPT 28
		IPT 32
		IPT 35
		IPT 42
		IPT 44
		IPT 48
		Nod-A-1
		Nod-P-1
		QLO-1

		RGM-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		PACS-1
		SL-1
		SL-3
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	DOLT-1
		DORM-1
		LUTS-1
		MA-B-3/TM
		NIES No. 6
		NIES No. 9
		SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
	WAT	SLRS-1
Mn	ASH	CRM 038
		CRM 176
		SRM 1633a
		SRM 1648
		SRM 2689
		SRM 2690
		SRM 2691
	INST	EPA QC - ELEM
		SRM 610
		SRM 611
		SRM 612
		SRM 613
		SRM 1643b
		SRM 3132
		SRM 3171
	OIL	SRM 1634b
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		IPT 35
		IPT 44
		IPT 48
		Nod-A-1
		Nod-P-1
		QLO-1
		RGM-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	DOLT-1
		DORM-1
		LUTS-1
		MA-A-1/TM
		MA-A-2/TM
		MA-B-3/TM
		NIES No. 6
		NIES No. 9
		RM50
		SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
	WAT	CASS-2
		NASS-2
		SLEW-1
		SLRS-1
Mo	ASH	NIES No. 8
		SRM 1633a
		SRM 1649
	INST	EPA QC - ELEM
		SRM 1643b
		SRM 3134
		SRM 3175
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		Nod-A-1
		Nod-P-1
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		PACS-1
		SL-1
		SRM 1646
	TISS	SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
	WAT	CASS-2
		NASS-2
		SLRS-1
N	INST	CRM 035
		CRM 036
		CRM 071
		CRM 072
		CRM 073
		CRM 127
	ROCK	BHVO-1
		G-2

	SED	MAG-1
	TISS	CRM 279
		SRM 1577a
Na	ASH	CRM 038
		CRM 176
		NIES No. 8
		SRM 1633a
		SRM 1648
		SRM 2689
		SRM 2690
		SRM 2691
	INST	EPA QC - ELEM
		SRM 3152
		SRM 3171
	OIL	SRM 1634b
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		IPT 28
		IPT 32
		IPT 35
		IPT 42
		IPT 44
		IPT 48
		Nod-A-1
		Nod-P-1
		QLO-1
		RGM-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SL-3
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	DOLT-1
		DORM-1
		MA-B-3/TM
		NIES No. 6
		NIES No. 9
		RM50
		SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
	WAT	SLRS-1
Nb	INST	SRM 3137
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	MAG-1
Nd	INST	SRM 3135
		SRM 3176
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
		W-2
	SED	MAG-1
		SL-1
		SL-3
Ni	ASH	CRM 038
		CRM 176
		NIES No. 8
		SRM 1633a
		SRM 1648
	INST	EPA QC - ELEM
		SRM 610
		SRM 611
		SRM 612
		SRM 613
		SRM 614
		SRM 615
		SRM 1643b
		SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
		SRM 3136
		SRM 3171
	OIL	SRM 1634b
	ROCK	AGV-1
		ASK-2
		BHVO-1
		BIR-1
		DNC-1
		G-2
		Nod-A-1
		Nod-P-1
		QLO-1
		RGM-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2

		PACS-1
		SL-1
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	DOLT-1
		DORM-1
		LUTS-1
		MA-A-1/TM
		MA-A-2/TM
		NIES No. 6
		SRM 1566a
		SRM 1572
		TORT-1
	WAT	CASS-2
		NASS-2
		SLEW-1
		SLRS-1
O	INST	CRM 034
		CRM 036
		CRM 071
		CRM 072
		SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
	ROCK	AGV-1
		G-2
		QLO-1
		RGM-1
		SCo-1
	SED	MAG-1
Os	ROCK	AGV-1
		BHVO-1
		G-2
		QLO-1
		RGM-1
		SCo-1
		SDC-1
		SGR-1
		STM-1
	SED	MAG-1
P	ASH	CRM 176
		NIES No. 8
		SRM 2689
		SRM 2690
		SRM 2691
	INST	CRM 183
		SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
		SRM 3139
		SRM 3173
		SRM 3175
	ROCK	AGV-1
		BHVO-1
		BIR-1
		DNC-1
		G-2
		IPT 28
		IPT 32
		IPT 35
		IPT 42
		IPT 44
		IPT 48
		Nod-A-1
		Nod-P-1
		QLO-1
		RGM-1
		SARM 46
		SARM 51
		SARM 52
		SCo-1
		SDC-1
		SGR-1
		SRM 88b
		SRM 97b
		SRM 98b
		SRM 278
		SRM 688
		STM-1
		W-2
	SED	BCSS-1
		MAG-1
		MESS-1
		NIES No. 2
		PACS-1
		SL-1
		SRM 1646
	SLUD	CRM 144
		CRM 145
		CRM 146
	TISS	CRM 279
		MA-B-3/TM
		NIES No. 6
		NIES No. 9
		SRM 1566a
		SRM 1572
		SRM 1577a
		TORT-1
Pb	ASH	CRM 038
		CRM 176
		NIES No. 8
		SRM 1633a
		SRM 1648
	INST	CRM 035
		EPA QC - ELEM
		SRM 610
		SRM 611
		SRM 612
		SRM 613
		SRM 614
		SRM 615
		SRM 616
		SRM 617
		SRM 1643b
		SRM 1871
		SRM 1872
		SRM 1873
		SRM 1874
		SRM 1875
		SRM 3128
		SRM 3172
		SRM 3174
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		G-2
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		BIR-1
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		Nod-A-1
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Isophorone	INST	E052 EPA QC - ORG
Isosafrole	INST	E499
Kepone	INST	E573
Limonene	TISS	RM50
Linuron	INST	P14-04
m-Chlorobenzoic acid	INST	SRM 2144
m-Cresol	INST	E251
m-Nitroaniline	INST	E325
m-Xylene	INST	E202 EPA QC - ORG
Malathion	INST	P12-05
Malononitrile	INST	E337
MCPA (2-ethylhexyl ester)	INST	P13-14
MCPA (acid)	INST	P13-07
MCPA (2-butoxyethyl ester)	INST	P13-16
MCPB (acid)	INST	P13-08
Mecarbam	INST	P12-06
Mecoprop	INST	P13-09
Mecoprop (2-butoxyethyl ester)	INST	P13-15
Methacrylonitrile	INST	E686
Methane	GAS	SRM 1658a SRM 1659a SRM 1660a
Methidathion	INST	P12-07
Methyl bromide	INST	E044
Methyl ethyl ketone	INST	E311
Methyl mercury chloride	INST	P15-02
Methyl methacrylate	INST	E439
Methyl methanesulfonate	INST	E431
Methyl parathion	INST	E572
Methyl stearate	INST	SRM 1543
Methyl thiouracil	INST	E378
Methylene chloride	INST	E042
Mirex	INST	E219
Monuron	INST	P14-05
N,N-Dimethylformamide	INST	E548
n-Butylbenzene	INST	E1105
n-Butylbenzene	INST	EPA QC - ORG
N-Nitroso-N-methyl ethylamine	INST	E974

N-Nitrosodi-n-propylamine	INST	E061
		EPA QC - ORG
N-Nitrosodiethylamine	INST	E334
N-Nitrosodimethylamine	INST	E059
N-Nitrosodiphenylamine	INST	E060
N-Nitrosomorpholine	INST	E485
N-Nitrosopyrrolidine	INST	E298
n-Nonadecane	INST	E244
n-Pentadecane	INST	E241
n-Propylbenzene	INST	E1112
		EPA QC - ORG
n-Tridecane	INST	E239
n-Undecane	INST	E237
Naphthalene	INST	E053
		EPA QC - ORG
		SRM 1586
		SRM 1647a
	SED	SES-1
Naphthalene-d8	INST	SRM 1586
Nicotine	INST	E519
Nicotinic acid	INST	SRM 148
Nitrobenzene	INST	E054
		EPA QC - ORG
		SRM 1586
Nitrobenzene-d5	INST	SRM 1586
o,p'-DDE	INST	P11-09
o,p'-DDT	INST	P11-11
o,p'-TDE	INST	P11-26
o-Bromobenzoic acid	INST	SRM 2142
o-Cresol	INST	E250
	OIL	SRM 1582
o-Nitroaniline	INST	E324
o-Toluidine hydrochloride	INST	E503
o-Xylene	GAS	SRM 1804
	INST	E201
		EPA QC - ORG
p,p'-DDD	INST	E092
		P11-27
	SED	SD-M-1/OC
	TISS	MA-A-1/OC
		MA-A-3/OC
		MA-B-3/OC
		MA-M-2/OC
		SP-M-1/OC
p,p'-DDD (olefin)	INST	P11-29
p,p'-DDE	INST	E091
		EPA QC - ORG
		P11-10
		SRM 1583
	SED	SD-M-1/OC
	TISS	MA-A-1/OC

		MA-A-3/OC
		MA-B-3/OC
		MA-M-2/OC
		SP-M-1/OC
p,p'-DDT	INST	E124
		EPA QC - ORG
		P11-12
		SRM 1583
	SED	SD-M-1/OC
	TISS	MA-A-1/OC
		MA-A-3/OC
		MA-B-3/OC
		MA-M-2/OC
		SP-M-1/OC
p,p'-Methoxychlor	INST	E952
		EPA QC - ORG
p-Cresol	INST	E252
p-Cymene	INST	EPA QC - ORG
p-Dimethylaminoazobenzene	INST	E429
p-Dioxane	INST	E480
p-Fluorobenzoic acid	INST	SRM 2143
p-Nitroaniline	INST	E342
p-Phenylenediamine	INST	E275
p-Xylene	INST	E203
		EPA QC - ORG
Paraquat chloride	INST	P16-22
PCB 4	INST	P16-07

PCB 7	INST	CRM 289
PCB 15	INST	CLB-1
PCB 18	INST	CLB-1
		EPA QC - ORG
PCB 20	INST	CRM 290
PCB 23	INST	E222
PCB 28	INST	CRM 291
		EPA QC - ORG
	OIL	CRM 349
		CRM 350
PCB 31	INST	CLB-1
PCB 35	INST	CRM 292
PCB 40	INST	CLB-1
PCB 44	INST	CLB-1
		EPA QC - ORG
PCB 49	INST	CLB-1
PCB 52	INST	CLB-1
		CRM 293
		EPA QC - ORG
	OIL	CRM 349
		CRM 350
PCB 54	INST	CLB-1
PCB 60	INST	CLB-1
PCB 66	INST	EPA QC - ORG

PCB 77	INST	CLB-1	PCB 138	INST	CLB-1
		EPA QC - ORG			EPA QC - ORG
PCB 86	INST	CLB-1		OIL	CRM 349
					CRM 350
PCB 87	INST	CLB-1		TISS	MA-B-3/OC
PCB 101	INST	CLB-1	PCB 141	INST	CLB-1
		CRM 294	PCB 143	INST	CLB-1
		EPA QC - ORG			
	OIL	CRM 349	PCB 151	INST	CLB-1
		CRM 350			
	TISS	MA-B-3/OC	PCB 153	INST	CLB-1
					CRM 297
PCB 103	INST	CLB-1			EPA QC - ORG
				OIL	CRM 349
PCB 105	INST	CLB-1			CRM 350
		EPA QC - ORG		TISS	MA-B-3/OC
PCB 114	INST	CLB-1	PCB 154	INST	CLB-1
PCB 118	INST	CLB-1	PCB 156	INST	CLB-1
		CRM 295			
		EPA QC - ORG	PCB 159	INST	CLB-1
	OIL	CRM 349			
		CRM 350	PCB 170	INST	CLB-1
					EPA QC - ORG
PCB 121	INST	CLB-1			
			PCB 171	INST	CLB-1
PCB 126	INST	EPA QC - ORG			
			PCB 173	INST	CLB-1
PCB 128	INST	CLB-1			
		EPA QC - ORG	PCB 180	INST	CLB-1
					CRM 298
PCB 129	INST	CLB-1			EPA QC - ORG
				OIL	CRM 349
PCB 137	INST	CRM 296			CRM 350
		CLB-1		TISS	MA-B-3/OC

PCB 182	INST	CLB-1
PCB 183	INST	CLB-1
PCB 185	INST	CLB-1
PCB 187	INST	CLB-1
PCB 189	INST	CLB-1
PCB 191	INST	CLB-1
PCB 194	INST	CLB-1
PCB 195	INST	CLB-1 EPA QC - ORG
PCB 196	INST	CLB-1
PCB 200	INST	CLB-1
PCB 201	INST	CLB-1
PCB 202	INST	CLB-1
PCB 203	INST	CLB-1
PCB 205	INST	CLB-1
PCB 206	INST	CLB-1 EPA QC - ORG
PCB 207	INST	CLB-1
PCB 208	INST	CLB-1
PCB 209	INST	CLB-1 EPA QC - ORG
PCN Halowax 1000	INST	E472
PCN Halowax 1001	INST	E471
PCN Halowax 1099	INST	E470
Pentachlorobenzene	INST	E260 EPA QC - ORG
Pentachloroethane	INST	EPA QC - ORG E300
Pentachloronitrobenzene	INST	E156 P11-25
Pentachlorophenol	INST	E062 EPA QC - ORG P16-23 SRM 1584
Pentachlorophenol-13C6	INST	E191
Perylene	ASH	SRM 1649 SRM 1650
	OIL	SRM 1582
Phenacetin	INST	E295
Phenanthrene	ASH	SRM 1649 SRM 1650
	INST	E079 EPA QC - ORG SRM 1647a
	OIL	SRM 1582
	SED	SES-1
Phenanthrene-d10	INST	E063

Phenol		E188
		EPA QC - ORG
		SRM 1584
		SRM 1586
	OIL	SRM 1582
Phenol-d5	INST	E189
		SRM 1586
Phthalic anhydride	INST	E293
Picloram	INST	E713
Piperonyl butoxide	INST	P16-25
Pirimicarb	INST	P16-26
Pristane	TISS	RM50
Prometryn	INST	P16-27
Propane	GAS	SRM 1660a
		SRM 1665b
		SRM 1666b
		SRM 1667b
		SRM 1668b
		SRM 1669b
		SRM 2645a
		SRM 2646a
		SRM 2647a
		SRM 2648a
		SRM 2649
		SRM 2650
		SRM 2651
		SRM 2652
Propargyl alcohol	INST	E543
Propionic acid	INST	E673

Propionitrile	INST	E338
Propoxur	INST	P16-28
Pyrene	ASH	SRM 1649
		SRM 1650
	INST	CRM 177
		E082
		EPA QC - ORG
		SRM 1647a
	OIL	SRM 1582
	SED	SES-1
Pyridine	INST	E271
Reserpine	INST	E559
Resorcinol	INST	E700
Saccharin	INST	E369
Safrole	INST	E366
sec-Butylbenzene	INST	E1104
		EPA QC - ORG
Simazine	INST	P16-29
Styrene	INST	E257
t-Butylbenzene	INST	E1106
		EPA QC - ORG
Tecnazene	INST	P11-30
Terbutryn	INST	P16-30
Tetrachloroethylene	GAS	SRM 1804

		SRM 1808
		SRM 1809
		SRM 1813
		SRM 1814
		SRM 1912
	INST	E083
		SRM 1639
Tetradecane	INST	E240
		EPA QC - ORG
Thioacetamide	INST	E513
Thiourea	INST	E294
Thiram	INST	E379
Toluene	GAS	SRM 1804
		SRM 1811
		SRM 1812
	INST	E084
		EPA QC - ORG
	TISS	RM50
Toxaphene	INST	E111
		EPA QC - ORG
trans-1,2-Dichloroethylene	INST	E028
		EPA QC - ORG
trans-1,3-Dichloropropylene	INST	E218
trans-Permethrin	INST	P17-02
Trichlorodibenzo-p-dioxin	INST	SRM 1614
Trichlorodibenzo-p-dioxin-13C12	INST	SRM 1614
Trichloroethylene	GAS	SRM 1804
	INST	E085
		SRM 1639
Trichlorofluoromethane	GAS	SRM 1804
	INST	E047
		EPA QC - ORG
Tricosane	INST	EPA QC - ORG
Trietazine	INST	P16-31
Triphenylene	ASH	SRM 1649
	INST	CRM 270
Urea	INST	SRM 2141
Urethane	INST	E306
Vinyl acetate	INST	E327
Vinyl chloride	GAS	SRM 1804
		SRM 1813
		SRM 1814
	INST	E536