

SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

Product Identifier

SRM Number: 4915f
SRM Name: Cobalt-60 Radioactivity Standard
Other Means of Identification: Not applicable.

Recommended Use of This Material and Restrictions of Use

This Standard Reference Material (SRM) is intended primarily for the calibration of instruments that are used to measure radioactivity and for the monitoring of radiochemical procedures. A unit of SRM 4915f consists of approximately 5 mL of 1.1 M (3.9 %) hydrochloric acid solution in which a certified amount of Cobalt-60 is dissolved.

Company Information

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2. HAZARDS IDENTIFICATION

Radiological Hazard

Warning: THIS MATERIAL SHOULD ONLY BE USED BY PERSONS QUALIFIED TO HANDLE RADIOACTIVE MATERIAL!

This product contains licensed radioactive material and is therefore subject to the requirements of 10 CFR Part 20 (e.g., public and occupational exposure limits, waste disposal). At a minimum, the basic radiation safety principles of time, distance, and shielding, and appropriate radiation contamination control should be practiced to avoid/minimize any external and/or internal exposure. Consult with your Radiation Safety office for your facility's radiation safety requirements/precautions specific to the radionuclide(s) (including its activity and chemical/physical form) in this Radioactive SRM.

SRM 4915f is a radioactive material, Cobalt-60, with a massic activity of approximately 58 kBq·g⁻¹ in hydrochloric acid. Cobalt-60 decays by beta-particle emission to excited levels of Ni-60. During the decay process X-rays and gamma rays with energies from approximately 1 keV to 2505 keV are emitted.

Classification

Physical Hazard: There are no known physical hazards associated with this material.

Health Hazard: Skin Corrosion/Irritation Category 1B
Serious Eye Damage/Irritation Category 1

Label Elements

Symbol



Signal Word
DANGER

Hazard Statement(s)
H314 Causes severe skin burns and eye damage.

Precautionary Statement(s)

| | |
|----------------|--|
| P260 | Do not breathe fumes, mists, vapors, or spray. |
| P264 | Wash hands thoroughly after handling. |
| P280 | Wear protective gloves, protective clothing, and eye protection. |
| P301+P330+P331 | If swallowed: Rinse mouth. Do NOT induce vomiting. |
| P303+P361+P353 | If on skin (or hair): Remove immediately all contaminated clothing. Rinse skin with water. |
| P304+P340 | If inhaled: Remove person to fresh air and keep comfortable for breathing. |
| P305+P351+P338 | If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| P310 | Immediately call a doctor. |
| P363 | Wash contaminated clothing before reuse. |
| P405 | Store locked up. |
| P501 | Dispose of contents and container according to local regulations. |

Hazards Not Otherwise Classified: None.

Ingredients(s) with Unknown Acute Toxicity: None.

3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Substance: Cobalt-60 in 1.1 M Hydrochloric Acid.

Other Designations:

Hydrochloric Acid: Muriatic acid, chlorohydric acid, hydrochloride.

Cobalt-60: Not applicable.

Components are listed in compliance with OSHA's 29 CFR 1910.1200; for the actual values see the NIST Certificate.

| Hazardous Component(s) | CAS Number | EC Number (EINECS) | Nominal Mass Concentration (%) |
|-----------------------------------|-------------------|-------------------------------|---|
| Hydrochloric Acid | 7647-01-0 | 231-595-7 | 3.9 |
| Cobalt-60 | Not applicable | Not applicable | 0.00000007 |
| Non-Hazardous Component(s) | | | |
| Water | 7732-18-5 | 231-791-2 | >96 |

4. FIRST AID MEASURES

Description of First Aid Measures:

Inhalation: If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration or oxygen by qualified personnel. Seek immediate medical attention.

Skin Contact: Rinse affected area with copious amounts of water followed by washing with soap and water for at least 15 minutes while removing contaminated clothing. Seek medical attention, if needed.

Eye Contact: Immediately flush eyes, including under the eyelids with copious amounts of water for at least 30 minutes. Seek immediate medical attention.

Ingestion: Contact a poison control center immediately for instructions. Wash out mouth with water, but do not induce vomiting. Seek medical aid at once, and bring the container or label.

Most Important Symptoms/Effects, Acute and Delayed: Acid burns to skin and eyes.

Indication of any immediate medical attention and special treatment needed, if necessary: If any of the above symptoms are present, seek immediate medical attention.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Negligible fire hazard. See Section 9, “Physical and Chemical Properties” for flammability properties.

Extinguishing Media:

Suitable: Use extinguishing media appropriate to the surrounding fire.

Unsuitable: None listed.

Specific Hazards Arising from the Chemical: Hydrogen chloride.

Special Protective Equipment and Precautions for Fire-Fighters: Avoid inhalation of material or combustion byproducts. Wear full protective clothing and NIOSH approved self-contained breathing apparatus (SCBA).

NFPA Ratings: (0 = Minimal; 1 = Slight; 2 = Moderate; 3 = Serious; 4 = Severe)

Health = 3

Fire = 0

Reactivity = 0

6. ACCIDENTAL RELEASE MEASURES

This material is radioactive. DO NOT touch spilled material. Immediately notify safety personnel of a spill.

Personal Precautions, Protective Equipment, Methods and Materials for Containment and Clean up:

Radiological Emergency Procedures:

The following is a guide for first responders. The following actions, including remediation, should be carried out by qualified individuals. In cases where a life-threatening injury occurs concurrent with personal contamination, treat the injury first.

Do not touch damaged packages or spilled material. Handle as a radioactive material spill. In addition to those actions described below, the guidelines in the Emergency Response Guidebook (ERG) provide more specific measures that should be followed.

Spill and Leak Control:

Alert and clear everyone from the area affected by the spill.

Take actions to limit the spread of contamination.

Summon aid.

Damage to the Radioactive Source:

Evacuate the immediate vicinity around the source.

Place a barrier at a safe distance from the source.

Identify area as a radiation hazard.

Suggested Emergency Protective Equipment:

Gloves

Footwear Covers

Outer layer or easily removed protective clothing (as situation requires)

7. HANDLING AND STORAGE

Safe Handling Precautions and Storage: **This material is radioactive.** Store and handle in accordance with all current regulations and standards. See NRC 10 CFR 20 or state regulations. See Section 8, “Exposure Controls and Personal Protection”.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits:

Cobalt-60:

ALI_{inh}: 200 µCi or 7.4 MBq. See NRC 10 CFR 20 Appendix B

ALI_{ing}: 500 µCi or 18.5 MBq.

OSHA: See OSHA 29 CFR and NRC 10 CFR 20.

ACGIH: See International Commission on Radiological Protection guidelines

Hydrochloric Acid:

NIOSH (REL): 7 mg/m³; 5 ppm (Ceiling)
75 mg/m³; 50 ppm (IDLH)

ACGIH (TLV): 3 mg/m³; 2 ppm (Ceiling)

OSHA (PEL): 7 mg/m³; 5 ppm (Ceiling)

Engineering Controls: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

Personal Protection: In accordance with OSHA 29 CFR 1910.132, subpart I, wear appropriate Personal Protective Equipment (PPE) to minimize exposure to this material.

Respiratory Protection: If workplace conditions warrant a respirator, a respiratory protection program that meets OSHA 29CFR 1910.134 must be followed. Refer to NIOSH 42 CFR 84 for applicable certified respirators.

Eye/Face Protection: Wear splash resistant safety goggles with a face shield. An eye wash station should be readily available near areas of use.

Skin and Body Protection: Wear protective clothing to prevent contact with skin. Wear appropriate gloves.

9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|--|---------------------------------------|
| Descriptive Properties: | Hydrochloric Acid (3.9 % of this SRM) |
| Appearance (physical state, color, etc.): | colorless to yellow liquid |
| Molecular Formula: | HCl |
| Molar Mass (g/mol): | 36.46 |
| Odor: | not available |
| Odor threshold: | not available |
| pH: | <2 |
| Evaporation rate: | >1 |
| Melting point/freezing point (°C): | not available |
| Relative Density (g/L) as specific gravity (water = 1): | 1 - 1.2 |
| Vapor Pressure (mmHg): | not applicable |
| Vapor Density (air = 1): | 0.7 (water) |
| Viscosity (cP): | 14 mmHg at 20 °C |
| Solubility(ies): | not available |
| Partition coefficient (n-octanol/water): | not available |
| Particle Size: | not applicable |
| Thermal Stability Properties: | |
| Autoignition Temperature (°C): | not applicable |
| Thermal Decomposition (°C): | not applicable |
| Initial boiling point and boiling range (°C): | not available |
| Explosive Limits, LEL (Volume %): | not applicable |
| Explosive Limits, UEL (Volume %): | not applicable |
| Flash Point (°C): | not applicable |
| Flammability (solid, gas): | not applicable |

10. STABILITY AND REACTIVITY

Reactivity: This material is stable at normal temperatures and pressure.

Stability: X Stable Unstable

Possible Hazardous Reactions: None listed.

Conditions to Avoid: Avoid contact with combustible materials and incompatible materials.

Incompatible Materials: Cyanides, metals, amines, bases, metal carbide, oxidizing materials, acids, halo carbons, combustible materials, halogens, metal salts.

Fire/Explosion Information: See Section 5, "Fire Fighting Measures".

Hazardous Decomposition: Hydrogen chloride.

Hazardous Polymerization: Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Exposure: X Inhalation X Skin X Ingestion

Symptoms Related to the Physical, Chemical and Toxicological Characteristics: Burning pain and severe corrosive skin damage. Permanent eye damage including blindness could result.

Potential Health Effects (Acute, Chronic and Delayed):

Inhalation: Hydrochloric acid, if inhaled, can damage the mucous membranes and respiratory tract. Short term exposure may cause irritation and inflammation of the upper respiratory tract, coughing, choking, sore throat, shortness of breath, headache, dizziness, and nausea. Long term exposure to acid fumes may cause damage to teeth, bronchial irritation, chronic cough, bronchial pneumonia, and gastrointestinal disturbances.

Skin Contact: Hydrochloric acid can cause severe skin burns. Severity of the damage depends on the concentration and duration of exposure. Effects of acid burns may be delayed.

Eye Contact: Hydrochloric acid can cause severe eye irritation, corneal burns, permanent eye damage, or blindness. Severity of the damage depends on the concentration and duration of exposure.

Ingestion: Ingestion of this material is unlikely under normal conditions of use. If ingested, Hydrochloric acid can cause severe burns and damage to the gastrointestinal tract.

Numerical Measures of Toxicity:

Acute Toxicity:

Hydrochloric acid, Rat, Inhalation LC50: 3124 ppm (1 h)
Rat, Oral LD50: 238 - 277 mg/kg

Skin Corrosion/Irritation: This SRM contains 3.9 % Hydrochloric acid and it is classified as Category 1.

Serious Eye Damage/Eye Irritation: This SRM contains 3.9 % Hydrochloric acid and it is classified as Category 1.

Respiratory Sensitization: No data available.

Skin Sensitization: No data available.

Germ Cell Mutagenicity: No data available.

Carcinogenicity: No data available.

Listed as a Carcinogen/Potential Carcinogen Yes X No
Hydrochloric acid is not listed by NTP, IARC or OSHA as a carcinogen.

Radiological Hazard: Cobalt-60
Ionizing radiation is a known carcinogen.

Reproductive Toxicity: Not classified.

Hydrochloric acid: Rat, Inhalation TCLO: 450 mg/kg (1 h, prior to copulation 1 d)

Specific Target Organ Toxicity, Single Exposure: No data available.

Specific Target Organ Toxicity, Repeated Exposure: No data available.

Aspiration Hazard: No data available.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data:

Component: Hydrochloric Acid

Fish Toxicity: Mosquitofish (*Gambusia affinis*) LC50 (static): 282 mg/L (96 h)

Invertebrate: Shore crab (*Carcinus maenas*) LC50 (mortality): 240 mg/L (48 h)

Component: Cobalt-60

No ecotoxicity data listed.

Persistence and Degradability: No data available.

Bioaccumulative Potential: No data available.

Mobility in Soil: No data available.

Other Adverse Effects: No data available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: This material is radioactive. Dispose in accordance with all applicable federal, state, and local regulations for **RADIOACTIVE** materials. See NRC 10 CFR 20 subpart K.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA:

Primary Risk: UN2910, Radioactive Material Excepted Package, Hazard Class 7, Packing Group III, Excepted Quantity E2.

Subsidiary Risk: Hydrochloric Acid.

15. REGULATORY INFORMATION

U.S. Regulations:

CERCLA Sections 102a/103 (40 CFR 302.4): Hydrochloric acid, 5000 lbs (2270 kg) final RQ.

SARA Title III Section 302 (40 CFR 355.30): Hydrochloric acid, 500 lbs (227 kg) TPQ (gas only).

SARA Title III Section 304 (40 CFR 355.40): Hydrochloric acid, 5000 lbs (2270 kg) EPCRA RQ (gas only).

SARA Title III Section 313 (40 CFR 372.65): Hydrochloric acid, 1.0 % de minimis concentration
(acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size).

OSHA Process Safety (29 CFR 1910.119): Not regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

| | |
|-----------------|------|
| ACUTE HEALTH: | Yes. |
| CHRONIC HEALTH: | No. |
| FIRE: | No. |
| REACTIVE: | No. |
| PRESSURE: | No. |

State Regulations:

California Proposition 65: No components are regulated.

U.S. TSCA Inventory: Hydrochloric acid listed.

TSCA 12(b), Export Notification: No components are listed.

Canadian Regulations:

WHMIS Information: Not provided for this material.

16. OTHER INFORMATION

Issue Date: 16 June 2015

Sources: ChemAdvisor, Inc., SDS *Hydrochloric Acid*, 15 December 2014.

CDC; NIOSH; *NIOSH Pocket Guide to Chemical Hazards*; Department of Health and Human Services (DHHS), Centers for Disease Control and Prevention (CDC), National Institute for Safety and Health; *Hydrochloric Acid*, 18 November 2010; available at <http://www.cdc.gov/niosh/npg/npgd0447.html> (accessed Apr 2015).

United States National Library of Medicine, Hazardous Substance Database (HSDB), *Hydrochloric Acid*; available at <http://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm> (accessed Apr 2015).

OSHA 29 CFR, Subpart Z, Ionizing radiation, 1910.1096.

NRC 10 CFR 20, Standards for Protection Against Radiation.

DOT 49 CFR 173, Shippers General Requirements for Shipments and Packages.

Key of Acronyms:

| | | | |
|--------|---|-------|---|
| ACGIH | American Conference of Governmental Industrial Hygienists | NIOSH | National Institute for Occupational Safety and Health |
| ALI | Annual Limit on Intake | NIST | National Institute of Standards and Technology |
| CAS | Chemical Abstracts Service | NRC | Nuclear Regulatory Commission |
| CEN | European Committee for Standardization | NTP | National Toxicology Program |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act | OSHA | Occupational Safety and Health Administration |
| CFR | Code of Federal Regulations | PEL | Permissible Exposure Limit |
| CPSU | Coal Mine Dust Personal Sample Unit | RCRA | Resource Conservation and Recovery Act |
| DOT | Department of Transportation | REL | Recommended Exposure Limit |
| EC50 | Effective Concentration, 50 % | RM | Reference Material |
| EINECS | European Inventory of Existing Commercial Chemical Substances | RQ | Reportable Quantity |
| EPCRA | Emergency Planning and Community Right-to-Know Act | RTECS | Registry of Toxic Effects of Chemical Substances |
| IARC | International Agency for Research on Cancer | SARA | Superfund Amendments and Reauthorization Act |
| IATA | International Air Transportation Agency | SCBA | Self-Contained Breathing Apparatus |
| IDLH | Immediately Dangerous to Life and Health | SRM | Standard Reference Material |
| ISO | International Organization for Standardization | STEL | Short Term Exposure Limit |
| LC50 | Lethal Concentration, 50 % | TDLo | Toxic Dose Low |
| LD50 | Lethal Dose, 50 % | TLV | Threshold Limit Value |
| LEL | Lower Explosive Limit | TPQ | Threshold Planning Quantity |
| MSDS | Material Safety Data Sheet | TSCA | Toxic Substances Control Act |
| NFPA | National Fire Protection Association | TWA | Time Weighted Average |
| MSHA | Mine Safety and Health Administration | UEL | Upper Explosive Limit |
| | | WHMIS | Workplace Hazardous Materials Information System |

Disclaimer: Physical and chemical data contained in this SDS are provided only for use in assessing the hazardous nature of this material. The SDS was prepared carefully, using current references; however, NIST does not certify the data in the SDS. The certified values for this material are given in the NIST Certificate.

Users of this SRM should ensure that the SDS in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 948-3730; e-mail srmmsds@nist.gov; or via the Internet at <http://www.nist.gov/srm>.