

## SAFETY DATA SHEET

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### 1. SUBSTANCE AND SOURCE IDENTIFICATION

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**Product Identifier****SRM Number:** 4927g**SRM Name:** Hydrogen-3 Radioactivity Standard**Other Means of Identification:** Not applicable.**Recommended Use of This Material and Restrictions of Use**

This Standard Reference Material (SRM) consists of a solution of tritiated water ( $^3\text{H}$  labeled oxidane) having a standardized and certified quantity of radioactive hydrogen-3 in a suitably stable and homogeneous matrix. It 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 4927g consists of approximately 5 mL of tritiated water in a flame-sealed borosilicate-glass ampoule.

**Company Information**

National Institute of Standards and Technology  
Standard Reference Materials Program  
100 Bureau Drive, Stop 2300  
Gaithersburg, Maryland 20899-2300

Telephone: 301-975-2200

FAX: 301-948-3730

E-mail: SRMMSDS@nist.gov

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

Emergency Telephone ChemTrec:

1-800-424-9300 (North America)

+1-703-527-3887 (International)

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### 2. HAZARDS IDENTIFICATION

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**Radiological Hazard**

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

SRM 4927g is a radioactive material, Hydrogen-3, with a massic activity of approximately  $544 \text{ kBq}\cdot\text{g}^{-1}$  in water. Hydrogen-3 decays by beta-particle emission. During the process no photons are emitted.

**Classification****Physical Hazard:** There are no known physical hazards associated with this material.**Health Hazard:** Not classified.**Label Elements****Symbol:** No symbol/No pictogram.**Signal Word:** No signal word.**Hazard Statement(s):** Not applicable.**Precautionary Statement(s):** Not applicable.**Hazards Not Otherwise Classified:** None.**Ingredients(s) with Unknown Acute Toxicity:** None.

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### 3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

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**Substance:** Hydrogen-3 in water.**Other Designations:** Tritium.

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

| Non-Hazardous Component(s) | CAS Number | EC Number (EINECS) | Nominal Mass Concentration (%) |
|----------------------------|------------|--------------------|--------------------------------|
| Water                      | 7732-18-5  | 231-791-2          | >99                            |
| Hydrogen-3                 | 10028-17-8 | 233-070-8          | 0.000 000 1                    |

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#### 4. FIRST AID MEASURES

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##### 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:** Not applicable.

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

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#### 5. FIRE FIGHTING MEASURES

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**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:** No information available.

**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 = 0

Fire = 0

Reactivity = 0

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#### 6. ACCIDENTAL RELEASE MEASURES

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**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)

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**7. HANDLING AND STORAGE**

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**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".

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**8. EXPOSURE CONTROLS AND PERSONAL PROTECTION**

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**Exposure Limits:****Hydrogen-3**

ALI<sub>inh</sub>: 8.00E+04 µCi or 2.96 GBq (See NRC 10 CFR 20 Appendix B)

ALI<sub>ing</sub>: 8.00E+04 µCi or 2.96 GBq

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

ACGIH: See International Commission on Radiological Protection guidelines

**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.

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**9. PHYSICAL AND CHEMICAL PROPERTIES**

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**Descriptive Properties:**

**Appearance (physical state, color, etc.):**

**Molecular Formula:**

**Molar Mass (g/mol):**

**Odor:**

**Odor threshold:**

**pH:**

**Evaporation rate:**

**Melting point/freezing point (°C):**

**Relative Density (g/L) as specific gravity (water = 1):**

**Vapor Pressure (mmHg):**

**Vapor Density (air = 1):**

**Viscosity (cP):**

**Solubility(ies):**

**Partition coefficient (n-octanol/water):**

**Water**

(>99 % of this SRM)

clear, colorless liquid

H<sub>2</sub>O

18.02

odorless

not available

7

not available

0 (32 °F)

1

17.5 at 20 °C

not available

not available

not available

not available

**Thermal Stability Properties:**

**Autoignition Temperature (°C):**

**Thermal Decomposition (°C):**

**Initial boiling point and boiling range (°C):**

**Explosive Limits, LEL (Volume %):**

**Explosive Limits, UEL (Volume %):**

**Flash Point (°C):**

**Flammability (solid, gas):**

not available

not available

100 (212 °F)

not available

not available

not available

not available

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## 10. STABILITY AND REACTIVITY

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**Reactivity:** Stable at normal temperatures and pressure.

**Stability:**   X   Stable        Unstable

**Possible Hazardous Reactions:** None listed.

**Conditions to Avoid:** None reported.

**Incompatible Materials:** No data available.

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

**Hazardous Decomposition:** No data available.

**Hazardous Polymerization:**        Will Occur   X   Will Not Occur

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## 11. TOXICOLOGICAL INFORMATION

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**Route of Exposure:**   X   Inhalation   X   Skin   X   Ingestion

**Symptoms Related to the Physical, Chemical and Toxicological Characteristics:** No adverse effects reported.

**Potential Health Effects (Acute, Chronic and Delayed):**

**Inhalation:** No adverse effects reported.

**Skin Contact:** No adverse effects reported.

**Eye Contact:** No adverse effects reported.

**Ingestion:** No adverse effects reported.

**Numerical Measures of Toxicity:**

**Acute Toxicity:** Not classified.

Water: Rat, Oral LD50: >90 g/kg

**Skin Corrosion/Irritation:** No data available.

**Serious Eye Damage/Irritation:** No data available.

**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  
Not applicable.

**Radiological Hazard:** Hydrogen-3  
Ionizing radiation is a known carcinogen.

**Reproductive Toxicity:** No data available.

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

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

**Aspiration Hazard:** No data available.

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## 12. ECOLOGICAL INFORMATION

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**Ecotoxicity Data:** 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.

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### 13. DISPOSAL CONSIDERATIONS

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**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.

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### 14. TRANSPORTATION INFORMATION

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**U.S. DOT and IATA:**

**Primary Risk:** Not regulated by DOT or IATA.

**Subsidiary Risk:** Not radioactive for shipping purposes.

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### 15. REGULATORY INFORMATION

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**U.S. Regulations:**

CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated.

SARA Title III Section 302 (40 CFR 355.30): Not regulated.

SARA Title III Section 304 (40 CFR 355.40): Not regulated.

SARA Title III Section 313 (40 CFR 372.65): Not regulated.

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

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

ACUTE HEALTH: No.

CHRONIC HEALTH: No.

FIRE: No.

REACTIVE: No.

PRESSURE: No.

**State Regulations:**

California Proposition 65: No components are regulated.

**U.S. TSCA Inventory:** Water is listed.

**TSCA 12(b), Export Notification:** Not listed.

**Canadian Regulations:** WHMIS Information is not provided for this material.

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### 16. OTHER INFORMATION

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**Issue Date:** 02 October 2015

**Sources:** ChemAdvisor, Inc., SDS *Water*, 20 March 2015.

United States National Library of Medicine, *ChemIDplus Database*, *Tritium Radioactive CAS # 10028-17-8*; available at <http://toxnet.nlm.nih.gov/> (accessed Oct 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](mailto:srmmsds@nist.gov); or via the Internet at <http://www.nist.gov/srm>.