

MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

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

SRM Number: 4341
MSDS Number: 4341
SRM Name: Neptunium-237
Radioactivity Standard

Date of Issue: 06 May 2008

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Description: SRM 4341 consists of a solution of radioactive Neptunium-237 nitrate, and nitric acid dissolved in 5mL of distilled water. The resulting solution is 2.0 M nitric acid. The solution (2 N Nitric Acid), is contained in a flame-sealed, 5 mL, NIST, borosilicate-glass ampoule.

Substance: Radioactive Neptunium-237 in 2.0 M Nitric Acid

Other Designations: Radioactive Neptunium-237 in **2 M Nitric Acid** (nitric acid solution, 2.0 normal; 2.0 N nitric acid; nitric acid 12 %).

SRM 4341 is a radioactive material with a massic activity of approximately $97 \text{ Bq}\cdot\text{g}^{-1}$. Neptunium-237 decays by alpha-particle emission. None of the alpha particles escape from the SRM ampoule. During the decay process X-rays and gamma rays with energies from 5 keV to 280 keV are also emitted. Most of these photons escape from the SRM ampoule but their intensities are so small that they do not represent a radiation hazard. This SRM should be used only by persons qualified to handle radioactive material.

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component: Nitric Acid

CAS Number: 7697-37-2

EU Number (EINECS): 231-741-2

SRM Nominal Concentration: 2 N

EU Classification:

C (Corrosive)

EU Risk/Safety Phrases: See Section 15, "Regulatory Information".

3. HAZARDS IDENTIFICATION

Nitric Acid

NFPA Ratings (Scale 0–4): Health = 3 Fire = 0 Reactivity = 0

Major Health Hazards: Respiratory tract and mucous membrane burns, skin burns, eye burns.

Physical Hazards: Glass ampoule may break or shatter.

Potential Health Effects

Inhalation: Inhalation may cause severe irritation and burning of the nose, throat, and upper respiratory tract.

Skin Contact: Skin contact of dilute solutions of nitric acid may cause chemical burns.

Eye Contact: Direct contact with may cause severe irritation, conjunctivitis, corneal necrosis, and burns with impairment or permanent loss of vision. The degree of injury depends on the duration of contact.

Ingestion: Ingestion can cause pain and burns of the mouth, throat, esophagus, and stomach.

Listed as a Carcinogen/ Potential Carcinogen

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	_____	<u> X </u>
In the International Agency for Research on Cancer (IARC) Monographs	_____	<u> X </u>
By the Occupational Safety and Health Administration (OSHA)	_____	<u> X </u>

4. FIRST AID MEASURES

Skin Contact: Rinse affected area with copious amounts of water for at least 15 minutes while removing contaminated clothing followed by washing thoroughly the affected skin with soap and water. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance immediately.

Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing by qualified personnel. Get medical attention if necessary.

Ingestion: If ingestion occurs, contact poison control center or physician immediately. Give large quantities of water or milk. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head lower than hips to prevent aspiration. If person is unconscious, turn head to side. Obtain immediate medical assistance.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Negligible fire hazard.

Extinguishing Media: Use regular dry chemical, soda ash, or water.

Fire Fighting: DO NOT touch spilled material. Move container from fire area if it can be done without risk. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products.

Flash Point (°C): Not flammable.

Autoignition Temp. (°C): Not applicable.

Flammability Limits in Air

UPPER (Volume %): Not applicable.

LOWER (Volume %): Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: DO NOT touch spilled material. Avoid contact with combustible materials. Notify safety personnel of spill. Spills should be handled according to radioactive spill procedures. In addition to the radioactive material, the material contains an acid and is corrosive.

Disposal: Refer to Section 13, "Disposal Considerations".

7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances. Store in a well-ventilated area.

Safe Handling Precautions: See Section 8, "Exposure Controls and Personal Protection"

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: Nitric Acid

OSHA (PEL): 5 mg/m³ (2 ppm) TWA

ACGIH: 5 mg/m³ (2 ppm) TWA

ACGIH: 10mg/m³ (4 ppm) STEL

WEL UK: 5.2 mg/m³ (2 ppm) TWA

WEL UK: 10 mg/m³ (4 ppm) STEL

Ventilation: Provide a local exhaust ventilation system. Ensure compliance with applicable exposure limits.

Eye Protection: Wear safety goggles. An eye wash station should be readily available near areas of use.

Personal Protection: Wear appropriate protective clothing and disposable chemically resistant gloves to prevent skin exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Component: Nitric Acid

Appearance: Colorless, liquid.

Relative Molecular Weight: 63 g/mol

Molecular Formula: HNO₃

Water Solubility: Miscible.

10. STABILITY AND REACTIVITY

Stability: Stable Unstable

Stable under ordinary conditions of use and storage.

Conditions to Avoid: Avoid heat and combustible materials.

Incompatible Materials: Nitric acid is incompatible with acids, combustible materials, halo carbons, amines, bases, oxidizing materials, metals, halogens, metal salts, metal oxides, reducing agents, peroxides, metal carbide, and cyanides.

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

Hazardous Decomposition: Oxides of nitrogen.

Hazardous Polymerization: Will Occur Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: Inhalation Skin Ingestion

Toxicity Data: Nitric Acid

Human, Oral LD₅₀: 430 mg/kg

Rat, Inhalation LC₅₀: 260 mg/m³ (30 min)

Rat, Inhalation LC₅₀: 130 mg/m³ (4 h)

Health Effects: See Section 3: "Hazards Identification" for potential health effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data: 2.8 µg/L/96 h (LC₅₀, Fish Toxicity).

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations for radioactive materials. Keep out of water supplies and sewers.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: Radioactive Material Excepted Package, UN2910, Hazard Class 7; Sub Risk: Nitric Acid, 12 % (5 mL Ampoule of Solution).

15. REGULATORY INFORMATION

U.S. REGULATIONS:

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

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

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

SARA Title III Section 313 (40 CFR 372.65): Nitric Acid.

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

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

ACUTE:	Yes
CHRONIC:	No
FIRE:	No
REACTIVE:	No
SUDDEN RELEASE:	No

STATE REGULATIONS

California Proposition 65: Not regulated.

CANADIAN REGULATIONS

WHMIS Classification: Not determined.

EUROPEAN REGULATIONS

EU Classification: C (Corrosive)

EC Risk and Safety Phrases

R 35	Causes severe burns.
S 1/2	Keep locked up and out of reach of children.
S 23	Do not breathe gas, fumes, vapor, or spray.
S 26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36	Wear suitable protective clothing, gloves, and eye/face protection.
S 45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

NATIONAL INVENTORY STATUS

U.S. Inventory (TSCA): Nitric Acid: Listed on inventory.

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

16. OTHER INFORMATION

Sources: Symyx, Inc., MSDS *Nitric Acid*, 13 December 2007.

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