

SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

Product Identifier

RM Number: 8610
RM Name: Mercury Isotopes in UM-Almaden Mono-Elemental Secondary Standard
Other Means of Identification: Not applicable.

Recommended Use of This Material and Restrictions of Use

This Reference Material (RM) is intended for use in developing and validating methods for measuring relative differences in mercury (Hg) isotope-number ratios, $R(^{XXX}\text{Hg}/^{198}\text{Hg})$. A unit of RM 8610 consists of four ampoules each containing approximately 5 mL of solution comprised of approximately 3 % mass fraction nitric acid and 2 % mass fraction hydrochloric acid, equivalent to amount-of-substance concentration (molarity) values of approximately 0.5 mol/L nitric acid and 0.5 mol/L hydrochloric acid.

Company Information

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2. HAZARDS IDENTIFICATION

Classification

Physical Hazard: Not classified.
Health Hazard: Skin Corrosion/Irritation Category 1B
 Serious Eye Damage/Eye 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, 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: Not applicable.

Ingredients(s) with Unknown Acute Toxicity: Not applicable.

3. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Substance: Hydrochloric acid/nitric acid solution

Other Designations:

Hydrochloric acid (HCl; muriatic acid)

Nitric acid (aqua fortis; hydrogen nitrate; azotic acid; engraver's acid)

NOTE: This material contains trace amounts of mercury. Components are listed in compliance with OSHA's 29 CFR 1910.1200; for the actual values see the Report of Investigation.

Hazardous Component(s)	CAS Number	EC Number (EINECS)	Nominal Mass Concentration (%)
Nitric acid	7697-37-2	231-714-2	3
Hydrochloric acid	7647-01-0	231-595-7	2
Non-Hazardous Component(s)			
Water	7732-18-5	231-791-2	>94

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: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing before reuse. Destroy contaminated shoes.

Eye Contact: Immediately flush eyes, including under the eyelids with copious amounts of water for at least 15 minutes. Seek immediate medical attention.

Ingestion: Contact a poison control center immediately for instructions. Do not induce vomiting. Give water to rinse out mouth. Never give liquids to a person with reduced awareness or becoming unconscious. If vomiting occurs, keep head lower than hips to prevent aspiration. If not breathing, give artificial respiration by qualified personnel. Seek immediate medical attention.

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

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: Thermal decomposition will form oxides of nitrogen and arsine.

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

Personal Precautions, Protective Equipment and Emergency Procedures: Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment; see Section 8, “Exposure Controls and Personal Protection”.

Methods and Materials for Containment and Clean up: Do not touch spilled material. Notify safety personnel of spills. Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Isolate hazard area and deny entry.

7. HANDLING AND STORAGE

Safe Handling Precautions: See Section 8, “Exposure Controls and Personal Protection”. Handle glass ampoules with care.

Storage: Store and handling in accordance with all current regulations and standards. Keep separated from incompatible substances (See Section 10, “Stability and Reactivity”).

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits:

Hydrochloric acid:

NIOSH (REL):	7 mg/m ³ (2 ppm; Ceiling)
	75 mg/m ³ (50 ppm; IDLH)
ACGIH (TLV):	3 mg/m ³ (2 ppm; Ceiling)
OSHA (PEL):	7 mg/m ³ (5 ppm; Ceiling)

Nitric acid:

NIOSH (REL):	5 mg/m ³ (2 ppm; TWA)
	10 mg/m ³ (4 ppm; STEL)
	65 mg/m ³ (25 ppm; IDLH)
ACGIH (TLV):	5 mg/m ³ (2 ppm; TWA)
	10 mg/m ³ (4 ppm; STEL)
OSHA (PEL):	5 mg/m ³ (2 ppm; TWA)

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 eyewash station should be readily available near areas of use.

Skin and Body Protection: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Chemical-resistant gloves should be worn at all times when handling chemicals.

9. PHYSICAL AND CHEMICAL PROPERTIES

NOTE: The physical and chemical data is for hydrochloric and nitric acids. No physical or chemical data are available for this solution. The actual behavior of the solution may differ from the individual components.

Descriptive Properties:	Hydrochloric acid (3 % of this RM)	Nitric acid (2 % of this RM)
Appearance (physical state, color, etc.):	colorless to yellow liquid	colorless to yellow liquid
Molecular Formula:	HCl	HNO ₃
Molar Mass (g/mol):	36.46	63.01
Odor:	not available	irritating odor
Odor threshold:	not available	not available
pH:	<2	1 (1 M)
Evaporation rate:	>1	not available
Melting point/freezing point (°C):	not available	-42 (-43 °F)
Relative Density (g/L) as specific gravity (water = 1):	1.0 to 1.2	1.5027 at 25 °C
Vapor Pressure (mmHg):	14 at 20 °C	47.9 at 20 °C
Vapor Density (air = 1):	0.7 (water)	3.2
Viscosity (cP):	not available	not available
Solubility(ies):	miscible with water	miscible with water and ether
Partition coefficient (n-octanol/water):	not available	not available
Thermal Stability Properties		
Autoignition Temperature (°C):	not applicable	not applicable
Thermal Decomposition (°C):	not applicable	not applicable
Initial boiling point and boiling range (°C):	not applicable	83 (181 °F)
Explosive Limits, LEL (Volume %):	not applicable	not applicable
Explosive Limits, UEL (Volume %):	not applicable	not applicable
Flash Point (°C):	not applicable	not applicable
Flammability (solid, gas):	not applicable	not applicable

10. STABILITY AND REACTIVITY

Reactivity: Stable at normal temperatures and pressure.

Stability: X Stable Unstable

Possible Hazardous Reactions: None listed.

Conditions to Avoid: Contact with combustible or incompatible materials.

Incompatible Materials: 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: Thermal decomposition will produce oxides of nitrogen, hydrogen chloride gas, and chlorine.

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 skin corrosion.

Potential Health Effects (Acute, Chronic and Delayed):

Inhalation: Inhalation of hydrochloric and nitric acids can damage the mucous membranes and upper 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 and nitric acids 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 and nitric acids 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: If ingested, hydrochloric and nitric acids can cause severe burns and damage to the gastrointestinal tract.

Numerical Measures of Toxicity:

Acute Toxicity: Not classified.

Hydrochloric acid, Rat, Inhalation LC50: 3124 ppm (1 h)
Rat, Oral LD50: 238 mg/kg to 277 mg/kg
Rat, Dermal LD50: >5010 mg/kg
Nitric acid, Rat, Inhalation LC50: 130 mg/m³ (4 h)

Skin Corrosion/Irritation: This RM contains >1 % of hydrochloric and nitric acids and it is classified as Category 1B.

Serious Eye Damage/Irritation: This RM contains >1 % hydrochloric and nitric acids and it is classified as Category 1.

Respiratory Sensitization: Not classified; no data available.

Skin Sensitization: Not classified; no data available.

Germ Cell Mutagenicity: Not classified; no data available.

Carcinogenicity: Not classified.

Listed as a Carcinogen/Potential Carcinogen Yes X No
Hydrochloric and nitric acids are not listed by NTP, IARC or OSHA as a carcinogen/potential carcinogen.

Reproductive Toxicity: Not classified.

Hydrochloric acid, Rat, Oral TDLo: 450 mg/kg (1 h, prior to copulation 1 d)
Nitric acid, Rat, Oral TDLo: 21 150 mg/kg (pregnant 1 d to 21 d)
Rat, Oral TDLo: 2345 mg/kg (pregnant 18 d)

Specific Target Organ Toxicity, Single Exposure: Not classified; no data available.

Specific Target Organ Toxicity, Repeated Exposure: Not classified; no data available.

Aspiration Hazard: Not classified; no data available.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data:

Hydrochloric acid, Mosquitofish (*Gambusia affinis*) LC50 (static): 282 mg/L (96 h)
Shore crab (*Carcinus maenas*) LC50 (mortality): 240 mg/L (48 h)
Nitric acid, Starfish (*Asterias rubens*) LC50: 100 mg/L to 300 mg/L (48 h, renewal/aerated water)

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: Dispose of waste in accordance with all applicable federal, state, and local regulations. Nitric acid is subject to disposal regulations: U.S. EPA 40 CFR 262, Hazardous Waste Numbers: D001, D002. Hydrochloric acid is subject to D002.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: UN1760, Corrosive liquid, n.o.s. (contains hydrochloric and nitric acids), Hazard Class 8, Packing Group II, Excepted Quantities E2.

15. REGULATORY INFORMATION

U.S. Regulations:

SARA Title III Section 302 (40 CFR 355.30): Hydrochloric acid, 5000 lbs (2270 kg);
Nitric acid, 1000 lbs (454 kg) TPQ

SARA Title III Section 304 (40 CFR 355.40): Hydrochloric acid, 500 lbs (227 kg) TPQ (gas only);
Nitric acid, 1000 lbs (454 kg) EPCRA RQ

SARA Title III Section 313 (40 CFR 372.65): Hydrochloric acid, 1 % de minimis concentration
(acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size).
Nitric acid, 1 % de minimis concentration

OSHA Process Safety (29 CFR 1910.119): Hydrochloric acid, 5000 lb TQ (anhydrous);
Nitric acid, higher concentrations 500 lbs TQ (≥ 94.5 % by weight)

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: Not listed.

U.S. TSCA Inventory: Hydrochloric and nitric acids are listed.

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

Canadian Regulations:

WHMIS Information: Not provided for this material.

16. OTHER INFORMATION

Issue Date: 31 March 2017

Sources: ChemAdvisor, Inc., SDS *Hydrochloric Acid*, 09 December 2015.

ChemAdvisor, Inc., SDS *Nitric Acid*, 22 September 2015.

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 Occupational Safety and Health; *Hydrogen Chloride CAS No. 7647-01-0*, 18 November 2010; available at <http://www.cdc.gov/niosh/npg/npgd0332.html> (accessed Mar 2016).

CDC; NIOSH; *NIOSH Pocket Guide to Chemical Hazards*; DHHS; *Nitric Acid CAS No. 7697-37-2*, 18 November 2010; available at <http://www.cdc.gov/niosh/npg/npgd0447.html> (accessed Mar 2016).

Hazardous Substances Data Bank (HSDB), National Library of Medicine, *Hydrochloric Acid CAS 7647-01-0*, Animal Toxicity Studies, available at <http://toxnet.nlm.nih.gov> (accessed Mar 2016).

HSDB, National Library of Medicine's TOXNET system, *Nitric Acid CAS No. 7697-37-2*; available at <http://toxnet.nlm.nih.gov> (accessed Mar 2016).

Key of Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists	NRC	Nuclear Regulatory Commission
ALI	Annual Limit on Intake	NTP	National Toxicology Program
CAS	Chemical Abstracts Service	OSHA	Occupational Safety and Health Administration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	PEL	Permissible Exposure Limit
CFR	Code of Federal Regulations	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 Transport Association	SCBA	Self-Contained Breathing Apparatus
IDLH	Immediately Dangerous to Life and Health	SRM	Standard Reference Material
LC50	Lethal Concentration, 50 %	STEL	Short Term Exposure Limit
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
NIOSH	National Institute for Occupational Safety and Health	UEL	Upper Explosive Limit
NIST	National Institute of Standards and Technology	WHMIS	Workplace Hazardous Materials Information System
n.o.s.	Not Otherwise Specified		

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

Users of this RM 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>.