

SAFETY DATA SHEET

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SECTION 1. IDENTIFICATION

Product Name: Ruthenium(III) NitrosylNitrate

Product Number: All applicable American Elements product codes, e.g. RU-NSNA-02 , RU-NSNA-025 , RU-NSNA-03 , RU-NSNA-035 , RU-NSNA-04 , RU-NSNA-05

CAS #: 34513-98-9

Relevant identified uses of the substance: Scientific research and development

Supplier details:

American Elements
10884 Weyburn Ave.
Los Angeles, CA 90024
Tel: +1 310-208-0551
Fax: +1 310-208-0351

Emergency telephone number:

+1 800-424-9300

SECTION 2. HAZARDS IDENTIFICATION

Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Corrosive to metals Category 1

Acute Inhalation Toxicity - Vapors Category 3

Skin Corrosion/Irritation Category 1 B Serious Eye Damage/Eye Irritation Category 1

Specific target organ toxicity (single exposure) Category 3

Target Organs - Respiratory system.

Label Elements

Signal Word

Danger

Hazard Statements

May be corrosive to metals

Toxic if inhaled

Causes severe skin burns and eye damage

Causes serious eye damage

May cause respiratory irritation



Precautionary Statements

Prevention

Keep only in original container

Avoid breathing dust/fume/gas/mist/vapors/spray

Use only outdoors or in a well-ventilated area

Wash face, hands and any exposed skin thoroughly after handling

Wear protective gloves/protective clothing/eye protection/face protection

Response

Call a POISON CENTER or doctor/physician if you feel unwell

Inhalation

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

Skin

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower

Wash contaminated clothing before reuse

Immediately call a POISON CENTER or doctor/physician

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

Immediately call a POISON CENTER or doctor/physician

Ingestion

IF SWALLOWED: Rinse mouth. DO NOT induce vomiting

Spills

Absorb spillage to prevent material damage

Storage

Store locked up

Store in a well-ventilated place. Keep container tightly closed

Store in corrosive resistant polypropylene container with a resistant liner

Store in a dry place

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

None identified

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component CAS-No Weight %

Water 7732-18-5 ca 93

Ruthenium, tris(nitrato-O)nitrosyl- 34513-98-9 5

Nitric acid 7697-37-2 ca 2

SECTION 4. FIRST AID MEASURES

General Advice Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.

Eye Contact Immediate medical attention is required. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with a respiratory medical device. Immediate medical attention is required.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms/effects Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Notes to Physician Treat symptomatically

SECTION 5. FIREFIGHTING MEASURES

Suitable Extinguishing Media CO 2, dry chemical, dry sand, alcohol-resistant foam.

Unsuitable Extinguishing Media No data available

Flash Point No data available

Method - No data available

Autoignition Temperature No data available

Explosion Limits

Upper No data available Lower No data available Sensitivity to Mechanical Impact No data available

Sensitivity to Static Discharge No data available

Specific Hazards Arising from the Chemical

Thermal decomposition can lead to release of irritating gases and vapors. The product causes burns of eyes, skin and mucous membranes.

Hazardous Combustion Products

Nitrogen oxides (NOx) Thermal decomposition can lead to release of irritating gases and vapors

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

NFPA

Health

3

Flammability

0

Instability

0

Physical hazards

N/A

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Use personal protective equipment. Ensure adequate ventilation.

Environmental Precautions Should not be released into the environment. See Section 12 for additional ecological information.

Methods for Containment and Clean Keep in suitable, closed containers for disposal. Soak up with inert absorbent material.

Up

SECTION 7. HANDLING AND STORAGE

Handling Do not breathe vapors or spray mist. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood. Wear personal protective equipment. Do not ingest.

Storage Corrosives area. Keep containers tightly closed in a dry, cool and well-ventilated place.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines:

Component ACGIH TLV OSHA PEL NIOSH IDLH

Nitric acid TWA: 2 ppm

STEL: 4 ppm (Vacated) TWA: 2 ppm (Vacated) TWA: 5 mg/m³ (Vacated) STEL: 4 ppm (Vacated)

STEL: 10 mg/m³

TWA: 2 ppm

TWA: 5 mg/m³ IDLH: 25 ppm TWA: 2 ppm TWA: 5 mg/m³

STEL: 4 ppm

STEL: 10 mg/m³

Component Quebec Mexico OEL (TWA) Ontario TWAEV

Nitric acid TWA: 2 ppm

TWA: 5.2 mg/m³

STEL: 4 ppm

STEL: 10 mg/m³ TWA: 2 ppm

TWA: 5 mg/m³

STEL: 4 ppm

STEL: 10 mg/m³ TWA: 2 ppm

STEL: 4 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Tightly fitting safety goggles. Face-shield.

Skin and body protection Long sleeved clothing.

Respiratory Protection Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State Liquid

Appearance Amber

Odor Odorless

Odor Threshold No data available

pH 1.98

Melting Point/Range No data available

Boiling Point/Range No data available

Flash Point No data available
Evaporation Rate No data available
Flammability (solid,gas) N/A
Flammability or explosive limits
Upper No data available
Lower No data available
Vapor Pressure No data available
Vapor Density No data available
Relative Density 1.070
Solubility No data available
Partition coefficient; n-octanol/water No data available
Autoignition Temperature No data available
Decomposition Temperature No data available
Viscosity No data available
Molecular Formula N₄ O₁₀ Ru
Molecular Weight 317.09

SECTION 10. STABILITY AND REACTIVITY

Reactive Hazard None known, based on information available
Stability No data available.
Conditions to Avoid Incompatible products. Excess heat.
Incompatible Materials Organic materials, Powdered metals, Alkali metals, Alcohols, Reducing agents
Hazardous Decomposition Products Nitrogen oxides (NO_x), Thermal decomposition can lead to release of irritating gases and vapors
Hazardous Polymerization Hazardous polymerization does not occur.
Hazardous Reactions None under normal processing.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute Toxicity
11. Toxicological information
Product Information
Oral LD₅₀ Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg. Dermal LD₅₀
Based on ATE data, the classification criteria are not met. ATE > 2000 mg/kg. Vapor LC₅₀ Category
3. ATE = 2 - 10 mg/l.
Component Information
Component LD₅₀ Oral LD₅₀ Dermal LC₅₀ Inhalation
Nitric acid Not listed Not listed 130 mg/m³ (Rat) 4 h
67 ppm (Rat) 4 h
Toxicologically Synergistic
Products
No data available
Delayed and immediate effects as well as chronic effects from short and long-term exposure
Irritation Causes burns by all exposure routes
Sensitization No data available
Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.
Component CAS-No IARC NTP ACGIH OSHA Mexico
Water 7732-18-5 Not listed Not listed Not listed Not listed Not listed
Ruthenium, tris(nitrato-O)nitrosyl- 34513-98-9 Not listed Not listed Not listed Not listed Not listed

Nitric acid 7697-37-2 Not listed Not listed Not listed Not listed Not listed

IARC: (International Agency for Research on Cancer) IARC: (International Agency for Research on Cancer)

Group 1 - Carcinogenic to Humans

Group 2A - Probably Carcinogenic to Humans

Group 2B - Possibly Carcinogenic to Humans

Mutagenic Effects No data available Reproductive Effects No data available. Developmental Effects

No data available. Teratogenicity No data available.

STOT - single exposure Respiratory system

STOT - repeated exposure None known

Aspiration hazard No data available

Symptoms / effects, both acute and delayed

Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Endocrine Disruptor Information No data available

Other Adverse Effects The toxicological properties have not been fully investigated. See actual entry in RTECS for complete information.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Do not empty into drains.

12. Ecological information

Component Freshwater Algae Freshwater Fish Microtox Water Flea

Nitric acid Not listed 72 mg/L LC50 96 h Not listed Not listed

Persistence and Degradability No data available

Bioaccumulation/ Accumulation No data available.

Mobility No data available.

Component log Pow

Nitric acid -2.3

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

SECTION 14. TRANSPORT INFORMATION

DOT

14. Transport information

UN-No UN2031

Proper technical name Ruthenium, tris(nitrato-O)nitrosyl-, Nitric acid

Hazard Class 8

Packing Group II

TDG

UN-No UN2031

Hazard Class 8

Packing Group II
IATA
UN-No UN3264
Proper Shipping Name Corrosive liquid, acidic, inorganic, n.o.s
Hazard Class 8
Packing Group II
IMDG/IMO
UN-No UN3264
Proper Shipping Name Corrosive liquid, acidic, inorganic, n.o.s
Hazard Class 8
Packing Group II

SECTION 15. REGULATORY INFORMATION

International Inventories

Component TSCA DSL NDSL EINECS ELINCS NLP PICCS ENCS AICS IECSC KECL

Water X X - 231-791-2 - X - X X X

Ruthenium, tris(nitrato-O)nitrosyl- X - X 252-068-8 - - - - X

Nitric acid X X - 231-714-2 - X X X X X

Legend:

X - Listed

E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA. F -

Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.

N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.

P - Indicates a commenced PMN substance

R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA. S -

Indicates a substance that is identified in a proposed or final Significant New Use Rule

T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.

XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base

Production and Site Reports (40 CFR 710(B)).

Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.

Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) N/A

SARA 313

Component CAS-No Weight % SARA 313 - Threshold

Values %

Nitric acid 7697-37-2 ca 2 1.0

SARA 311/312 Hazardous Categorization

Acute Health Hazard Yes Chronic Health Hazard Yes Fire Hazard No Sudden Release of Pressure
Hazard No Reactive Hazard No

Clean Water Act

Component CWA - Hazardous

Substances CWA - Reportable

Quantities CWA - Toxic Pollutants CWA - Priority Pollutants

Nitric acid X 1000 lb - -

Clean Air Act N/A

OSHA Occupational Safety and Health Administration

N/A

Component Specifically Regulated Chemicals Highly Hazardous Chemicals

Nitric acid - TQ: 500 lb

CERCLA

N/A

Component Hazardous Substances RQs CERCLA EHS RQs

Nitric acid 1000 lb 1000 lb

California Proposition 65 This product does not contain any Proposition 65 chemicals

State Right-to-Know

Component Massachusetts New Jersey Pennsylvania Illinois Rhode Island

Water - - X - -

Ruthenium, tris(nitrato-O)nitrosyl- - X - X -

Nitric acid X X X X X

U.S. Department of Transportation

Reportable Quantity (RQ): N DOT Marine Pollutant N DOT Severe Marine Pollutant N

U.S. Department of Homeland Security

This product does not contain any DHS chemicals.

Component DHS Chemical Facility Anti-Terrorism Standard

Nitric acid 2000 lb STQ

Other International Regulations

Mexico - Grade No data available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

WHMIS Hazard Class E Corrosive material

D2B Toxic materials

D1A Very toxic materials

SECTION 16. OTHER INFORMATION

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH). The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. American Elements shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. COPYRIGHT 1997-2022 AMERICAN ELEMENTS. LICENSED GRANTED TO MAKE UNLIMITED PAPER COPIES FOR INTERNAL USE ONLY.