SAFETY DATA SHEET

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SECTION 1. IDENTIFICATION

Product Identifier: (2N) 99% Ruthenium Nitrate Solution

Product Code: RU-NAT-02-SOL

CAS Number: 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 of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)
GHS03 Flame over circle
Ox. Liq. 2
H272 May intensify fire; oxidizer.
GHS05 Corrosion
Skin Corr. 1A H314 Causes severe skin burns and eye damage.
Hazards not otherwise classified
No data available.
GHS label elements
The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)
Hazard pictograms



GHS03 GHS05
Signal word
Danger
Hazard-determining components of labeling:
Nitric acid
Ruthenium(III) nitrosylnitrate

Hazard statements
H272 May intensify fire; oxidizer.
H314 Causes severe skin burns and eye damage.
Precautionary statements
P221
Take any precaution to avoid mixing with combustibles.
P210
Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405
Store locked up.
P501
Dispose of contents/container in accordance with local/regional/national/international regulations.
WHMIS classification
C - Oxidizing materials
D2B - Toxic material causing other toxic effects
E - Corrosive material
Classification system
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)
Health (acute effects) = 3
Flammability = 0
Physical Hazard = 2
Other hazards
Results of PBT and vPvB assessment:
PBT:
N/A.
vPvB:
N/A

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical characterization: Mixtures
Dangerous components:
7697-37-2 Nitric acid Ox. Liq. 3, H272; Skin Corr. 1A, H314
34513-98-9 Ruthenium(III) nitrosylnitrate Ox. Sol. 2, H272; Met. Corr.1, H290; Skin Corr. 1B, H314; Eye Dam. 1, H318
Additional information
None known.
Non-Hazardous Ingredients
7732-18-5 Water

SECTION 4. FIRST AID MEASURES

Description of first aid measures
General information
Immediately remove any clothing soiled by the product.
If inhaled:

Supply fresh air. If not breathing, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
In case of skin contact:
Immediately wash with soap and water; rinse thoroughly.
Seek immediate medical advice.
In case of eye contact:
Rinse opened eye for several minutes under running water. Consult a physician.
If swallowed:
Seek medical treatment.
Information for doctor
Most important symptoms and effects, both acute and delayed
Causes severe skin burns.
Causes serious eye damage.
Indication of any immediate medical attention and special treatment needed
No information available.

SECTION 5. FIREFIGHTING MEASURES

Extinguishing media
Suitable extinguishing media
Product is not flammable. Use fire-fighting measures that suit the surrounding fire.
For safety reasons unsuitable extinguishing media
Halocarbon extinguisher
Special hazards arising from the substance or mixture
This substance is an oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.
If this product is involved in a fire, the following can be released:
Nitrogen oxides (NOx)
Ruthenium oxide
Advice for firefighters
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Environmental precautions:
Do not allow product to reach sewage system or any water course.
Methods and material for containment and cleanup:
Use neutralizing agent.
Dispose of contaminated material as waste according to section 13.
Ensure adequate ventilation.
Absorb with liquid-binding material.
Prevention of secondary hazards:
Acts as an oxidizing agent on organic materials such as wood, paper and fats
Keep away from combustible material.
Reference to other sections
See Section 7 for information on safe handling

See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7. HANDLING AND STORAGE

Handling
Precautions for safe handling
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure adequate ventilation.
Information about protection against explosions and fires:
Substance/product can reduce the ignition temperature of flammable substances.
This substance is an oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.
Conditions for safe storage, including any incompatibilities
Storage
Requirements to be met by storerooms and receptacles:
No special requirements.
Information about storage in one common storage facility:
Store away from flammable substances.
Store away from reducing agents.
Do not store with organic materials.
Store away from metal powders.
Store away from strong bases.
Water reacts with many metals to give hydrogen, often violently. Water is also incompatible with many reactive organic and inorganic chemicals.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well-sealed containers.
Specific end use(s)
No information available.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.
Control parameters
Components with limit values that require monitoring at the workplace:
7697-37-2 Nitric acid (20.0%)
PEL (USA)
Long-term value: 5 mg/m³, 2 ppm
REL (USA)
Short-term value: 10 mg/m³, 4 ppm
Long-term value: 5 mg/m³, 2 ppm
TLV (USA)
Short-term value: 10 mg/m³, 4 ppm
Long-term value: 5.2 mg/m³, 2 ppm
EL (Canada) Short-term value: 4 ppm
Long-term value: 2 ppm
EV (Canada) Short-term value: 10 mg/m³, 4 ppm

Long-term value: 5 mg/m³, 2 ppm
Additional information:
No data
Exposure controls
Personal protective equipment
Follow typical general protective and industrial hygiene measures for handling chemicals.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Do not inhale dust / smoke / mist.
Avoid contact with the eyes and skin.
Breathing equipment:
Use suitable respirator when high concentrations are present.
Recommended filter device for short term use:
Use a respirator with multi-purpose combination (US) or type ABEK (EN 14387) as a backup to engineering controls. Risk assessment should be performed to determine if air-purifying respirators are appropriate. Only use equipment tested and approved under appropriate government standards such as NIOSH (USA) or CEN (EU).
Protection of hands:
Impervious gloves
Inspect gloves prior to use.
Suitability of gloves should be determined both by material and quality, the latter of which may vary by manufacturer.
Material of gloves
Nitrile rubber, NBR
Penetration time of glove material (in minutes)
480
Glove thickness
0.11 mm
Eye protection:
Tightly sealed goggles
Full face protection
Body protection:
Protective work clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties
Appearance:
Form: Liquid
Color: Red-brown
Odor: Acidic
Odor threshold: No data available.
pH: No data available.
Melting point/range: No data available.
Boiling point/range: No data available.
Sublimation temperature / start: No data available.
Flammability (solid, gas):
No data available.
Ignition temperature: No data available.
Decomposition temperature: No data available.
Auto igniting: Product is not selfigniting.
Danger of explosion:

No data available.
Explosion limits:
Lower: No data available.
Upper: No data available.
Vapor pressure at 20 °C (68 °F): 4 hPa (3 mm Hg)
Density at 20 °C (68 °F): 1.07 g/cm³ (8.929 lbs/gal)
Relative density
No data available.
Vapor density
No data available.
Evaporation rate
No data available.
Solubility in Water (H_2O): Fully miscible
Partition coefficient (n-octanol/water): No data available.
Viscosity:
Dynamic: No data available.
Kinematic: No data available.
Other information
No information available.

SECTION 10. STABILITY AND REACTIVITY

Reactivity
May intensify fire; oxidizer.
Chemical stability
Stable under recommended storage conditions.
Thermal decomposition / conditions to be avoided:
Decomposition will not occur if used and stored according to specifications.
Possibility of hazardous reactions
Water reacts with many metals to give hydrogen, often violently. Water is also incompatible with many reactive organic and inorganic chemicals.
Water reacts violently with alkali metals.
Reacts with reducing agents
Reacts with flammable substances
Conditions to avoid
No information available.
Incompatible materials:
Flammable substances
Reducing agents
Bases
Organic materials
Metal powders
Hazardous decomposition products:
Nitrogen oxides
Ruthenium oxide

SECTION 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects
Acute toxicity:
Swallowing will lead to a strong corrosive effect on mouth and throat and to the danger of perforation

of esophagus and stomach.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for components in this product.
LD/LC50 values that are relevant for classification:
7697-37-2 Nitric acid
Inhalative LC50/4H 0.13 mg/l/4H (rat)
Skin irritation or corrosion:
Causes severe skin burns.
Eye irritation or corrosion:
Causes serious eye damage.
Sensitization:
No sensitizing effects known.
Germ cell mutagenicity:
N/A
Carcinogenicity:
No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.
Reproductive toxicity:
The Registry of Toxic Effects of Chemical Substances (RTECS) contains reproductive data for components in this product.
Specific target organ system toxicity - repeated exposure:
N/A
Specific target organ system toxicity - single exposure:
N/A
Aspiration hazard:
N/A
Subacute to chronic toxicity:
The Registry of Toxic Effects of Chemical Substances (RTECS) contains multiple dose toxicity data for this substance.
Additional toxicological information:
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
The product shows the following dangers according to internally approved calculation methods for preparations:
Corrosive

SECTION 12. ECOLOGICAL INFORMATION

Toxicity
Aquatic toxicity:
No information available.
Persistence and degradability:
No information available.
Bioaccumulative potential:
No information available.
Mobility in soil:
No information available.
Additional ecological information:
General notes:
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
Avoid transfer into the environment.
Results of PBT and vPvB assessment:
PBT:

N/A.
vPvB:
N/A.
Other adverse effects
No information available.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods
Recommendation:
Consult state, local or national regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation:
Disposal must be made according to official regulations.
Recommended cleansing agent:
Water, if necessary with cleansing agents.

SECTION 14. TRANSPORT INFORMATION

UN-Number
DOT, IMDG, IATA
UN3093
UN proper shipping name
DOT
Corrosive liquids, oxidizing, n.o.s. (Nitric acid, Ruthenium(III) nitrosylnitrate)
IMDG, IATA
CORROSIVE LIQUID, OXIDIZING, N.O.S. (NITRIC ACID, Ruthenium(III) nitrosylnitrate)
Transport hazard class(es)
DOT
Class
8 Corrosive substances.
Label
8+5.1
Class
8 (CO1) Corrosive substances
Label
8+5.1
IMDG, IATA
Class
8 Corrosive substances.
Label
8+5.1
Packing group
DOT, IMDG, IATA
II
Environmental hazards:
Marine pollutant (IMDG):
No
Special precautions for user
Warning: Corrosive substances
EMS Number: F-A,S-Q

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
N/A.
Transport/Additional information:
DOT
Marine Pollutant (DOT):
No
UN "Model Regulation":
UN3093, Corrosive liquids, oxidizing, n.o.s. (Nitric acid, Ruthenium(III) nitrosylnitrate), 8 (5.1), II

SECTION 15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture
GHS label elements
The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)
Hazard pictograms
GHS03
GHS05
Signal word
Danger
Hazard-determining components of labeling:
Nitric acid
Ruthenium(III) nitrosylnitrate
Hazard statements
H272 May intensify fire; oxidizer.
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P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P405
Store locked up.
P501
Dispose of contents/container in accordance with local/regional/national/international regulations.
National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.
The components of this product are listed on the Canadian Domestic Substances List (DSL) and/or the Canadian Non-Domestic Substances List (NDSL).
SARA Section 313 (specific toxic chemical listings)
7697-37-2 Nitric acid
California Proposition 65
Prop 65 - Chemicals known to cause cancer
None of the ingredients are listed.
Prop 65 - Developmental toxicity
None of the ingredients are listed.
Prop 65 - Developmental toxicity, female
None of the ingredients are listed.
Prop 65 - Developmental toxicity, male

None of the ingredients are listed.
Information about limitation of use:
For use only by technically qualified individuals.
Other regulations, limitations and prohibitive regulations
Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.
None of the ingredients are listed.
The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.
None of the ingredients is listed.
Annex XIV of the REACH Regulations (requiring Authorisation for use)
None of the ingredients is listed.
Chemical safety assessment:
A Chemical Safety Assessment has not been carried out.

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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.