100015-1 Dysprosium (1000μg/mL in 2% HNO3)

High-Purity Standards

Catalogue number: 100015-1
Version No: 3.3

Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

SECTION 1 IDENTIFICATION

Product Identifier

<table>
<thead>
<tr>
<th>Product name</th>
<th>100015-1 Dysprosium (1000μg/mL in 2% HNO3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonyms</td>
<td>100015-1 Dysprosium in 2% HNO3</td>
</tr>
<tr>
<td>Proper shipping name</td>
<td>Corrosive liquid, acidic, inorganic, n.o.s. (contains nitric acid)</td>
</tr>
<tr>
<td>Other means of identification</td>
<td>100015-1</td>
</tr>
</tbody>
</table>

Recommended use of the chemical and restrictions on use

Relevant identified uses
Use according to manufacturer's directions.

Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Registered company name: High-Purity Standards
Address: PO Box 41727 SC 29423 United States
Telephone: 843-767-7900
Fax: 843-767-7906
Website: highpuritystandards.com
Email: Not Available

Emergency phone number

Association / Organisation: INFOTRAC
Emergency telephone numbers: 1-800-535-5053
Other emergency telephone numbers: 1-352-323-3500

SECTION 2 HAZARD(S) IDENTIFICATION

Classification of the substance or mixture

| Classification               | Metal Corrosion Category 1, Skin Corrosion/Irritation Category 1A, Serious Eye Damage Category 1 |

Label elements

GHS label elements

SIGNAL WORD: DANGER

Hazard statement(s)

H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

Hazard(s) not otherwise specified
Not Applicable

Precautionary statement(s) Prevention

Continued...
SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances
See section below for composition of Mixtures

Mixtures

<table>
<thead>
<tr>
<th>CAS No</th>
<th>% [weight]</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1308-87-8</td>
<td>0.1 (as Dy)</td>
<td>dysprosium(III) oxide</td>
</tr>
<tr>
<td>7697-37-2</td>
<td>2</td>
<td>nitric acid</td>
</tr>
<tr>
<td>7732-18-5</td>
<td>balance</td>
<td>water</td>
</tr>
</tbody>
</table>

SECTION 4 FIRST-AID MEASURES

Description of first aid measures

Eye Contact
If this product comes in contact with the eyes:
- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact
If skin or hair contact occurs:
- Immediately flush body and clothes with large amounts of water, using safety shower if available.
- Quickly remove all contaminated clothing, including footwear.
- Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.
- Transport to hospital, or doctor.

Inhalation
If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

Ingestion
- For advice, contact a Poisons Information Centre or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Transport to hospital or doctor without delay.

Most important symptoms and effects, both acute and delayed

See Section 11

Indication of any immediate medical attention and special treatment needed

For acute or short term repeated exposures to strong acids:
- Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.
- Respiratory distress may require tracheotomy if endotracheal intubation is contraindicated by excessive swelling
- Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.
- Strong acids produce a coagulation necrosis characterised by formation of a coagulum (eschar) as a result of the dissolving action of the acid on proteins in specific tissues.

INGESTION:
- Immediate dilution (milk or water) within 30 minutes post ingestion is recommended.
- DO NOT attempt to neutralise the acid since exothermic reaction may extend the corrosive injury.
- Be careful to avoid further vomit since re-exposure of the mucosa to the acid is harmful. Limit fluids to one or two glasses in an adult.
- Charcoal has no place in acid management.
- Some authors suggest the use of lavage within 1 hour of ingestion.

SKIN:
Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.

Eye:
- Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjunctival cul-de-sacs. Irrigation should last at least 20-30 minutes. DO NOT use neutralising agents or any other additives. Several litres of saline are required.
- Cycloplegic drops, (1% cyclopentolate for short-term use or 5% homatropine for longer term use) antibiotic drops, vasoconstrictive agents or artificial tears may be indicated dependent on the severity of the injury.
- Steroid eye drops should only be administered with the approval of a consulting ophthalmologist.

SECTION 5 FIRE-FIGHTING MEASURES

Extinguishing media
- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

Special hazards arising from the substrate or mixture

Fire Incompatibility | None known.

Special protective equipment and precautions for fire-fighters

Fire Fighting
- Non combustible.
- Not considered to be a significant fire risk.
- Acids may react with metals to produce hydrogen, a highly flammable and explosive gas.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- May emit corrosive, poisonous fumes. May emit acrid smoke.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills
- Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.
- Check regularly for spills and leaks.
- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact with the substance, by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable, labelled container for waste disposal.

Major Spills
- Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storage and handling recommendations contained within this SDS.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Other information
- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuffs containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer’s storage and handling recommendations contained within this SDS.

Conditions for safe storage, including any incompatibilities

Suitable container
- DO NOT use aluminium or galvanised containers
Check regularly for spills and leaks.
Lined metal can, lined metal pail can.
Plastic pail.
Polyliner drum.
Packing as recommended by manufacturer.
Check all containers are clearly labelled and free from leaks.
For low viscosity materials
Drums and jerricans must be of the non-removable head type.
Where a can is to be used as an inner package, the can must have a screwed enclosure. For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.): Removable head packaging;
Cans with friction closures and low pressure tubes and cartridges may be used.
Where combination packages are used, and the inner packages are of glass, porcelain or stoneware, there must be sufficient inert cushioning material in contact with inner and outer packages unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

**Storage incompatibility**

Inorganic acids are generally soluble in water with the release of hydrogen ions. The resulting solutions have pH's of less than 7.0.
Inorganic acids neutralise chemical bases (for example: amines and inorganic hydroxides) to form salts - neutralisation can generate dangerously large amounts of heat in small spaces.
The dissolution of inorganic acids in water or the dilution of their concentrated solutions with additional water may generate significant heat.
The addition of water to inorganic acids often generates sufficient heat in the small region of mixing to cause some of the water to boil explosively. The resulting "bumping" can spatter the acid.
Inorganic acids react with active metals, including such structural metals as aluminium and iron, to release hydrogen, a flammable gas.
Inorganic acids can initiate the polymerisation of certain classes of organic compounds.
Inorganic acids react with cyanide compounds to release gaseous hydrogen cyanide.
Inorganic acids generate flammable and/or toxic gases in contact with dithiocarbamates, isocyanates, mercaptans, nitrides, nitriles, sulfides, and strong reducing agents. Additional gas-generating reactions occur with sulfites, nitriles, thiosulfates (to give HGS and SO3), dithionites (SO2), and even carbonates.
Acids often catalyse (increase the rate of) chemical reactions.

**SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION**

**Control parameters**

**OCCIDENTAL EXPOSURE LIMITS (OEL)**

<p>| INGREDIENT DATA |</p>
<table>
<thead>
<tr>
<th>Source</th>
<th>Ingredient</th>
<th>Material name</th>
<th>TWA</th>
<th>STEL</th>
<th>Peak</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>US OSHA Permissible Exposure Levels (PELs) - Table Z1</td>
<td>nitric acid</td>
<td>Nitric acid</td>
<td>5 mg/m^3 / 2 ppm</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>US ACGIH Threshold Limit Values (TLV)</td>
<td>nitric acid</td>
<td>Nitric acid</td>
<td>2 ppm</td>
<td>4 ppm</td>
<td>Not Available</td>
<td>TLV® Basis: URT &amp; eye in: dental erosion</td>
</tr>
<tr>
<td>US NIOSH Recommended Exposure Limits (RELs)</td>
<td>nitric acid</td>
<td>Aqua fortis, Engravers acid, Hydrogen nitrate, Red fuming nitric acid (RFNA), White fuming nitric acid (WFNA)</td>
<td>5 mg/m^3 / 2 ppm</td>
<td>10 mg/m^3 / 4 ppm</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

| EMERGENCY LIMITS |
| Ingredient | Material name | TEEL-1 | TEEL-2 | TEEL-3 |
| dysprosium(III) oxide | Dysprosium oxide, (Dysprosium(III) oxide) | 15 mg/m^3 | 170 mg/m^3 | 990 mg/m^3 |
| nitric acid | Nitric acid | Not Available | Not Available | Not Available |
| Ingredient | Original IDLH | Revised IDLH |
| dysprosium(III) oxide | Not Available | Not Available |
| nitric acid | 100 ppm | 25 ppm |
| water | Not Available | Not Available |

**Exposure controls**

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
The basic types of engineering controls are:
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
Employers may need to use multiple types of controls to prevent employee overexposure.

**Appropriate engineering controls**

Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection.
Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.
An approved self contained breathing apparatus (SCBA) may be required in some situations.
Provide adequate ventilation in warehouse or closed storage area. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

<table>
<thead>
<tr>
<th>Type of Contaminant</th>
<th>Air Speed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>solvent, vapours, degreasing etc., evaporating from tank (in still air)</td>
<td>0.25-0.5 m/s (50-100 f/min.)</td>
</tr>
<tr>
<td>aerosols, fumes from pouring operations, intermittent container filling, low speed conveyor transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)</td>
<td>0.5-1 m/s (100-200 f/min.)</td>
</tr>
</tbody>
</table>

Continued...
### SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

#### Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>colorless</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Odour</td>
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<tr>
<td>Odour threshold</td>
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<tr>
<td>pH (as supplied)</td>
<td>&lt;2</td>
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<td>Melting point / freezing point (°C)</td>
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<tr>
<td>Initial boiling point and boiling range (°C)</td>
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<tr>
<td>Flash point (°C)</td>
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<tr>
<td>Evaporation rate</td>
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<td>Flammability</td>
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<td>Upper Explosive Limit (%)</td>
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<td>Lower Explosive Limit (%)</td>
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<td>Vapour pressure (kPa)</td>
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<td>Relative density (Water = 1)</td>
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<td>Partition coefficient n-octanol / water</td>
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<tr>
<td>Auto-ignition temperature (°C)</td>
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<td>Decomposition temperature</td>
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<tr>
<td>Viscosity (cSt)</td>
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<tr>
<td>Molecular weight (g/mol)</td>
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<tr>
<td>Taste</td>
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<tr>
<td>Explosive properties</td>
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<tr>
<td>Oxidising properties</td>
<td>Not Available</td>
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<tr>
<td>Surface Tension (dyn/cm or mN/m)</td>
<td>Not Available</td>
</tr>
<tr>
<td>Gas group</td>
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</tr>
</tbody>
</table>

**Eye and face protection**

- Safety glasses with unperforated side shields may be used where continuous eye protection is desirable, as in laboratories; spectacles are not sufficient where complete eye protection is needed such as when handling bulk quantities, where there is a danger of splashing, or if the material may be under pressure.
- Chemical goggles whenever there is a danger of the material coming in contact with the eyes; goggles must be properly fitted.
- Full face shield (20 cm, 8 in minimum) may be required for supplementary but never for primary protection of eyes; these afford face protection.
- Alternatively a gas mask may replace splash goggles and face shields.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59, [AS/NZS 1336 or national equivalent]

**Body protection**

- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.

**Hands/feet protection**

- Elbow length PVC gloves
- When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

**Personal protection**

- Ensure there is ready access to a safety shower.
- Eyewash unit.
- Hands/feet protection
- Body protection
- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Overalls.
- Ensure there is ready access to a safety shower.
SECTION 10 STABILITY AND REACTIVITY

<table>
<thead>
<tr>
<th>Reactivity</th>
<th>See section 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical stability</td>
<td></td>
</tr>
<tr>
<td>Possibility of hazardous reactions</td>
<td>See section 7</td>
</tr>
<tr>
<td>Conditions to avoid</td>
<td>See section 7</td>
</tr>
<tr>
<td>Incompatible materials</td>
<td>See section 7</td>
</tr>
<tr>
<td>Hazardous decomposition products</td>
<td>See section 5</td>
</tr>
</tbody>
</table>

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled
The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Corrosive acids can cause irritation of the respiratory tract, with coughing, choking and mucous membrane damage. There may be dizziness, headache, nausea and weakness.

Ingestion
Ingestion of acidic corrosives may produce burns around and in the mouth, the throat and oesophagus. Immediate pain and difficulties in swallowing and speaking may also be evident. Dysprosium is a rare earth metal - heavy type (yttrium family). There have been no reports of poisoning in workers, although the metal can cause chest X-ray abnormalities due to its high density. The material has NOT been classified by EC Directives or other classification systems as "harmful by inhalation". This is because of the lack of corroborating animal or human evidence.

Skin Contact
Skin contact with acidic corrosives may result in pain and burns; these may be deep with distinct edges and may heal slowly with the formation of scar tissue. Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions. Open cuts, abraded or irritated skin should not be exposed to this material. Entry into the bloodstream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

Eye
If applied to the eyes, this material causes severe eye damage. Direct eye contact with acid corrosives may produce pain, tearing, sensitivity to light and burns. Mild burns of the epithelia generally recover rapidly and completely.

Chronic
Repeated or prolonged exposure to acids may result in the erosion of teeth, swelling and/or ulceration of mouth lining. Irritation of airways to lung, with cough, and inflammation of lung tissue often occurs. Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure. Dysprosium is a rare earth metal - heavy type (yttrium family). There have been no reports of poisoning in workers, although the metal can cause chest X-ray abnormalities due to its high density.

100015-1 Dysprosium (1000μg/mL in 2% HNO3)

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

Dysprosium(III) oxide

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral (rat) LD50: &gt;5000 mg/kg[2]</td>
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</tr>
</tbody>
</table>

Nitric acid

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation (rat) LC50: 0.13 mg/L/4hr[2]</td>
<td>Not Available</td>
</tr>
<tr>
<td>Inhalation (rat) LC50: 2500 ppm/1hr * t[2]</td>
<td></td>
</tr>
</tbody>
</table>

Water

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral (rat) LD50: &gt;90000 mg/kg[2]</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

Legend:
1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. * Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances

DYSPROSIUM(III) OXIDE
Lanthanide poisoning causes immediate defaecation, withering, inco-ordination, laboured breathing, and inactivity.

NITRIC ACID
Asthma-like symptoms may continue for months or even years after exposure to the material ceases. For acid mists, aerosols, vapours, data from assays for genotoxic activity in vitro suggest that eukaryotic cells are susceptible to genetic damage when the pH falls to about 6.5. The material may produce severe irritation to the eye causing pronounced inflammation.
The material may produce respiratory tract irritation, and result in damage to the lung including reduced lung function.
The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.
Oral (7) LD50: 50-500 mg/kg * [Various Manufacturers]

DYSPROSIUM(III) OXIDE & WATER

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOEC</td>
<td>16</td>
<td>Crustacea</td>
</tr>
<tr>
<td>EC50</td>
<td>107 mg/L</td>
<td></td>
</tr>
</tbody>
</table>

**Acute Toxicity**  
No significant acute toxicological data identified in literature search.

**Carcinogenicity**

**Reproductivity**

**Serious Eye Damage-Irritation**  
STOT - Single Exposure

**Respiratory or Skin sensitisation**  
STOT - Repeated Exposure

**Mutagenicity**

**Legend:**

- - Data available but does not fill the criteria for classification
- - Data available to make classification
- - Data Not Available to make classification

### SECTION 12 ECOLOGICAL INFORMATION

#### Toxicity

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Endpoint</th>
<th>Test Duration (hr)</th>
<th>Species</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>nitric acid</td>
<td>NOEC</td>
<td>16</td>
<td>Crustacea</td>
<td>107mg/L</td>
<td>4</td>
</tr>
</tbody>
</table>

**Legend:**

Extracted from 1. IUCLID Toxicity Data  
2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity  
3. EPISuite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated)  
4. US EPA, Ecotox database - Aquatic Toxicity Data  
5. ECETOC Aquatic Hazard Assessment Data  
6. NITE (Japan) - Bioconcentration Data  
7. METI (Japan) - Bioconcentration Data  
8. Vendor Data

**Ecotoxicity:**  
The tolerance of water organisms towards pH margin and variation is diverse. Recommended pH values for test species listed in OECD guidelines are between 6.0 and almost 9. Acute testing with fish showed 96h-LC50 at about pH 3.5
For Lanthanoids (Formerly Lanthanides: Synonym Rare Earth Metals and their Salts):
Environmental Fate: Rare earths, such as the lanthanoids, are relatively abundant in the crust of the Earth. These elements are not rare - scientists once thought these substances were only found in very small amounts on the Earth Most of the lanthanides occur together in nature, and they are very difficult to separate from each other. The lanthanoids form alloys, (mixtures), with many other metals, and these alloys exhibit a wide range of physical properties. Lanthanoid emissions to the environment have increased as a result of the growing industrial applications of these elements; however, robust data to evaluate the environmental fate of lanthanoids are scarce.
Atmospheric Fate: These substances react with oxygen in the atmosphere to form an oxide residue which tarnishes surfaces exposed to these elements. They burn readily in air to form oxides. Terrestrial Fate: Soil - Lanthanoids can be found in most soils. These substances are expected to strongly sorb to soil and are not expected to evaporate from soil surfaces. Plants - These substances are expected to accumulate in plants, especially duckweed. Aquatic Fate: Rare earth chlorides are very poorly soluble in water. These substances will bind to carbonated and dissolved organic matter in water. The lanthanides react slowly with cold water and more rapidly with hot water to form hydrogen gas. The lanthanum ion is expected to have high attraction to the negatively charged humic material present in most natural waters. This mechanism will also remove lanthanum from the water column.
Ecotoxicity: These elements have a high tendency to accumulate in plants and organisms. A typical oxide of this group, cerium oxide, has low toxicity to the fathead minnow, green algae, and Daphnia water fleas. Rare earth chlorides exhibit acute aquatic toxicity at concentrations exceeding 100 ppm and chronic toxicity, persisting for more than 21 days, at concentrations greater than 30 ppm. Industrial processes have little impact on altering background levels. Lanthanum 3+ is toxic to some aquatic organisms. Dissolved lanthanum is very toxic to species of Daphnia in both chronic and acute tests and may also be toxic to other species. There seems little doubt that dissolved lanthanum has at least high acute and chronic toxicity to fresh water fish and to various species of Daphnia in soft water, although water quality appears to have a very large effect on the toxicity.
Prevent, by any means available, spillage from entering drains or water courses.
**DO NOT** discharge to sewer or waterways.

#### Persistence and degradability

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>LOW</td>
<td>LOW</td>
</tr>
</tbody>
</table>

#### Bioaccumulative potential

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Bioaccumulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>LOW (LogKOW = -1.38)</td>
</tr>
</tbody>
</table>

#### Mobility in soil

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>LOW (KOC = 14.3)</td>
</tr>
</tbody>
</table>

### SECTION 13 DISPOSAL CONSIDERATIONS

#### Waste treatment methods

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Treat and neutralise at an approved treatment plant. Treatment should involve: Neutralisation with soda ash or soda/lime followed by: burial in a land-fill specifically licensed to accept chemical and/or pharmaceutical wastes or incineration in a licensed apparatus (after admixture with suitable combustible material).
- Decontaminate empty containers with 5% aqueous sodium hydroxide or soda ash, followed by water. Observe all label safeguards until containers are cleaned and destroyed.
### SECTION 14 TRANSPORT INFORMATION

#### Labels Required

| Marine Pollutant | NO |

#### Land transport (DOT)

| UN number | 3264 |
| UN proper shipping name | Corrosive liquid, acidic, inorganic, n.o.s. (contains nitric acid) |
| Transport hazard class(es) | Class 8 |
| | Subrisk Not Applicable |
| Packing group | II |
| Environmental hazard | Not Applicable |
| Special precautions for user | Hazard Label 8 |
| | Special provisions 386, B2, IB2, T11, TP2, TP27 |

#### Air transport (ICAO-IATA / DGR)

| UN number | 3264 |
| UN proper shipping name | Corrosive liquid, acidic, inorganic, n.o.s. * (contains nitric acid) |
| Transport hazard class(es) | ICAO/IATA Class 8 |
| | ICAO / IATA Subrisk Not Applicable |
| | ERG Code 8L |
| Packing group | II |
| Environmental hazard | Not Applicable |
| Special precautions for user | Special provisions A0A803 |
| | Cargo Only Packing Instructions 855 |
| | Cargo Only Maximum Qty / Pack 30 L |
| | Passenger and Cargo Packing Instructions 851 |
| | Passenger and Cargo Maximum Qty / Pack 1 L |
| | Passenger and Cargo Limited Quantity Packing Instructions Y840 |
| | Passenger and Cargo Limited Maximum Qty / Pack 0.5 L |

#### Sea transport (IMDG-Code / GGVSee)

| UN number | 3264 |
| UN proper shipping name | CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (contains nitric acid) |
| Transport hazard class(es) | IMDG Class 8 |
| | IMDG Subrisk Not Applicable |
| Packing group | II |
| Environmental hazard | Not Applicable |
| Special precautions for user | EMS Number F-A, S-B |
| | Special provisions 274 |
| | Limited Quantities 1 L |

#### Transport in bulk according to Annex II of MARPOL and the IBC code

<table>
<thead>
<tr>
<th>Source</th>
<th>Product name</th>
<th>Pollution Category</th>
<th>Ship Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMO MARPOL (Annex II) - List of Noxious Liquid Substances Carried in Bulk</td>
<td>Nitric acid (70% and over)</td>
<td>Nitric acid (less than 70%)</td>
<td>Y; Y</td>
</tr>
</tbody>
</table>

Continued...
SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

**DYSPROSIUM(III) OXIDE (1308-87-8) IS FOUND ON THE FOLLOWING REGULATORY LISTS**

- US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

**NITRIC ACID (7697-37-2) IS FOUND ON THE FOLLOWING REGULATORY LISTS**

- International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List
- Passenger and Cargo Aircraft
- US - Alaska Limits for Air Contaminants
- US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)
- US - California Permissible Exposure Limits for Chemical Contaminants
- US - Hawaii Air Contaminant Limits
- US - Idaho - Limits for Air Contaminants
- US - Massachusetts - Right To Know Listed Chemicals
- US - Michigan Exposure Limits for Air Contaminants
- US - Minnesota Permissible Exposure Limits (PELs)
- US - Oregon Permissible Exposure Limits (Z-1)
- US - Pennsylvania - Permissible Exposure Limits (Z-1)
- US - Rhode Island Hazardous Substance List
- US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants
- US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants
- US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants
- US - Washington Toxic air pollutants and their ASIL, SQER and de minimis emission values
- US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants
- US ACOSH Threshold Limit Values (TLV)
- US CWA (Clean Water Act) - List of Hazardous Substances
- US EPCRA Section 313 Chemical List
- US NIOSH Recommended Exposure Limits (RELs)
- US OSHA Permissible Exposure Levels (PELs) - Table Z1
- US SARA Section 302 Extremely Hazardous Substances
- US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

**WATER (7732-18-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS**

- US - Pennsylvania - Hazardous Substance List
- US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

Federal Regulations

Superfund Amendments and Reauthorization Act of 1986 (SARA)

**SECTION 311/312 HAZARD CATEGORIES**

- Immediate (acute) health hazard: Yes
- Delayed (chronic) health hazard: No
- Fire hazard: No
- Pressure hazard: No
- Reactivity hazard: No

**US. EPA CERCLA HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES (40 CFR 302.4)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Reportable Quantity in Pounds (lb)</th>
<th>Reportable Quantity in kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitric acid</td>
<td>1000</td>
<td>454</td>
</tr>
</tbody>
</table>

State Regulations

**US. CALIFORNIA PROPOSITION 65**

None Reported

<table>
<thead>
<tr>
<th>National Inventory</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - AICS</td>
<td>Y</td>
</tr>
<tr>
<td>Canada - DSL</td>
<td>N (dysprosium(III) oxide)</td>
</tr>
<tr>
<td>Canada - NDSL</td>
<td>N (water; nitric acid)</td>
</tr>
<tr>
<td>China - IECS</td>
<td>Y</td>
</tr>
<tr>
<td>Europe - EINEC / ELINCS / NLP</td>
<td>Y</td>
</tr>
<tr>
<td>Japan - ENCS</td>
<td>N (water)</td>
</tr>
<tr>
<td>Korea - KECI</td>
<td>Y</td>
</tr>
<tr>
<td>New Zealand - NZIoC</td>
<td>Y</td>
</tr>
<tr>
<td>Philippines - PICCS</td>
<td>N (dysprosium(III) oxide)</td>
</tr>
<tr>
<td>USA - TSCA</td>
<td>Y</td>
</tr>
</tbody>
</table>

**Legend:**

- Y = All ingredients are on the inventory
- N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing (see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Other information
Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

- PC - TWA: Permissible Concentration-Time Weighted Average

Continued...
PC — STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit
IDLH: Immediately Dangerous to Life or Health Concentrations
OSF: Odour Safety Factor
NOAEL: No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index

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