

10 10-1 Cerium (10 µg/mL in 2% HNO₃)

High-Purity Standards

Catalogue number: **10 10-1**
 Version No: **3.3**
 Safety Data Sheet according to OSHA HazCom Standard (2012) requirements

Chemwatch Hazard Alert Code: **3**

Issue Date: **05/31/2017**
 Print Date: **05/31/2017**
 S.GHS.USA.EN

SECTION 1 IDENTIFICATION

Product Identifier

Product name	10 10-1 Cerium (10 µg/mL in 2% HNO ₃)
Synonyms	10µg/mL Cerium in 2% HNO ₃
Proper shipping name	Corrosive liquid, acidic, inorganic, n.o.s. (contains nitric acid)
Other means of identification	10 10-1

Recommended use of the chemical and restrictions on use

Relevant identified uses	Use according to manufacturer's directions.
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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
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Label elements

Hazard pictogram(s)	
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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

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P260 Do not breathe dust/fume/gas/mist/vapours/spray.

Precautionary statement(s) Response

P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

Precautionary statement(s) Storage

P405 Store locked up.

Precautionary statement(s) Disposal

P501 Dispose of contents/container in accordance with local regulations.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
7697-37-2	2	<u>nitric acid</u>
7732-18-5	balance	<u>water</u>
1306-38-3	0.001 (as Ce)	<u>cerium(IV) oxide</u>

SECTION 4 FIRST-AID MEASURES

Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none">▶ 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.▶ Transport to hospital or doctor without delay.▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	<p>If skin or hair contact occurs:</p> <ul style="list-style-type: none">▶ 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	<ul style="list-style-type: none">▶ If fumes or combustion products are inhaled remove from contaminated area.▶ Lay patient down. Keep warm and rested.▶ Prosthesis 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, without delay.▶ Inhalation of vapours or aerosols (mists, fumes) may cause lung oedema.▶ Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs).▶ As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete rest (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested.▶ Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered. <p>This must definitely be left to a doctor or person authorised by him/her. (ICSC13719)</p>
Ingestion	<ul style="list-style-type: none">▶ 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 cricothyroidotomy 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 desiccating 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:

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- ▶ Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.
- ▶ Deep second-degree burns may benefit from topical silver sulfadiazine.

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).

[Ellenhorn and Barceloux: Medical Toxicology]

SECTION 5 FIRE-FIGHTING MEASURES

Extinguishing media

- ▶ Water spray or fog.
- ▶ Foam.
- ▶ Dry chemical powder.
- ▶ BCF (where regulations permit).
- ▶ Carbon dioxide.

Special hazards arising from the substrate or mixture

Fire Incompatibility	None known.
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Special protective equipment and precautions for fire-fighters

Fire Fighting	<ul style="list-style-type: none">▶ Alert Fire Brigade and tell them location and nature of hazard.▶ Wear full body protective clothing with breathing apparatus.▶ Prevent, by any means available, spillage from entering drains or water course.▶ Use fire fighting procedures suitable for surrounding area.▶ Do not approach containers suspected to be hot.▶ Cool fire exposed containers with water spray from a protected location.▶ If safe to do so, remove containers from path of fire.▶ Equipment should be thoroughly decontaminated after use.
Fire/Explosion Hazard	<ul style="list-style-type: none">▶ 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	<ul style="list-style-type: none">▶ 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	<ul style="list-style-type: none">▶ Clear area of personnel and move upwind.▶ Alert Fire Brigade and tell them location and nature of hazard.▶ Wear full body protective clothing with breathing apparatus.▶ Prevent, by any means available, spillage from entering drains or water course.▶ Consider evacuation (or protect in place).▶ Stop leak if safe to do so.▶ Contain spill with sand, earth or vermiculite.▶ Collect recoverable product into labelled containers for recycling.▶ Neutralise/decontaminate residue (see Section 13 for specific agent).▶ Collect solid residues and seal in labelled drums for disposal.▶ Wash area and prevent runoff into drains.▶ After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.▶ If contamination of drains or waterways occurs, advise emergency services.

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

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	<ul style="list-style-type: none">▶ Avoid all personal contact, including inhalation.▶ Wear protective clothing when risk of exposure occurs.▶ Use in a well-ventilated area.
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Continued...

10 10-1 Cerium (10 µg/mL in 2% HNO₃)

	<ul style="list-style-type: none"> ▶ 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	<ul style="list-style-type: none"> ▶ Store in original containers. ▶ Keep containers securely sealed. ▶ Store in a cool, dry, well-ventilated area. ▶ Store away from incompatible materials and foodstuff 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	<ul style="list-style-type: none"> ▶ 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. <p>For low viscosity materials</p> <ul style="list-style-type: none"> ▶ 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. <p>For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):</p> <ul style="list-style-type: none"> ▶ Removable head packaging; ▶ Cans with friction closures and ▶ low pressure tubes and cartridges <p>may be used.</p> <p>-</p> <p>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.</p>
Storage incompatibility	<ul style="list-style-type: none"> ▶ 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 aluminum 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, nitrites, thiosulfates (to give H₂S and SO₃), dithionites (SO₂), and even carbonates. ▶ Acids often catalyse (increase the rate of) chemical reactions.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
US OSHA Permissible Exposure Levels (PELs) - Table Z1	nitric acid	Nitric acid	5 mg/m ³ / 2 ppm	10 mg/m ³ / 4 ppm	Not Available	TLV® Basis: URT & eye irr; dental erosion
US NIOSH Recommended Exposure Limits (RELs)	nitric acid	Aqua fortis, Engravers acid, Hydrogen nitrate, Red fuming nitric acid (RFNA), White fuming nitric acid (WFNA)	5 mg/m ³ / 2 ppm	4 ppm	Not Available	Not Available
US ACGIH Threshold Limit Values (TLV)	nitric acid	Nitric acid	2 ppm	Not Available	Not Available	Not Available


EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
nitric acid	Nitric acid	Not Available	Not Available	Not Available
cerium(IV) oxide	Ceric oxide	3 mg/m ³	33 mg/m ³	200 mg/m ³

Ingredient	Original IDLH	Revised IDLH
nitric acid	100 ppm	25 ppm
water	Not Available	Not Available
cerium(IV) oxide	Not Available	Not Available

Exposure controls

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Appropriate engineering controls	<p>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.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>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.</p> <p>Employers may need to use multiple types of controls to prevent employee overexposure.</p> <p>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.</p> <p>An approved self contained breathing apparatus (SCBA) may be required in some situations.</p> <p>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.</p>										
	<table border="1"> <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 conveyer 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> <tr> <td>direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)</td> <td>1-2.5 m/s (200-500 f/min.)</td> </tr> <tr> <td>grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).</td> <td>2.5-10 m/s (500-2000 f/min.)</td> </tr> </tbody> </table>	Type of Contaminant:	Air Speed:	solvent, vapours, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min.)	aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)	direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)	grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)
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<p>Within each range the appropriate value depends on:</p> <table border="1"> <thead> <tr> <th>Lower end of the range</th> <th>Upper end of the range</th> </tr> </thead> <tbody> <tr> <td>1: Room air currents minimal or favourable to capture</td> <td>1: Disturbing room air currents</td> </tr> <tr> <td>2: Contaminants of low toxicity or of nuisance value only.</td> <td>2: Contaminants of high toxicity</td> </tr> <tr> <td>3: Intermittent, low production.</td> <td>3: High production, heavy use</td> </tr> <tr> <td>4: Large hood or large air mass in motion</td> <td>4: Small hood-local control only</td> </tr> </tbody> </table>	Lower end of the range	Upper end of the range	1: Room air currents minimal or favourable to capture	1: Disturbing room air currents	2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity	3: Intermittent, low production.	3: High production, heavy use	4: Large hood or large air mass in motion	4: Small hood-local control only	
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<p>Simple theory shows that air velocity falls rapidly with distance from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.</p>											
Personal protection											
Eye and face protection	<ul style="list-style-type: none"> ▶ 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] 										
Skin protection	See Hand protection below										
Hands/feet protection	<ul style="list-style-type: none"> ▶ Elbow length PVC gloves ▶ When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots. 										
Body protection	See Other protection below										
Other protection	<ul style="list-style-type: none"> ▶ Overalls. ▶ PVC Apron. ▶ PVC protective suit may be required if exposure severe. ▶ Eyewash unit. ▶ Ensure there is ready access to a safety shower. 										
Thermal hazards	Not Available										

Respiratory protection

Type A Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	colorless		
Physical state	Liquid	Relative density (Water = 1)	Not Available

10 10-1 Cerium (10 µg/mL in 2% HNO₃)

Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	<2	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Available
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water (g/L)	Miscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> ▶ Contact with alkaline material liberates heat ▶ Unstable in the presence of incompatible materials. ▶ Product is considered stable. ▶ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	<p>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.</p> <p>Exposure to vapours of some rare earth salts can cause sensitivity to heat, itching, and increased sensitivity of smell and taste. Other effects include inflamed airways and lung, emphysema, regional narrowing of terminal airways and cell changes.</p> <p>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.</p>
Ingestion	<p>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.</p> <p>The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.</p>
Skin Contact	<p>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.</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p> <p>Entry into the blood-stream, 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.</p>
Eye	<p>If applied to the eyes, this material causes severe eye damage.</p> <p>Direct eye contact with acid corrosives may produce pain, tears, sensitivity to light and burns. Mild burns of the epithelia generally recover rapidly and completely.</p>
Chronic	<p>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.</p> <p>Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems.</p> <p>Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.</p>

10 10-1 Cerium (10 µg/mL in 2% HNO ₃)	TOXICITY	IRRITATION
	Not Available	Not Available
nitric acid	TOXICITY	IRRITATION
	Inhalation (rat) LC50: 625 ppm/1h ^[2]	Not Available

10 10-1 Cerium (10 µg/mL in 2% HNO₃)

water	TOXICITY	IRRITATION
	Not Available	Not Available
cerium(IV) oxide	TOXICITY	IRRITATION
	Oral (rat) LD50: 1000 mg/kg ^[2]	Not Available

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

NITRIC ACID	For acid mists, aerosols, vapours Test results 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 (?) LD50: 50-500 mg/kg * [Various Manufacturers]
WATER	No significant acute toxicological data identified in literature search.
CERIUM(IV) OXIDE	Lanthanide poisoning causes immediate defaecation, writhing, inco-ordination, laboured breathing, and inactivity. For typical lanthanides: Symptoms of toxicity from rare earth elements include writhing, inco-ordination, laboured breathing, and sedation. Inhalation (rat) TCLo: 50 mg/m ³ /4h/17W-I
NITRIC ACID & CERIUM(IV) OXIDE	Asthma-like symptoms may continue for months or even years after exposure to the material ends.

Acute Toxicity	☒	Carcinogenicity	☒
Skin Irritation/Corrosion	✓	Reproductivity	☒
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	☒
Respiratory or Skin sensitisation	☒	STOT - Repeated Exposure	☒
Mutagenicity	☒	Aspiration Hazard	☒

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

10 10-1 Cerium (10 µg/mL in 2% HNO ₃)	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
nitric acid	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	NOEC	16	Crustacea	107mg/L	4
water	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
cerium(IV) oxide	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Legend: Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite 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 Cerium:

Environmental Fate: Despite their name, rare earth elements are relatively plentiful in the Earth's crust, with cerium being the 25th most abundant element. Cerium compounds include cerium oxide, cerium carbonate, and cerium chloride.

Atmospheric Fate: Cerium oxidizes very readily at room temperature, especially in moist air. Except for europium, cerium is the most reactive of the rare-earth metals.

Terrestrial Fate: Soil ♦ Cerium is found in minerals including allanite, monazite, cerite, and bastnaesite. Plants ♦ Crops can take up cerium.

Aquatic Fate: Cerium oxide and cerium carbonate are insoluble in water, while cerium chloride is soluble in water. Cerium has affinity for humic substances, which may alter its availability in aquatic systems. The substance slowly decomposes in cold water, and rapidly decomposes in hot water. Alkali solutions and dilute/concentrated acids attack the metal rapidly.

Ecotoxicity: Current fate and transport studies are limited and may not adequately address long term environmental exposure risks to both humans and other living organisms. Although cerium has low acute toxicity, long term health and environmental effects are less well understood. The form cerium takes can also influence its biological and environmental fate. Oxides and hydroxides of cerium are poorly soluble in body fluids thus are slow to clear from the organism. Cerium can affect the respiratory tract and associated lymph nodes, (inhalation exposure), and, once in the

10 10-1 Cerium (10 µg/mL in 2% HNO₃)

circulatory system, can partition to the skeleton, liver, kidney and spleen. Studies subjecting animals to large dosages of cerium show evidence of neurological effects, possibly due to cerium competing with calcium binding sites in the brain. Long term human expose to cerium is correlated with rare earth pneumoconiosis, but, the precise role of cerium in this disease is not well characterized.

Prevent, by any means available, spillage from entering drains or water courses.

DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
water	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
water	LOW (LogKOW = -1.38)

Mobility in soil

Ingredient	Mobility
water	LOW (KOC = 14.3)


SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	Waste treatment methods
	<ul style="list-style-type: none"> ▶ 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

Labels Required	Labels
	
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)	<table border="1"> <tr> <td>Class</td> <td>8</td> </tr> <tr> <td>Subrisk</td> <td>Not Applicable</td> </tr> </table>	Class	8	Subrisk	Not Applicable
Class	8				
Subrisk	Not Applicable				
Packing group	II				
Environmental hazard	Not Applicable				
Special precautions for user	<table border="1"> <tr> <td>Hazard Label</td> <td>8</td> </tr> <tr> <td>Special provisions</td> <td>386, B2, IB2, T11, TP2, TP27</td> </tr> </table>	Hazard Label	8	Special provisions	386, B2, IB2, T11, TP2, TP27
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)	<table border="1"> <tr> <td>ICAO/IATA Class</td> <td>8</td> </tr> <tr> <td>ICAO / IATA Subrisk</td> <td>Not Applicable</td> </tr> <tr> <td>ERG Code</td> <td>8L</td> </tr> </table>	ICAO/IATA Class	8	ICAO / IATA Subrisk	Not Applicable	ERG Code	8L
ICAO/IATA Class	8						
ICAO / IATA Subrisk	Not Applicable						
ERG Code	8L						
Packing group	II						
Environmental hazard	Not Applicable						

10 10-1 Cerium (10 µg/mL in 2% HNO3)

Special precautions for user	Special provisions	A3A803
	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

Source	Product name	Pollution Category	Ship Type
IMO MARPOL (Annex II) - List of Noxious Liquid Substances Carried in Bulk	Nitric acid (70% and over) Nitric acid (less than 70%)	Y; Y	2 2

SECTION 15 REGULATORY INFORMATION

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

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

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
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CERIUM(IV) OXIDE(1306-38-3) IS FOUND ON THE FOLLOWING REGULATORY LISTS

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

Name	Reportable Quantity in Pounds (lb)	Reportable Quantity in kg
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10 10-1 Cerium (10 µg/mL in 2% HNO3)

Nitric acid	1000	454
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State Regulations

US. CALIFORNIA PROPOSITION 65

None Reported

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (water; cerium(IV) oxide; nitric acid)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	N (water; cerium(IV) oxide; nitric acid)
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
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

Ingredients with multiple cas numbers

Name	CAS No
cerium(IV) oxide	1306-38-3, 23322-64-7

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
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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