

NITRITE TITRANT MN2

Wilhelmsen Ships Service AS* Central Warehouse

Part Number: 777122

Version No: 7.10

Safety Data Sheet

Issue Date: 27/04/2022

Print Date: 15/06/2023

L.GHS.TTO.EN

SECTION 1 Identification of the substance / mixture and of the company / undertaking

Product Identifier

| | |
|-------------------------------|---|
| Product name | NITRITE TITRANT MN2 |
| Chemical Name | Not Applicable |
| Synonyms | KS364 - N2 (Marine) mN2, 0.136N Cerium(IV) Sulfate Product Part Number: 777122(Used in MO380, Boiler test kit, MO246A Motor ship test kit, MO248A Nitrite test kit) |
| Proper shipping name | CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (contains sulfuric acid) |
| Chemical formula | Not Applicable |
| Other means of identification | 777122, 777066, 777067, 777100 |

Relevant identified uses of the substance or mixture and uses advised against

| | |
|--------------------------|---------|
| Relevant identified uses | Reagent |
|--------------------------|---------|

Details of the manufacturer or supplier of the safety data sheet

| | | | |
|-------------------------|---|--|---|
| Registered company name | Wilhelmsen Ships Service AS* Central Warehouse | Outback (M)SDS portal: http://jr.chemwatch.net/outb/account/login?login=wilhelmsen | Wilhelmsen Ships Service AS* Central Warehouse |
| Address | Willem Barentszstraat 50 Rotterdam Netherlands | -----Use our Outback portal to obtain our (M)SDSs in other languages and/or format.----- For questions relating to our SDSs please use Email: WSS.GLOBAL.SDSINFO@wilhelmsen.com ----- Norway | Willem Barentszstraat 50 Rotterdam Netherlands |
| Telephone | +31 10 4877 777 | Not Available | +31 10 4877 777 |
| Fax | Not Available | Not Available | Not Available |
| Website | http://www.wilhelmsen.com | http://www.wilhelmsen.com | http://www.wilhelmsen.com |
| Email | wss.rotterdam@wilhelmsen.com | wss.global.sdsinfo@wilhelmsen.com | wss.rotterdam@wilhelmsen.com |

Emergency telephone number

| | | | |
|-----------------------------------|--------------------------|-------------------|--------------------------|
| Association / Organisation | Dutch nat. poison centre | 24hrs - Chemwatch | Dutch nat. poison centre |
| Emergency telephone numbers | + 31 88 7558561 | +31-10-4877700 | + 31 30 274 88 88 |
| Other emergency telephone numbers | + 31 10 4877700 | +31-10-4877700 | + 31-10-4877700 |

| | |
|----------------------------|-------------------------------------|
| Association / Organisation | CHEMWATCH EMERGENCY RESPONSE (24/7) |
|----------------------------|-------------------------------------|

| | |
|-----------------------------------|-----------------|
| Emergency telephone numbers | +61 3 9573 3188 |
| Other emergency telephone numbers | Not Available |


Once connected and if the message is not in your preferred language then please dial 01

SECTION 2 Hazards identification

Classification of the substance or mixture

| | |
|----------------|---|
| Classification | Skin Corrosion/Irritation Category 1C, Corrosive to Metals Category 1, Serious Eye Damage/Eye Irritation Category 1, Carcinogenicity Category 1 |
|----------------|---|

Label elements

| | |
|---------------------|---|
| Hazard pictogram(s) |   |
|---------------------|---|

| | |
|-------------|--------|
| Signal word | Danger |
|-------------|--------|

Hazard statement(s)

| | |
|------|--|
| H314 | Causes severe skin burns and eye damage. |
| H290 | May be corrosive to metals. |
| H350 | May cause cancer. |

Precautionary statement(s) General

| | |
|------|---|
| P101 | If medical advice is needed, have product container or label at hand. |
| P102 | Keep out of reach of children. |
| P103 | Read carefully and follow all instructions. |

Precautionary statement(s) Prevention

| | |
|------|--|
| P201 | Obtain special instructions before use. |
| P260 | Do not breathe mist/vapours/spray. |
| P264 | Wash all exposed external body areas thoroughly after handling. |
| P280 | Wear protective gloves, protective clothing, eye protection and face protection. |
| P234 | Keep only in original packaging. |

Precautionary statement(s) Response

| | |
|----------------|--|
| P301+P330+P331 | IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. |
| P303+P361+P353 | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or 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. |
| P308+P313 | IF exposed or concerned: Get medical advice/ attention. |
| P310 | Immediately call a POISON CENTER/doctor/physician/first aider. |
| P363 | Wash contaminated clothing before reuse. |
| P390 | Absorb spillage to prevent material damage. |
| P304+P340 | IF INHALED: Remove person to fresh air and keep comfortable for breathing. |

Precautionary statement(s) Storage

| | |
|------|------------------|
| P405 | Store locked up. |
|------|------------------|

Precautionary statement(s) Disposal

| | |
|------|--|
| P501 | Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation. |
|------|--|

SECTION 3 Composition / information on ingredients

Substances

See section below for composition of Mixtures

Mixtures

| CAS No | %[weight] | Name |
|------------|-----------|---------------------------|
| 13590-82-4 | 2.5-5 | <u>cerium(IV) sulfate</u> |
| 7664-93-9 | 5-10 | <u>sulfuric acid</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. 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, 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. |

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 dessicating 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.
- Deep second-degree burns may benefit from topical silver sulfadiazine.

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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 Firefighting 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. |
|----------------------|-------------|

Advice for firefighters

| | |
|-----------------------|---|
| 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. |
| 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. <p>Decomposition may produce toxic fumes of:</p> <ul style="list-style-type: none"> › sulfur oxides (SOx) › metal oxides |

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 | <p>Chemical Class:acidic compounds, inorganic</p> <p>For release onto land: recommended sorbents listed in order of priority.</p> <table><thead><tr><th>SORBENT TYPE</th><th>RANK</th><th>APPLICATION</th><th>COLLECTION</th><th>LIMITATIONS</th></tr></thead><tbody><tr><td colspan="5">LAND SPILL - SMALL</td></tr></tbody></table> | | | | | SORBENT TYPE | RANK | APPLICATION | COLLECTION | LIMITATIONS | LAND SPILL - SMALL | | | | |
| SORBENT TYPE | RANK | APPLICATION | COLLECTION | LIMITATIONS | | | | | | | | | | | |
| LAND SPILL - SMALL | | | | | | | | | | | | | | | |

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| | | | | |
|--------------------------------|---|--------|------------|-----------------|
| foamed glass - pillows | 1 | throw | pitchfork | R, P, DGC, RT |
| expanded mineral - particulate | 2 | shovel | shovel | R, I, W, P, DGC |
| foamed glass - particulate | 2 | shovel | shovel | R, W, P, DGC |
| LAND SPILL - MEDIUM | | | | |
| expanded mineral -particulate | 1 | blower | skiploader | R, I, W, P, DGC |
| foamed glass- particulate | 2 | blower | skiploader | R, W, P, DGC |
| foamed glass - particulate | 3 | throw | skiploader | R, W, P, DGC |

Legend

DGC: Not effective where ground cover is dense

R; Not reusable

I: Not incinerable

P: Effectiveness reduced when rainy

RT:Not effective where terrain is rugged

SS: Not for use within environmentally sensitive sites

W: Effectiveness reduced when windy

Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control;

R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988

- ▶ 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.

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. ▶ 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. |
| 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> |
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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 aluminum and iron, to release hydrogen, a flammable gas.
- ▶ Reacts with mild steel, galvanised steel / zinc producing hydrogen gas which may form an explosive mixture with air.



X — Must not be stored together

O — May be stored together with specific preventions

+ — May be stored together

Note: Depending on other risk factors, compatibility assessment based on the table above may not be relevant to storage situations, particularly where large volumes of dangerous goods are stored and handled. Reference should be made to the Safety Data Sheets for each substance or article and risks assessed accordingly.

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

| Source | Ingredient | Material name | TWA | STEL | Peak | Notes |
|--|---------------|-----------------------|------------|---------------|---------------|---------------|
| EU Consolidated List of Indicative Occupational Exposure Limit Values (IOELVs) | sulfuric acid | Sulphuric acid (mist) | 0,05 mg/m3 | Not Available | Not Available | Not Available |

Emergency Limits

| Ingredient | TEEL-1 | TEEL-2 | TEEL-3 |
|--------------------|---------------|---------------|---------------|
| cerium(IV) sulfate | 30 mg/m3 | 330 mg/m3 | 2,000 mg/m3 |
| sulfuric acid | Not Available | Not Available | Not Available |

| Ingredient | Original IDLH | Revised IDLH |
|--------------------|---------------|---------------|
| cerium(IV) sulfate | Not Available | Not Available |
| sulfuric acid | 15 mg/m3 | Not Available |

Occupational Exposure Banding

| Ingredient | Occupational Exposure Band Rating | Occupational Exposure Band Limit |
|--|-----------------------------------|----------------------------------|
| cerium(IV) sulfate | E | ≤ 0.01 mg/m ³ |
| Notes: Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health. | | |

MATERIAL DATA

as cerium

CEL TWA: 1 mg/m3 (compare TLV-TWA yttrium)

(CEL=Chemwatch Exposure Limit)

Exposure to the vapours of some rare earth salts reportedly produces sensitivity to heat, itching and an increased perception of odour and taste. Other effects may include bronchiolitis, subacute bronchitis, acute transient chemical pneumonitis, focal hypertrophic emphysema, regional bronchiolar stricturing and cellular eosinophilia. In rare fatal cases of exposure to the rare-earth fluoride and/or oxide mixtures, delayed chemical hyperaemia has occurred. Lung granulomas have also been seen in experimental animals.


NOTE: Detector tubes for sulfuric acid, measuring in excess of 1 mg/m3, are commercially available.

Based on controlled inhalation studies the TLV-TWA is thought to be protective against the significant risk of pulmonary irritation and incorporates a margin of safety so as to prevent injury to the skin and teeth seen in battery workers acclimatised to workplace concentrations of 16 mg/m3. Experimental evidence in normal unacclimated humans indicates the recognition, by all subjects, of odour, taste or irritation at 3 mg/m3 or 5 mg/m3. All subjects reported these levels to be objectionable but to varying degrees.

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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. Employers may need to use multiple types of controls to prevent employee overexposure.</p> |
| Individual protection measures, such as personal protective equipment |  |
| 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. [AS/NZS 1337.1, EN166 or national equivalent] ▸ 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. |
| 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. |

Recommended material(s)

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the

computer-generated selection:

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| Material | CPI |
|------------------|-----|
| NEOPRENE | A |
| BUTYL | C |
| NATURAL RUBBER | C |
| NATURAL+NEOPRENE | C |
| NEOPRENE/NATURAL | C |
| NITRILE | C |
| PE | C |
| PVA | C |
| PVC | C |
| SARANEX-23 | C |
| VITON | C |

* CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

Respiratory protection

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

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required.

Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

| Required Minimum Protection Factor | Half-Face Respirator | Full-Face Respirator | Powered Air Respirator |
|------------------------------------|----------------------|----------------------|-------------------------|
| up to 10 x ES | E-AUS P2 | - | E-PAPR-AUS / Class 1 P2 |
| up to 50 x ES | - | E-AUS / Class 1 P2 | - |
| up to 100 x ES | - | E-2 P2 | E-PAPR-2 P2 ^ |

^ - Full-face

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

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* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

| | | | |
|---|------------------------|--|----------------|
| Appearance | Yellow | | |
| Physical state | Liquid | Relative density (Water = 1) | 1.24 |
| Odour | Not Available | Partition coefficient n-octanol / water | Not Available |
| Odour threshold | Not Available | Auto-ignition temperature (°C) | Not Available |
| pH (as supplied) | <1 | Decomposition temperature (°C) | 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 Applicable |
| Flash point (°C) | Not Applicable | Taste | Not Available |
| Evaporation rate | Not Available BuAC = 1 | Explosive properties | Not Available |
| Flammability | Not Applicable | Oxidising properties | Not Available |
| Upper Explosive Limit (%) | Not Applicable | Surface Tension (dyn/cm or mN/m) | Not Available |
| Lower Explosive Limit (%) | Not Applicable | Volatile Component (%vol) | Not Available |
| Vapour pressure (kPa) | Not Available | Gas group | Not Available |
| Solubility in water | 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>Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may produce toxic effects.</p> <p>Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system, in a substantial number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.</p> <p>Acidic corrosives produce respiratory tract irritation with coughing, choking and mucous membrane damage. Symptoms of exposure may include dizziness, headache, nausea and weakness. In more severe exposures, pulmonary oedema may be</p> |
|----------------|---|

Continued...

| | <p>evident either immediately or after a latent period of 5-72 hours. Symptoms of pulmonary oedema include a tightness in the chest, dyspnoea, frothy sputum and cyanosis. Examination may reveal hypotension, a weak and rapid pulse and moist rates. Death, due to anoxia, may occur several hours after onset of the pulmonary oedema.</p> <p>The toxicology of rare earth metal oxides has been determined by pathological and biochemical examination of rodents exposed to the oxides by oral, intraperitoneal or endotracheal routes. Weakly expressed general toxic action of the oxides is seen in acute and prolonged exposure. The dusts cause pronounced changes in the lungs. (The oxides of the rare earth metals are significantly less toxic than their salts.)</p> <p>Symptoms of exposure to rare earth oxides are coughing, congestion, granuloma in lungs and haemoglobinaemia. Rare earths may cause impairment of blood clotting.</p> <p>Exposure to rare earth oxide vapours has been reported to result in sensitivity to heat, itching, and an increased awareness of odour and taste, bronchiolitis, sub-acute bronchiolitis (inflammation of the bronchial tubes), acute transient chemical pneumonitis (inflammation of the lungs caused by chemical irritation), focal hypertrophia (excessive development of an organ), emphysema, regional bronchiolar stricturing, cellular eosinophilia (abnormal increase in the number of leucocytes with cytoplasmic inclusions, in the blood that is characteristic of allergic reactions), and, in some cases, fatal delayed chemical hyperemia (excess of blood in a body part).</p> <p>Intratracheal administration to animals of some rare earth oxides, has been reported to cause changes ranging from mild to marked fibrosis (a condition marked by the increase of interstitial fibrous tissue), emphysema (a condition of the lungs marked by abnormal dilation of the its air spaces and distension of its walls), small white nodules, granulomas (a mass or nodule of chronically inflamed tissue with granulations that are generally associated with an infective process), giant cells, and accumulation of dust in the lungs.</p> | | | | |
|---------------------|--|----------|------------|---------------|---------------|
| Ingestion | <p>Ingestion of acidic corrosives may produce circumoral burns with a distinct discolouration of the mucous membranes of the mouth, throat and oesophagus. Immediate pain and difficulties in swallowing and speaking may also be evident. Oedema of the epiglottis may produce respiratory distress and possibly, asphyxia. Nausea, vomiting, diarrhoea and a pronounced thirst may occur. More severe exposures may produce a vomitus containing fresh or dark blood and large shreds of mucosa. Shock, with marked hypotension, weak and rapid pulse, shallow respiration and clammy skin may be symptomatic of the exposure. Circulatory collapse may, if left untreated, result in renal failure.</p> <p>The material is not thought to produce adverse health effects following ingestion (as classified by EC Directives using animal models). Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum.</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.</p> <p>Skin contact is not thought to produce harmful health effects (as classified under EC Directives using animal models). Systemic harm, however, has been identified following exposure of animals by at least one other route and the material may still produce health damage following entry through wounds, lesions or abrasions. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.</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, puncture wounds 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>Direct eye contact with acid corrosives may produce pain, lachrymation, photophobia and burns. Mild burns of the epithelia generally recover rapidly and completely. Severe burns produce long-lasting and possible irreversible damage. The appearance of the burn may not be apparent for several weeks after the initial contact. The cornea may ultimately become deeply vascularised and opaque resulting in blindness.</p> <p>When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation.</p> <p>Irritation of the eyes may produce a heavy secretion of tears (lachrymation).</p> | | | | |
| Chronic | <p>Repeated or prolonged exposure to acids may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Gastrointestinal disturbances may also occur. Chronic exposures may result in dermatitis and/or conjunctivitis.</p> <p>The impact of inhaled acidic agents on the respiratory tract depends upon a number of interrelated factors. These include physicochemical characteristics, e.g., gas versus aerosol; particle size (small particles can penetrate deeper into the lung); water solubility (more soluble agents are more likely to be removed in the nose and mouth). Given the general lack of information on the particle size of aerosols involved in occupational exposures to acids, it is difficult to identify their principal deposition site within the respiratory tract.</p> <p>On the basis of epidemiological data, it has been concluded that prolonged inhalation of the material, in an occupational setting, may produce cancer in humans.</p> <p>Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.</p> <p>Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed. Serious damage (clear functional disturbance or morphological change which may have toxicological significance) is likely to be caused by repeated or prolonged exposure. As a rule the material produces, or contains a substance which produces severe lesions. Such damage may become apparent following direct application in subchronic (90 day) toxicity studies or following sub-acute (28 day) or chronic (two-year) toxicity tests.</p> <p>Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.</p> | | | | |
| NITRITE TITRANT MN2 | <table><tr><th>TOXICITY</th><th>IRRITATION</th></tr><tr><td>Not Available</td><td>Not Available</td></tr></table> | TOXICITY | IRRITATION | Not Available | Not Available |
| TOXICITY | IRRITATION | | | | |
| Not Available | Not Available | | | | |

NITRITE TITRANT MN2

| | | |
|--------------------|---|---|
| cerium(IV) sulfate | TOXICITY | IRRITATION |
| | Not Available | Not Available |
| sulfuric acid | TOXICITY | IRRITATION |
| | Inhalation(Mouse) LC50: 0.85 mg/l4h ^[1] Oral (Rat) LD50: 2140 mg/kg ^[2] | Eye (rabbit): 1.38 mg SEVERE Eye (rabbit): 5 mg/30sec SEVERE |
| 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 | |

| | |
|---|---|
| NITRITE TITRANT MN2 | 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. Cells from the respiratory tract have not been examined in this respect. Mucous secretion may protect the cells of the airways from direct exposure to inhaled acidic mists, just as mucous plays an important role in protecting the gastric epithelium from its auto-secreted hydrochloric acid. In considering whether pH itself induces genotoxic events in vivo in the respiratory system, comparison should be made with the human stomach, in which gastric juice may be at pH 1-2 under fasting or nocturnal conditions, and with the human urinary bladder, in which the pH of urine can range from <5 to > 7 and normally averages 6.2. Furthermore, exposures to low pH in vivo differ from exposures <i>in vitro</i> in that, <i>in vivo</i> , only a portion of the cell surface is subjected to the adverse conditions, so that perturbation of intracellular homeostasis may be maintained more readily than in vitro. |
| CERIUM(IV) SULFATE | Symptoms of acute lanthanide toxicity in rats are immediate defecation, writhing, ataxia (the inability to coordinate voluntary muscular movement), sedation, laboured respiration and reduced activity. Death is due mainly to respiratory and cardiac failure. The rare earths exhibit low toxicity following ingestion but may be toxic by the intraperitoneal route and mildly toxic when administered by the subcutaneous route. The production of skin and lung granulomas, following exposure, may also occur. No significant acute toxicological data identified in literature search. |
| SULFURIC ACID | Occupational exposures to strong inorganic acid mists of sulfuric acid: WARNING: For inhalation exposure <u>ONLY</u> : This substance has been classified by the IARC as Group 1: CARCINOGENIC TO HUMANS |
| NITRITE TITRANT MN2 & CERIUM(IV) SULFATE & SULFURIC ACID | Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production. |

| | | | |
|--|---|---------------------------------|---|
| 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 either not available or does not fill the criteria for classification
✓ – Data available to make classification

SECTION 12 Ecological information

Toxicity

| | | | | | |
|----------------------------|-----------------|---------------------------|-------------------------------|---------------|---------------|
| NITRITE TITRANT MN2 | Endpoint | Test Duration (hr) | Species | Value | Source |
| | Not Available | Not Available | Not Available | Not Available | Not Available |
| cerium(IV) sulfate | Endpoint | Test Duration (hr) | Species | Value | Source |
| | EC50 | 72h | Algae or other aquatic plants | 0.507mg/l | 2 |
| | EC50 | 48h | Crustacea | 0.98mg/l | 2 |
| | NOEC(ECx) | 48h | Crustacea | 0.23mg/l | 2 |

Continued...

NITRITE TITRANT MN2

| sulfuric acid | Endpoint | Test Duration (hr) | Species | Value | Source |
|----------------|--|--------------------|-------------------------------|-----------|--------|
| | ErC50 | 72h | Algae or other aquatic plants | >100mg/l | 2 |
| | NOEC(ECx) | 1560h | Fish | 0.025mg/l | 2 |
| | EC50 | 72h | Algae or other aquatic plants | >100mg/l | 2 |
| | LC50 | 96h | Fish | 8mg/l | 1 |
| | EC50 | 48h | Crustacea | 42.5mg/l | 1 |
| Legend: | Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 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 | | | | |

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

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

Crops can take up cerium. Cerium has affinity for humic substances that may alter its availability in aquatic systems. Current fate and transport studies are limited and may not adequately address long term environmental exposure risks to both humans and other 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 and are slow to clear from the organism. Cerium can affect the respiratory tract and associated lymph nodes (inhalation exposure) and once in the circulatory system can partition to the skeleton, liver, kidney and spleen.

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 |
|------------|---------------------------------------|---------------------------------------|
| | No Data available for all ingredients | No Data available for all ingredients |

Bioaccumulative potential

| Ingredient | Bioaccumulation |
|------------|---------------------------------------|
| | No Data available for all ingredients |

Mobility in soil


| Ingredient | Mobility |
|------------|---------------------------------------|
| | No Data available for all ingredients |

SECTION 13 Disposal considerations**Waste treatment methods**

| | |
|-------------------------------------|--|
| Product / Packaging disposal | <ul style="list-style-type: none"> Containers may still present a chemical hazard/ danger when empty. Return to supplier for reuse/ recycling if possible. <p>Otherwise:</p> <ul style="list-style-type: none"> If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill. Where possible retain label warnings and SDS and observe all notices pertaining to the product. 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**

Continued...

| | |
|------------------|---|
| |  |
| Marine Pollutant | NO |

Land transport (UN)

| | | |
|------------------------------|--|----------------|
| UN number or ID number | 3264 | |
| UN proper shipping name | CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (contains sulfuric acid) | |
| Transport hazard class(es) | Class | 8 |
| | Subsidiary risk | Not Applicable |
| Packing group | II | |
| Environmental hazard | Not Applicable | |
| Special precautions for user | Special provisions | 274 |
| | Limited quantity | 1 L |

Air transport (ICAO-IATA / DGR)

| | | |
|------------------------------|--|----------------|
| UN number | 3264 | |
| UN proper shipping name | Corrosive liquid, acidic, inorganic, n.o.s. * (contains sulfuric 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 | A3 A803 |
| | 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 sulfuric 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

Not Applicable

Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

| | |
|--------------|-------|
| Product name | Group |
|--------------|-------|

Continued...

NITRITE TITRANT MN2

| Product name | Group |
|--------------------|---------------|
| cerium(IV) sulfate | Not Available |
| sulfuric acid | Not Available |

Transport in bulk in accordance with the IGC Code

| Product name | Ship Type |
|--------------------|---------------|
| cerium(IV) sulfate | Not Available |
| sulfuric acid | Not Available |

SECTION 15 Regulatory information

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

cerium(IV) sulfate is found on the following regulatory lists

Not Applicable

sulfuric acid is found on the following regulatory lists

Chemical Footprint Project - Chemicals of High Concern List

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs - Group 1: Carcinogenic to humans

National Inventory Status

| National Inventory | Status |
|---|---|
| Australia - AIIC / Australia Non-Industrial Use | Yes |
| Canada - DSL | Yes |
| Canada - NDSL | No (cerium(IV) sulfate; sulfuric acid) |
| China - IECSC | Yes |
| Europe - EINEC / ELINCS / NLP | Yes |
| Japan - ENCS | Yes |
| Korea - KECI | Yes |
| New Zealand - NZIoC | Yes |
| Philippines - PICCS | Yes |
| USA - TSCA | Yes |
| Taiwan - TCSI | Yes |
| Mexico - INSQ | Yes |
| Vietnam - NCI | Yes |
| Russia - FBEPH | No (cerium(IV) sulfate) |
| Legend: | <i>Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.</i> |

SECTION 16 Other information

| | |
|---------------|------------|
| Revision Date | 27/04/2022 |
| Initial Date | 23/02/2017 |

CONTACT POINT

- For quotations contact your local Customer Services - <http://wssdirectory.wilhelmsen.com/#!/customerservices> - Responsible for safety data sheet Wilhelmsen Ships Service AS - Prepared by: Compliance Manager, - Email: wss.global.sdsinfo@wilhelmsen.com - Telephone: Tel.: +47 67584000

SDS Version Summary

| Version | Date of Update | Sections Updated |
|---------|----------------|--|
| 6.10 | 27/04/2022 | Toxicological information - Acute Health (eye), Toxicological information - Acute Health (inhaled), Toxicological information - Acute Health (skin), Toxicological information - Acute Health (swallowed), Toxicological information - Chronic Health, Hazards identification - Classification, Disposal considerations - Disposal, Ecological |

Continued...

NITRITE TITRANT MN2

| Version | Date of Update | Sections Updated |
|---------|----------------|---|
| | | Information - Environmental, Firefighting measures - Fire Fighter (fire/explosion hazard), Composition / information on ingredients - Ingredients |

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
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
ES: Exposure Standard
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
AII: Australian Inventory of Industrial Chemicals
DSL: Domestic Substances List
NDSL: Non-Domestic Substances List
IECSC: Inventory of Existing Chemical Substance in China
EINECS: European INventory of Existing Commercial chemical Substances
ELINCS: European List of Notified Chemical Substances
NLP: No-Longer Polymers
ENCS: Existing and New Chemical Substances Inventory
KECI: Korea Existing Chemicals Inventory
NZIoC: New Zealand Inventory of Chemicals
PICCS: Philippine Inventory of Chemicals and Chemical Substances
TSCA: Toxic Substances Control Act
TCSI: Taiwan Chemical Substance Inventory
INSQ: Inventario Nacional de Sustancias Químicas
NCI: National Chemical Inventory
FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

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