10 65-1 Vanadium (10μg/mL in 2% HNO3)

High-Purity Standards

SECTION 1 IDENTIFICATION

Product Identifier

<table>
<thead>
<tr>
<th>Product name</th>
<th>10 65-1 Vanadium (10μg/mL in 2% HNO3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synonyms</td>
<td>10μg/mL Vanadium in 2% HNO3</td>
</tr>
<tr>
<td>Proper shipping name</td>
<td>Corrosive liquid, acidic, inorganic, n.o.s. (contains nitric acid)</td>
</tr>
<tr>
<td>Other means of identification</td>
<td>10 65-1</td>
</tr>
</tbody>
</table>

Recommended use of the chemical and restrictions on use

| Relevant identified uses | Use according to manufacturer's directions. |

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

<table>
<thead>
<tr>
<th>Registered company name</th>
<th>High-Purity Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>PO Box 41727 SC 29423 United States</td>
</tr>
<tr>
<td>Telephone</td>
<td>843-767-7900</td>
</tr>
<tr>
<td>Fax</td>
<td>843-767-7906</td>
</tr>
<tr>
<td>Website</td>
<td>highpuritystandards.com</td>
</tr>
<tr>
<td>Email</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

Emergency phone number

<table>
<thead>
<tr>
<th>Association / Organisation</th>
<th>INFOTRAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency telephone numbers</td>
<td>1-800-635-5053</td>
</tr>
<tr>
<td>Other emergency telephone numbers</td>
<td>1-352-323-3500</td>
</tr>
</tbody>
</table>

SECTION 2 HAZARD(S) IDENTIFICATION

Classification of the substance or mixture

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

Label elements

<table>
<thead>
<tr>
<th>Hazard pictogram(s)</th>
<th></th>
</tr>
</thead>
</table>

| SIGNAL WORD | DANGER |

Hazard statement(s)

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

Hazard(s) not otherwise specified

Not Applicable

Precautionary statement(s) Prevention

Continued...
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

<table>
<thead>
<tr>
<th>CAS No</th>
<th>% [weight]</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>7803-55-6</td>
<td>0.001 (as V)</td>
<td>ammonium metavanadate</td>
</tr>
<tr>
<td>7697-37-2</td>
<td>2</td>
<td>nitric acid</td>
</tr>
<tr>
<td>7732-18-5</td>
<td>balance</td>
<td>water</td>
</tr>
</tbody>
</table>

SECTION 4 FIRST-AID MEASURES

Description of first aid measures

**Eye Contact**

- If this product comes in contact with the eyes:
  - Immediately hold eyelids apart and flush the eye continuously with running water.
  - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
  - Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
  - Transport to hospital or doctor without delay.
  - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

**Skin Contact**

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

**Inhalation**

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

**Ingestion**

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

**Most important symptoms and effects, both acute and delayed**

See Section 11

**Indication of any immediate medical attention and special treatment needed**

For acute or short term repeated exposures to strong acids:
- Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.
- Respiratory distress may require tracheotomy or endotracheal intubation if tracheal 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:**

Continued...
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.

**SECTION 5 FIRE-FIGHTING MEASURES**

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

**Special hazards arising from the substrate or mixture**

| Fire Incompatibility | None known. |

**Special protective equipment and precautions for fire-fighters**

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

**SECTION 6 ACCIDENTAL RELEASE MEASURES**

**Personal precautions, protective equipment and emergency procedures**

See section 8

**Environmental precautions**

See section 12

**Methods and material for containment and cleaning up**

| Minor Spills |
| Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material. |
| Check regularly for spills and leaks. |
| Clean up all spills immediately. |
| Avoid breathing fumes 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 |
| **DO NOT** use aluminium or galvanised containers |

**SECTION 7 HANDLING AND STORAGE**

**Precautions for safe handling**

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

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

**Conditions for safe storage, including any incompatibilities**

| Suitable container |
| **DO NOT** use aluminium or galvanised containers |
Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

<table>
<thead>
<tr>
<th>Source</th>
<th>Ingredient</th>
<th>Material name</th>
<th>TWA</th>
<th>STEL</th>
<th>Peak</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>US OSHA Permissible</td>
<td>nitric acid</td>
<td>Nitric acid</td>
<td>5 mg/m³</td>
<td>10 mg/m³</td>
<td>Not</td>
<td>TLV® Basis: URT &amp; eye ir; dental erosion</td>
</tr>
<tr>
<td>Exposure Levels (PELs)</td>
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<td></td>
<td>2 ppm</td>
<td>4 ppm</td>
<td>Available</td>
<td></td>
</tr>
<tr>
<td>US NIOSH Recommended</td>
<td>nitric acid</td>
<td>Aqua foris, Engravers acid, Hydrogen nitrate, Red</td>
<td>5 mg/m³</td>
<td>4 ppm</td>
<td>Not</td>
<td>Not Available</td>
</tr>
<tr>
<td>Exposure Limits (RELs)</td>
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<td>turning nitric acid (RFNA), White turning nitric</td>
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<td></td>
<td>Available</td>
<td></td>
</tr>
<tr>
<td>US ACGIH Threshold Limit</td>
<td>nitric acid</td>
<td>Nitric acid</td>
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<td>Not</td>
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</tr>
<tr>
<td>Values (TLV)</td>
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<td></td>
<td></td>
<td>Available</td>
<td>Available</td>
<td></td>
</tr>
</tbody>
</table>

EMERGENCY LIMITS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Material name</th>
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<th>TEEL-2</th>
<th>TEEL-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>ammonium metavanadate</td>
<td>Ammonium vanadate; (Ammonium vanadum oxide; Ammonium metavanadate)</td>
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<td>0.11 mg/m³</td>
<td>80 mg/m³</td>
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<tr>
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</tr>
<tr>
<td>water</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Exposure controls

Appropriate engineering controls

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

Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection.

Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.

An approved self contained breathing apparatus (SCBA) may be required in some situations.

Provide adequate ventilation in warehouse or closed storage area. Air contaminants generated in the workplace possess varying “escape” velocities which, in turn, determine the “capture velocities” of fresh circulating air required to effectively remove the contaminant.
### SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

#### Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
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<tr>
<td><strong>Physical state</strong></td>
<td>Liquid</td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td><strong>Odour threshold</strong></td>
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</tr>
<tr>
<td><strong>pH (as supplied)</strong></td>
<td>&lt;2</td>
</tr>
<tr>
<td><strong>Melting point / freezing point (°C)</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td><strong>Initial boiling point and boiling range (°C)</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td><strong>Flash point (°C)</strong></td>
<td>Not Available</td>
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<tr>
<td><strong>Evaporation rate</strong></td>
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<tr>
<td><strong>Flammability</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td><strong>Relative density (Water = 1)</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td><strong>Partition coefficient n-octanol / water</strong></td>
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</tr>
<tr>
<td><strong>Auto-ignition temperature (°C)</strong></td>
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</tr>
<tr>
<td><strong>Decomposition temperature</strong></td>
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</tr>
<tr>
<td><strong>Viscosity (cSt)</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td><strong>Molecular weight (g/mol)</strong></td>
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</tr>
<tr>
<td><strong>Taste</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td><strong>Explosive properties</strong></td>
<td>Not Available</td>
</tr>
<tr>
<td><strong>Oxidising properties</strong></td>
<td>Not Available</td>
</tr>
</tbody>
</table>

#### Personal protection

- **Eye and face protection**
  - Safety glasses with unperforated side shields may be used where continuous eye protection is desirable, as in laboratories; spectators 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. Lenses 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]
  - 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. Lenses 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**
  - 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**
  - Overalls.
  - PVC Apron.
  - PVC protective suit may be required if exposure severe.
  - Eyewash unit.
  - Overalls.

- **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]

#### Evaporation

- 0.25-0.5 m/s (50-100 f/min.)
- 0.5-1 m/s (100-200 f/min.)
- 1-2.5 m/s (200-500 f/min.)
- 2.5-10 m/s (500-2000 f/min.)

Simple theory shows that air velocity falls rapidly with distance away 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.
SECTION 10 STABILITY AND REACTIVITY

Reactivity
See section 7

Chemical stability
Contact with alkaline material liberates heat

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
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. 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.

Ingestion
Ingestion of acidic corrosives may produce burns around and in the mouth, the throat and oesophagus. Immediate pain and difficulties in swallowing and speaking may also be evident. 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.

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

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

Chronic
Repeated or prolonged exposure to acids may result in the erosion of teeth, swelling and/or ulceration of mouth lining. Irritation of airways to lung, with cough, and inflammation of lung tissue often occurs. Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

<table>
<thead>
<tr>
<th>10 65-1 Vanadium (10μg/mL in 2% HNO3)</th>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Available</td>
<td>Not Available</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ammonium metavanadate</th>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>dermal (rat) LD50: 2102 mg/kg[^2]</td>
<td>Not Available</td>
<td></td>
</tr>
<tr>
<td>Oral (rat) LD50: 160 mg/kg[^2]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>nitric acid</th>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation (rat) LC50: 625 ppm/1h[^2]</td>
<td>Not Available</td>
<td></td>
</tr>
</tbody>
</table>

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

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

NITRIC ACID
For acid mists, aerosols, vapours
Test results suggest that eukaryotic cells are susceptible to generic 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]
**SECTION 12 ECOCLOGICAL INFORMATION**

### Toxicity

<table>
<thead>
<tr>
<th>ENDPOINT</th>
<th>TEST DURATION (HR)</th>
<th>SPECIES</th>
<th>VALUE</th>
<th>SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50</td>
<td>96</td>
<td>Fish</td>
<td>0.693mg/L</td>
<td>2</td>
</tr>
<tr>
<td>EC50</td>
<td>48</td>
<td>Crustacea</td>
<td>2.387mg/L</td>
<td>2</td>
</tr>
<tr>
<td>EC50</td>
<td>72</td>
<td>Algae or other aquatic plants</td>
<td>0.9894mg/L</td>
<td>2</td>
</tr>
<tr>
<td>EC50</td>
<td>72</td>
<td>Algae or other aquatic plants</td>
<td>1.162mg/L</td>
<td>2</td>
</tr>
<tr>
<td>NOEC</td>
<td>72</td>
<td>Algae or other aquatic plants</td>
<td>0.0168mg/L</td>
<td>2</td>
</tr>
</tbody>
</table>

**Legend:**
- \(\checkmark\) – Data available to make classification
- \(\times\) – Data available but does not fill the criteria for classification
- \(\times\) – Data Not Available to make classification

#### ammonium metavanadate

#### nitric acid

#### water

**Legend:**
- Not Applicable
- Not Available to make classification
- Not Applicable to the species

### 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 Vanadium Compounds:**

- **Environmental Fate:** Vanadium is travels through the environment via long range transportation in the atmosphere, water, and land by natural and man-made sources, wet and dry deposition, adsorption and complexing. From natural sources, vanadium is probably in the form of less soluble trivalent mineral particles.

- **Atmospheric Fate:** Vanadium generally enters the atmosphere as an aerosol. Natural and man-made sources of vanadium tend to release large particles that are more likely to settle near the source. Smaller particles, such as those emitted from oil-fueled power plants, have a longer residence time in the atmosphere and are more likely to be transported farther away from the site of release.

- **Terrestrial Fate:** Soil - Transport and partitioning of vanadium in soil is influenced by pH and reduction potential. Ferric hydroxides and solid bitumens (organic) are the main carriers of vanadium in the sedimentation process. Iron acts as a carrier for trivalent vanadium and is responsible for its diffusion through molten rocks where it becomes trapped during crystallization. Vanadium is fairly mobile in neutral or alkaline soils, but its mobility decreases in acidic soils. Under oxidizing, unsaturated conditions, some mobility is observed, but under reducing, saturated conditions, vanadium is immobile. Plants - Vanadium levels in terrestrial plants are dependent upon the amount of water-soluble vanadium available in the soil as well as pH and growing conditions. The uptake of vanadium into the above-ground parts of many plants is low, although root concentrations have shown some correlation with levels in the soil. Certain legumes have been shown to be vanadium accumulators and the root nodules of these plants may contain vanadium levels three times greater than those of the surrounding soil. Fly agaric (Amanita muscaria) mushrooms are known to actively accumulate vanadium.

- **Aquatic Fate:** Vanadium is eventually adsorbed to hydroxides or associated with organic compounds and is deposited on the sea bed. Vanadium is transported in water by solution (13%) or suspension (87%). Upon entering the ocean, vanadium is deposited to the sea bed. Only about 0.001% of vanadium entering the oceans is estimated to persist in soluble form. Sorption and biochemical processes are thought to contribute to the extraction of vanadium from sea water. Adsorption to organic matter as well as to manganese oxide and ferric hydroxide results in the precipitation of dissolved vanadium. Biochemical processes are also of importance in the partitioning from sea water to sediment.

- **Ecotoxicity:** Some marine organisms, in particular the sea squirts, bioconcentrate vanadium very efficiently, attaining body concentrations approximately 10,000 times greater than the ambient sea water. Upon the death of the organism, the body burden adds to the accumulation of vanadium in silt. In general, marine plants and invertebrates contain higher levels of vanadium than terrestrial plants and animals. In the terrestrial environment, bioconcentration is more commonly observed amongst the lower plant phyla than in the higher, seed-producing phyla. Vanadium appears to be present in all terrestrial animals; however, tissue concentrations in vertebrates are often so low that detection is difficult. The highest levels of vanadium in terrestrial mammals are generally found in the liver and skeletal tissues. No data are available regarding biomagnification of vanadium within the food chain, but human studies suggest that it is unlikely. Bioaccumulation appears to be unlikely. Prevent, by any means available, spillage from entering drains or water courses.

**DO NOT discharge into sewer or waterways.**

### Persistence and degradability

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Bioaccumulative potential

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Bioaccumulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ammonium metavanadate</td>
<td>LOW (LogKOW = 2.229)</td>
</tr>
<tr>
<td>water</td>
<td>LOW (LogKOW = -1.38)</td>
</tr>
</tbody>
</table>

Mobility in soil

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>ammonium metavanadate</td>
<td>LOW (KOC = 35.04)</td>
</tr>
<tr>
<td>water</td>
<td>LOW (KOC = 14.3)</td>
</tr>
</tbody>
</table>

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

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

SECTION 14 TRANSPORT INFORMATION

Labels Required

- Marine Pollutant: NO

Land transport (DOT)

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

Air transport (ICAO-IATA / DGR)

- UN number: 3264
- UN proper shipping name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (contains nitric acid)
- Transport hazard class(es):
  - ICAO/IATA Class 8
  - ICAO / IATA Subrisk: Not Applicable
  - ERG Code: 8L
- Packing group: II
- Environmental hazard: Not Applicable
- Special precautions for user:
  - Special provisions: A3A803
  - Cargo Only Packing Instructions: 855
  - Cargo Only Maximum Qty / Pack: 30 L
  - Passenger and Cargo Packing Instructions: 851
Sea transport (IMDG-Code / GGVSee)

| UN number | 3084 |
| UN proper shipping name | Corrosive liquid, acidic, inorganic, n.o.s. * (contains nitric acid) |
| Transport hazard class(es) | IMDG Class 8, IMDG Subrisk Not Applicable |
| Packing group | II |
| Environmental hazard | Not Applicable |
| Special precautions for user | EMS Number F-A, S-B, Special provisions 274, Limited Quantities 1 L |

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

<table>
<thead>
<tr>
<th>Source</th>
<th>Product name</th>
<th>Pollution Category</th>
<th>Ship Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMO MARPOL (Annex II) - List of Noxious Liquid Substances Carried in Bulk</td>
<td>Nitric acid (70% and over)</td>
<td>Y; Y</td>
<td>2; 1</td>
</tr>
</tbody>
</table>

SECTION 15 REGULATORY INFORMATION

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

AMMONIUM METAVANADATE(7803-55-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS

- US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)
- US - Massachusetts - Right To Know Listed Chemicals
- US - Pennsylvania - Hazardous Substance List

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

- International Air Transport Association (IATA) Dangerous Goods Regulations - Prohibited List
- US - Alaska Limits for Air Contaminants
- US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)
- US - California Permissible Exposure Limits for Chemical Contaminants
- US - Hawaii Air Contaminant Limits
- US - Idaho - Limits for Air Contaminants
- US - Massachusetts - Right To Know Listed Chemicals
- US - Michigan Exposure Limits for Air Contaminants
- US - Minnesota Permissible Exposure Limits (PELs)
- US - Oregon Permissible Exposure Limits (Z-1)
- US - Pennsylvania - Hazardous Substance List
- US - Rhode Island Hazardous Substance List
- 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

Federal Regulations

Superfund Amendments and Reauthorization Act of 1986 (SARA)

<table>
<thead>
<tr>
<th>SECTION 311/312 HAZARD CATEGORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate (acute) health hazard</td>
</tr>
<tr>
<td>Delayed (chronic) health hazard</td>
</tr>
<tr>
<td>Fire hazard</td>
</tr>
<tr>
<td>Pressure hazard</td>
</tr>
<tr>
<td>Reactivity hazard</td>
</tr>
</tbody>
</table>

| US EPA CERCLA HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES (40 CFR 302.4) |
| Name                       | Reportable Quantity in Pounds (lb) | Reportable Quantity in kg |
| Ammonium vanadate          | 1000                          | 454                        |
| Nitric acid                | 1000                          | 454                        |
State Regulations

US. CALIFORNIA PROPOSITION 65
None Reported

National Inventory | Status
--- | ---
Australia - AICS | Y
Canada - DSL | Y
Canada - NDSL | N (ammonium metavanadate; water; nitric acid)
China - IECSC | Y
Europe - EINEC / ELINCS / NLP | Y
Japan - ENCS | N (water; 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
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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