1. Identification

1.1. Product identifier

Product Identity: Vanadium Trioxide (V₂O₃)
Alternate Names: Vanadium Trioxide (MVO)

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

Intended use: See Technical Data Sheet.
Application Method: See Technical Data Sheet.

1.3. Details of the supplier of the safety data sheet

Company Name: EVRAZ Stratcor, Inc.
Company Identification: EVRAZ Stratcor, Inc.
Address: 4285 Malvern Rd, Hot Springs, AR 71901; U.S.A
Address: 200 Randolph Dr, Chicago, IL 60601; U.S.A
Telephone: +1-501-262-1270 (Company Identification)
Fax: +1-501-262-2793
Website: www.evrazstratcor.com

Emergency

24 hour Emergency Telephone No.
NATIONAL RESPONSE CENTER: +1-800-424-8802
CHEMTREC U.S. and CANADA: +1-800-424-9300
CHEMTREC International: +1-202-483-7616 (Collect)

2. Hazard(s) identification

2.1. Classification of the substance or mixture

Acute Tox. 4; H332: Harmful if inhaled.
Eye Irrit. 2; H319: Causes serious eye irritation.

2.2. Label elements

Signal Word: Warning

Hazard Statement:
H319 Causes serious eye irritation.
H332 Harmful if inhaled.

Precautionary Statements:

[Prevention]:
P261 Avoid breathing dust / fume / gas / mist / vapors / spray.
P264 Wash thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves / eye protection / face protection.

[Response]:
P304+312 IF INHALED: Call a POISON CENTER or doctor / physician if you feel unwell.
P305+351+338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing.
P337+313 If eye irritation persists: Get medical advice / attention.
P340 Remove victim to fresh air and keep at rest in a position comfortable for breathing.

[Storage]:
No GHS storage statements

[Disposal]:

3. Composition/information on ingredients

This product contains the following substances that present a hazard within the meaning of the relevant State and Federal Hazardous Substances regulations.

<table>
<thead>
<tr>
<th>Ingredient/Chemical Designations</th>
<th>Weight %</th>
<th>GHS Classification</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanadium oxide (V2O3)</td>
<td>&gt;99%</td>
<td>Eye Irrit. 2; H319</td>
<td></td>
</tr>
<tr>
<td>CAS Number: 0001314-34-7</td>
<td></td>
<td>Acute Tox. 4; H332</td>
<td>[1]</td>
</tr>
</tbody>
</table>

In accordance with paragraph (i) of §1910.1200, the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

[1] Substance classified with a health or environmental hazard.

*The full texts of the phrases are shown in Section 16.

4. First aid measures

4.1. Description of first aid measures

**General**
- In all cases of doubt, or when symptoms persist, seek medical attention.
- Never give anything by mouth to an unconscious person.

**Inhalation**
- Remove to fresh air, keep patient warm and at rest. If breathing is irregular or stopped, give artificial respiration. If unconscious place in the recovery position and obtain immediate medical attention. Give nothing by mouth.

**Eyes**
- Flush with water 15 minutes to remove particles. See an ophthalmologist.

**Skin**
- Remove contaminated clothing. Wash skin thoroughly with soap and water or use a recognized skin cleanser.

**Ingestion**
- Give two glasses of water. Induce vomiting if conscious. Call a physician.

4.2. Most important symptoms and effects, both acute and delayed

**Overview**
- **Eye Contact:** Irritation with possible corneal injury.
- **Skin Contact:** Irritation with redening and itching. Absorption of harmful amounts possible.
- **Inhalation:** Irritation of the respiratory tract, chest tightness, wheezing, bloody nose, and coughing.
- **Ingestion:** Abdominal discomfort, nausea, vomiting, cramping. Harmless green tongue discoloration.
- EXTREME or repeated overexposure may cause chronic bronchitis, allergic skin reaction, or asthmatic reaction with possible lung injury in susceptible individuals. When exposure ceases, effects are usually reversible. See section 2 for further details.

**Inhalation**
- Harmful if inhaled.

**Eyes**
- Causes serious eye irritation.

5. Fire-fighting measures

5.1. Extinguishing media

- Not flammable. Use media suitable for surrounding fire.

5.2. Special hazards arising from the substance or mixture

- Hazardous decomposition: Reacts slowly with air to form V2O4 (blue). Reacts with moisture to form V6O13 (green). Reacts slowly at 120°C to form V2O5 (yellow).
- Avoid breathing dust / fume / gas / mist / vapors / spray.

5.3. Advice for fire-fighters

- Full protective equipment including positive pressure-breathing apparatus.
- Avoid creating dust. May oxidize to vanadium pentoxide under fire-fighting conditions.

ERG Guide No. ----

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- Put on appropriate personal protective equipment (see section 8).

6.2. Environmental precautions

- Do not allow spills to enter drains or waterways.
- Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and

Vanadium Trioxide (V2O3) r0
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wash thoroughly before reuse.

6.3. Methods and material for containment and cleaning up
Prevent entering sewage systems or surface water.
Vacuum preferred (or sweeping). Addition of sand or sweeping compound is advisable.
Avoid decontamination procedures which create airborne dusting. Use ventilation if necessary to control dusting.

7. Handling and storage

7.1. Precautions for safe handling
See section 2 for further details. - [Prevention]:

7.2. Conditions for safe storage, including any incompatibilities
Handling: Vacuum dust at point of formation. Provide proper protective gear for handling dusty materials. Personnel should clean up after handling. Avoid areas where dust is present. Reacts slowly with moisture to form vanadium pentoxide.
Storage: Keep dry and in closed containers.
Incompatible materials: Aluminum powder, moisture.
See section 2 for further details. - [Storage]:

7.3. Specific end use(s)
No data available.

8. Exposure controls and personal protection

8.1. Control parameters

Exposure

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>Ingredient</th>
<th>Source</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001314-34-7</td>
<td>Vanadium oxide (V2O3)</td>
<td>OSHA</td>
<td>No Established Limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACGIH</td>
<td>No Established Limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NIOSH</td>
<td>No Established Limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supplier</td>
<td>No Established Limit</td>
</tr>
</tbody>
</table>

Not listed in OSHA 29 CFR 1910.1000, Table Z-1 (Air Contaminants):
0.05 mg/m³ 15 Min. Ceiling for Vanadium (NIOSH)
0.05 mg/m³ for V₂O₅ (NIOSH TLV TWA)

Carcinogen Data

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>Ingredient</th>
<th>Source</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001314-34-7</td>
<td>Vanadium oxide (V2O3)</td>
<td>OSHA</td>
<td>Select Carcinogen: No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NTP</td>
<td>Known: No; Suspected: No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IARC</td>
<td>Group 1: No; Group 2a: No; Group 2b: No; Group 3: No; Group 4: No;</td>
</tr>
</tbody>
</table>

8.2. Exposure controls

Respiratory Use respirators approved by NIOSH/MSHA in dusty areas.
Eyes Use goggles or safety glasses with side shields.
Skin Use protective gloves and barrier creams.
Engineering Proper dust collection. Minimize dust during dumping operations.
Controls

Other Work Practices Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.
See section 2 for further details. - [Prevention]:

9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Black Solid Granules</td>
</tr>
<tr>
<td>Odor</td>
<td>No smell</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not determined</td>
</tr>
<tr>
<td>pH</td>
<td>Not Measured</td>
</tr>
<tr>
<td>Melting point / freezing point</td>
<td>1970°C (3578°F)</td>
</tr>
</tbody>
</table>
Safety Data Sheet

Initial boiling point and boiling range
Flash Point
Evaporation rate (Ether = 1)
Flammability (solid, gas)

Lower Explosive Limit: Not Measured
Upper Explosive Limit: Not Measured

Vapor pressure (Pa)
Vapor Density
Specific Gravity

Vapor Density
Essentially zero.

Solubility in Water
Partition coefficient n-octanol/water (Log Kow)
Auto-ignition temperature
Decomposition temperature
Viscosity (cSt)

Lower Explosive Limit: Not Measured
Upper Explosive Limit: Not Measured

Oxidizing Properties
May act as a catalyst in certain chemical environments.

9.2. Other information
No other relevant information.

10. Stability and reactivity

10.1. Reactivity
Hazardous Polymerization will not occur.

10.2. Chemical stability
Stable under normal circumstances.

10.3. Possibility of hazardous reactions
No data available.

10.4. Conditions to avoid
Avoid any situations which cause dusting.

10.5. Incompatible materials
Aluminum powder, moisture.

10.6. Hazardous decomposition products
Reacts slowly with air to form V2O4 (blue). Reacts with moisture to form V6O13 (green). Reacts slowly at 120°C to form V2O5 (yellow).

11. Toxicological information

Acute toxicity

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Oral LD50, mg/kg</th>
<th>Skin LD50, mg/kg</th>
<th>Inhalation Vapor LC50, mg/L/4hr</th>
<th>Inhalation Dust/Mist LC50, mg/L/4hr</th>
<th>Inhalation Gas LC50, ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanadium oxide (V2O3) - (1314-34-7)</td>
<td>No data available</td>
<td>No data available</td>
<td>No data available</td>
<td>No data available</td>
<td>No data available</td>
</tr>
</tbody>
</table>

Note: When no route specific LD50 data is available for an acute toxin, the converted acute toxicity point estimate was used in the calculation of the product's ATE (Acute Toxicity Estimate).

Classification

<table>
<thead>
<tr>
<th>Classification</th>
<th>Category</th>
<th>Hazard Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity (oral)</td>
<td>---</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Acute toxicity (dermal)</td>
<td>---</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Acute toxicity (inhalation)</td>
<td>4</td>
<td>Harmful if inhaled.</td>
</tr>
<tr>
<td>Skin corrosion/irritation</td>
<td>---</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Serious eye damage/irritation</td>
<td>2</td>
<td>Causes serious eye irritation.</td>
</tr>
<tr>
<td>Respiratory sensitization</td>
<td>---</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Skin sensitization</td>
<td>---</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
12. Ecological information

12.1. Toxicity

No additional information provided for this product. See Section 3 for chemical specific data.

Aquatic Ecotoxicity

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>96 hr LC50 fish, mg/l</th>
<th>48 hr EC50 crustacea, mg/l</th>
<th>ErC50 algae, mg/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanadium oxide (V2O3) - (1314-34-7)</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability

Does not readily deteriorate in the environment. Reacts slowly with moisture to form vanadium pentoxide.

12.3. Bioaccumulative potential

Not Measured

12.4. Mobility in soil

No data available.

12.5. Results of PBT and vPvB assessment

This product contains no PBT/vPvB chemicals.

12.6. Other adverse effects

No data available.

13. Disposal considerations

13.1. Waste treatment methods

Observe all federal, state and local regulations when disposing of this substance.

14. Transport information

14.1. UN number

Not Applicable

14.2. UN proper shipping name

Not Regulated

14.3. Transport hazard class(es)

DOT Hazard Class: Not Applicable

IMDG: Not Applicable

Sub Class: Not Applicable

Air Class: Not Applicable

14.4. Packing group

Not Applicable

14.5. Environmental hazards

IMDG

Marine Pollutant: No

14.6. Special precautions for user

No further information

15. Regulatory information

Regulatory Overview

The regulatory data in Section 15 is not intended to be all-inclusive, only selected regulations are represented.

Toxic Substance Control Act (TSCA)

All components of this material are either listed or exempt from listing on the TSCA Inventory.

WHMIS Classification

D2B

US EPA Tier II Hazards

Fire: No
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Sudden Release of Pressure: No
Reactive: No
Immediate (Acute): Yes
Delayed (Chronic): No

EPCRA 311/312 Chemicals and RQs:
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

EPCRA 302 Extremely Hazardous:
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

EPCRA 313 Toxic Chemicals:
Vanadium oxide (V2O3)

Proposition 65 - Carcinogens (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Developmental Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Female Repro Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Male Repro Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

New Jersey RTK Substances (>1%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Pennsylvania RTK Substances (>1%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

16. Other information

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to our products. Customers/users of this product must comply with all applicable health and safety laws, regulations, and orders.

The full text of the phrases appearing in section 3 is:
H319 Causes serious eye irritation.
H332 Harmful if inhaled.

This is the first version in the GHS SDS format. Listings of changes from previous versions in other formats are not applicable.

EVRAZ Stratcor, Inc. believes that the data on this sheet are correct as of the effective date and that the opinions given reflect those of qualified experts. Since EVRAZ Stratcor cannot control the product or its use, it is the user's responsibility to use the product safely. The data on this sheet apply only to products sold by corporate subsidiaries of EVRAZ Stratcor and may not apply to products sold by others.

End of Document