Section 1 - Product and Company Information

Product Name                   VANADIUM(V) OXYTRICHLORIDE, 99.995%
Product Number                 256048
Brand                          ALDRICH
Company                        Sigma-Aldrich Canada, Ltd
Address                        2149 Winston Park Drive
                                Oakville ON L6H 6J8 CA
Technical Phone:               9058299500
Fax:                           9058299292
Emergency Phone:              800-424-9300

Section 2 - Composition/Information on Ingredient

Substance Name                  VANADIUM OXYTRICHLORIDE
CAS #                          7727-18-6
SARA 313                       No

Formula                        VOCl3
Synonyms                       Trichlorooxovanadium * Trichlorooxovanadium oxide
                                 * Vanadium monoxide trichloride * Vanadium oxide
                                 trichloride * Vanadium oxychloride * Vanadium
                                 trichloride monooxide * Vanadyl trichloride
RTECS Number:                  YW2975000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Toxic.
Toxic if swallowed. Causes burns. Reacts violently with water.
Readily absorbed through skin. Target organ(s): Liver. Kidneys.

HMIS RATING
HEALTH: 3*
FLAMMABILITY: 0
REACTIVITY: 2
SPECIAL HAZARD(S): Water reactive

NFPA RATING
HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 2
SPECIAL HAZARD(S): Water reactive

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is
conscious. Call a physician immediately.
INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

EXPLOSION HAZARDS
Container explosion may occur under fire conditions.

CONDITIONS OF FLAMMABILITY
Water hydrolyzes material liberating acidic gas which in contact with metal surfaces can generate flammable and/or explosive hydrogen gas.

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Carbon dioxide. Dry chemical powder.
Unsuitable: Do not use water.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Cover with dry lime or soda ash, pick up, keep in a closed container, and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe vapor. Avoid all contact.
STORAGE
Suitable: Keep tightly closed. Store in a cool dry place. Handle and store under nitrogen.
Incompatible Materials: Do not allow contact with water.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Use only in a chemical fume hood. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.
Hand: Long rubber or neoprene gauntlet gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

<table>
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<tr>
<th>Country</th>
<th>Source</th>
<th>Type</th>
<th>Value</th>
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<tbody>
<tr>
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<td>NIOSH</td>
<td>Ceiling</td>
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Section 9 - Physical/Chemical Properties

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<tr>
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<tr>
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<td>760 mmHg</td>
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Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Acids, Alcohols, Amines, Bases Reacts violently with water.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: Causes burns. May be toxic in contact with skin.
Skin Absorption: Readily absorbed through skin.
Eye Contact: Causes burns.
Inhalation: May be toxic by inhalation. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion: Toxic if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)

SIGNS AND SYMPTOMS OF EXPOSURE
Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

TOXICITY DATA

Oral
Rat
140 mg/kg
LD50

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information
Proper Shipping Name: Vanadium oxytrichloride
UN#: 2443
Class: 8
Packing Group: Packing Group II
Hazard Label: Corrosive
PIH: Not PIH

IATA
Proper Shipping Name: Vanadium oxytrichloride
IATA UN Number: 2443
Hazard Class: 8
Packing Group: II
Not Allowed - Aircraft: Cargo aircraft only. Not permitted on passenger aircraft.

Section 15 - Regulatory Information

EU ADDITIONAL CLASSIFICATION
Symbol of Danger: T
Indication of Danger: Toxic.
R: 25-34-14
Risk Statements: Toxic if swallowed. Causes burns. Reacts violently with water.
S: 45-26-27-36/37/39
Safety Statements: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water. Take off immediately all contaminated clothing. Wear suitable protective clothing, gloves, and eye/face protection.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Toxic.
Risk Statements: Toxic if swallowed. Causes burns. Reacts violently with water.
Safety Statements: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water. Take off immediately all contaminated clothing. Wear suitable protective clothing, gloves, and eye/face protection.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.
WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.