

# MATERIAL SAFETY DATA SHEET



Complies with U.S. OSHA  
E.C. Guideline 91/155/EEC:  
Revision: 3  
Last Revision: October 2007  
Replaces: April 2004

**EMERGENCY TELEPHONE NUMBERS:**  
NATIONAL RESPONSE CENTER: 1-800-424-8802  
CHEMTREC U.S. and CANADA: 1-800-424-9300  
CHEMTREC International: 1-202-483-7616 (Collect)

Users of this product are requested to study this data sheet to learn the product's characteristics so that the product can be used safely. If the material is resold, the purchaser should be furnished a copy of this data sheet and the information should be made available to all users.

## SECTION 1

### Chemical Product and Company Identification

**Product Trade Name** Vanadium Tetrachloride  
**Article No.** MC8  
**Company Identification** Stratcor, Inc. Tel.: (501) 262-1270  
4285 Malvern Road Fax: (501) 262-2793  
Hot Springs, Arkansas 71901; U.S.A.  
**Inquiry Department** Stratcor, Inc.; Pittsburgh, Pennsylvania; U.S.A.  
1-412-787-4500; www.stratcor.com

## SECTION 2

### Composition and Information on Ingredients

**Chemical Characterization:**  
**Chemical Description** Vanadium Tetrachloride,  $VCl_4$   
**UN Number** UN 2444  
**DOT Guide** 137  
**CAS No.** 7632-51-1  
**EINECS No.** 231-561-1 vanadium tetrachloride

This substance contains only vanadium tetrachloride with trace impurities.

## SECTION 3

### Hazards Identification

#### Potential Hazards for Humans and Animals:

**Eye Contact** Chemical and possible thermal burns with redness, swelling, corneal burns, and possible blindness.  
**Skin Contact** Liquid causes chemical burns with redness, swelling, blisters, and pain. Vapors and fumes may cause chemical burns.  
**Inhalation** Fumes cause chemical burns of nasal passages, throat, and respiratory tract, with coughing, chest pain, and breathing difficulty.  
**Ingestion** Chemical and possible thermal burns of the mouth, throat, stomach, and intestinal tract, with injury to liver and kidneys.

## SECTION 4

### First-Aid Measures

#### General Information:

**Inhalation** Remove to fresh air. Administer oxygen if breathing difficult. Administer artificial aspiration if breathing has stopped. Call a physician.  
**Skin** Remove contaminated clothing. Dab liquid from skin using DRY cotton or paper toweling. Flood area with plenty of the coldest water available. See a physician if exposure symptoms develop.  
**Eyes** Immediately flood the eyes with plenty of cold water for at least 15 minutes. See a physician and ophthalmologist.  
**Ingestion** Do not induce vomiting. Give at least two glasses of water. Call a physician.

## SECTION 5 Fire-Fighting Measures

<b>Suitable Extinguishing Media</b>	No fire hazard. Use media suitable for surrounding fire.
<b>Extinguishing Media Not to Be Used</b>	Cool containers immersed in fire by blanketing with cold water. <b>Do not use water to cool leaking containers. Product reacts violently with water.</b>
<b>Special Exposure Hazards</b>	Dense fumes of product, vanadium oxytrichlorides and hydrochloric acid. Product reacts exothermically with water to form vanadium oxychlorides and hydrochloric acid.
<b>Special Protective Equipment for Fire Fighters</b>	Impermeable acid-resistant clothing. Positive-pressure, self-contained breathing apparatus.
<b>Additional Information</b>	Shipping container vapor space contains a fusible plug which melts between 75 and 175°C (165 and 350°F).

## SECTION 6 Accidental- Release Measures

<b>Personal Precautions</b>	Evacuate the area immediately. Cleanup personnel must wear impermeable acid-resistant clothing, including positive-pressure, self-contained breathing apparatus.
<b>Environmental Precautions</b>	Prevent water and moisture contact. Product fumes in air from reaction with atmospheric moisture. Fumes are a mix of hydrochloric acid and vanadium oxychlorides. May also form vanadium-pentoxide fume, which is U.S. EPA-listed as hazardous substance with a reportable quantity (RQ) of 454 kg (1000 lbs.).
<b>Cleaning Methods</b>	Minor spills can be misted with water and neutralized with soda ash. Dike large spills with clay, earth, or soda ash. Pump or absorb with dry clay and shovel up to a dry-polyethylene container. Steel or aluminum may react and dissolve.
<b>Additional Information</b>	Product may be neutralized in place using foam and soda ash. Vanadium-pentoxide fume has an OSHA PEL of 0.1 mg/m <sup>3</sup> . Shipping-container vapor space contains a fusible plug which melts between 75 and 175°C (165 and 350°F).

## SECTION 7 Handling and Storage

<b>Handling</b>	Do not allow contact with moisture. Use only in a closed system. Do not open container to the atmosphere. Use only approved materials of construction. Product slowly decomposes to vanadium trioxide, a solid. Higher temperatures and mixing with solvents and monomers accelerate decomposition.
<b>Storage</b>	Store in a closed steel container under dry inert-gas blanket. Storage area should be well ventilated. Protect containers from temperature cycling which may cause breathing.

## SECTION 8 Exposure Controls and Personal Protection

<b>Recommendations on Equipment Designs</b>	Ensure sufficient ventilation of the workplace. Use recommended materials of construction. Use design and operational practices which exclude atmosphere and moisture contact.
<b>Occupational Exposure Limit</b>	Not listed in OSHA 29 CFR 1910.1000, Table Z-1 (Air Contaminants): 0.05 mg/m <sup>3</sup> 15 Min. Ceiling for Vanadium (NIOSH) 0.05 mg/m <sup>3</sup> for V <sub>2</sub> O <sub>5</sub> (NIOSH TLV TWA) 5 ppm (7 mg/m <sup>3</sup> ) Ceiling for Hydrogen Chloride from reaction of VCl <sub>4</sub> with Moisture
<b>Personal Safety Equipment:</b>	
<b>Respiratory Protection</b>	Use full-face gas mask approved by NIOSH/MSHA; self-contained breathing apparatus.
<b>Hand Protection</b>	Use nitrile or natural-rubber gloves.
<b>Eye Protection</b>	Use goggles, face mask, face shield; do not wear contact lenses.
<b>Skin Protection</b>	Use chemically acid-resistant clothing and boots.
<b>Personal Hygiene</b>	Do not allow contact.

## SECTION 9

# Physical and Chemical Properties

This MSDS reflects available research data and is not a product- or quality-specification document.

<b>Appearance:</b>	
<b>Physical State</b>	Liquid.
<b>Color</b>	Dark Reddish-Brown.
<b>Odor</b>	Acrid.
<b>Change in Physical State:</b>	
<b>Vapor Pressure</b>	6 mm Hg (20°C), 100 mm Hg (100°C), 360 mm Hg (136°C).
<b>Boiling Point</b>	154.4°C
<b>Decomposition</b>	Vanadium tetrachloride slowly decomposes to vanadium trichloride, a solid. Long-term storage may affect usability
<b>Flash Point</b>	None.
<b>Flammability</b>	Not flammable.
<b>Ignition Temperature</b>	Not applicable.
<b>Auto Flammability</b>	Not applicable.
<b>Oxidizing Properties</b>	Acts as a catalyst in certain chemical environments.
<b>Explosive Properties</b>	
<b>Upper Explosion Limit</b>	Not applicable.
<b>Lower Explosion Limit</b>	Not applicable.
<b>Density</b>	1.8.
<b>Solubility in Water (20°C)</b>	Exothermically hygroscopic; dissolves as HCl, VOCl, and VOCl <sub>2</sub> .
<b>pH Value</b>	Not applicable.

## SECTION 10

# Stability and Reactivity

<b>Conditions to Avoid</b>	Contact with water in any form.
<b>Incompatible Materials</b>	Water, polar solvents, most plastics, aluminum, sodium.
<b>Hazardous Decomposition</b>	Exothermically hygroscopic, forming vanadium oxytrichlorides and hydrochloric acid. May also form vanadium pentoxide.

## SECTION 11

# Toxicological Information

<b>Acute Toxicity</b>	LD <sub>50</sub> orl-rat: 160 mg/kg.
<b>Irritation</b>	Corrosive irritant to skin, eyes, and mucous membranes. Hydrothermic property may cause thermal burns.
<b>Chronic Toxicity</b>	Inhalation of fumes may cause chronic bronchitis, allergic skin reaction, or asthmatic reaction with possible lung injury in susceptible individuals. When exposure ceases, effects are usually reversible.
<b>Carcinogen Status:</b>	
<b>IARC</b>	Not listed, International Agency for Research on Cancer
<b>NTP Annual Report</b>	Not listed, National Toxicology Program
<b>OSHA Subpart Z</b>	Not listed.
<b>U.S. EPA Genetic Toxicity</b>	Not reported.
<b>Mutagen Status</b>	Water-decomposition products may have mutagenic effects or may be an experimental teratogen.
<b>Teratogen Status</b>	See above.

## SECTION 12

# Ecological Information

<b>Persistence and Degradability</b>	Cannot exist in the environment.
<b>Aquatic Toxicity and Other Data Relating to Exotoxicity</b>	Violently exothermically reacts with water, forming hydrochloric acid and vanadium oxychlorides. Any of these may be harmful to aquatic environment.

## SECTION 13 Disposal Considerations

<b>Product Recommendation</b>	Neutralize by slowly reacting with an alkaline solution, preferably sodium hydroxide. Dispose of resulting solution in accordance with local regulatory guidelines. Unused product may be returned to manufacturer for recycling.
<b>Empty-Container Recommendation</b>	Rinse with alkaline solution, preferably sodium hydroxide. Dispose of rinseate and cleaned packaging in accordance with local regulatory guidelines.

## SECTION 14 Transport Information

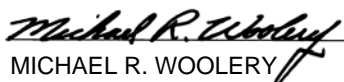
<b>U.N. packaging requirements shall be met for air and non-U.S. shipments.</b>	
<b>Proper Shipping Description</b>	UN 2444, VANADIUM TETRACHLORIDE, 8, I.
<b>Empty-Container Description</b>	Last contained UN 2444, Vanadium Tetrachloride, 8, I. (Both of above must be prefaced with X in "HM" column on Bill of Lading.)
<b>Land Transport</b>	U.S. DOT or appropriate local guidelines.
<b>Inland-Waterway Transport</b>	U.S. DOT or appropriate local guidelines.
<b>Sea Transport</b>	Requires an IMO Shipper's Declaration Form. Container shipments require a Container Packing Certificate or Vehicle Packing Declaration.
<b>Air Transport</b>	ICAO-IT and IATA-DGR (cargo only, 2.51). Requires an ICAO or IATA Air Declaration Form.

## SECTION 15 Regulatory Information

<b>Classification According to U.N. Guidelines</b>	Corrosive, 8.
<b>E.C. Danger Symbol</b>	C, X <sub>m</sub>
<b>R-Phrases</b>	R14, R20, R21.
<b>S-Phrases</b>	S3, S9, S23, S36, S37, S39, S49.
<b>U.S. EPA TSCA Inventory</b>	Reported in the initial EPA TSCA Inventory.
<b>U.S. EPA SARA III, Section 302 and 304.</b>	Not applicable.
<b>U.S. EPA SARA III, Section 311 and 312</b>	Reporting may be required. Check local regulations.
<b>U.S. EPA SARA III, Section 313</b>	Water-decomposition products, such as hydrochloric acid, may require reporting.
<b>Non-U.S. Requirements</b>	Refer to specific national guidelines.

## SECTION 16 Other Information

Data Sheet Prepared by:

  
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Strategic Minerals Corporation 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 Strategic Minerals 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 Strategic Minerals and may not apply to products sold by others.

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