

MATERIAL SAFETY DATA SHEET

Identity: Vanadium dioxide

Formula: VO₂

Vanadium oxide

SECTION I - GENERAL INFORMATION

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Molecular weight: 82.94

CAS # OSHA PEL ACGIH TLV %

12036-21-4 0.05mg(V₂O₅/m³) 0.05mg(V₂O₅/m³) 0.0-100%

SECTION III – PHYSICAL/CHEMICAL CHARACTERISTICS

Physical States: Solid

Boiling Point: N/A Specific Gravity (H₂O=1): 4.33

Melting Point: 1967.00°C Vapor Pressure (vs. air or mmHg): N/A

Evaporation Rate: N/A Vapor Density (vs. air=1): N/A

Solubility in water: Soluble Percent Volatile: N/A

Appearance and odor: Blue powder and pieces, no odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA:

Flash Point: N/A

Method Used: Non-flammable *Explosive Limits:* LEL: N/A UEL: N/A

Extinguishing Media:

Use suitable extinguishing agent for surrounding material and type of fire

Special Fire Fighting Procedures:

Firefighters must wear full face, self-contained breathing apparatus with full protective clothing to prevent contact with skin and eyes. Fumes from fire are hazardous. Isolate runoff to prevent environmental pollution.

Unusual Fire and Explosion Hazards:

When heated to decomposition, vanadium oxide may emit toxic fumes of vanadium oxides.

SECTION V - HEALTH HAZARD DATA

Routes of entry: Inhalation, skin, eyes, and ingestion

Signs and Symptoms of Overexposure:

Inhalation: May cause redness, coughing and dry throat. Vanadium toxicity may cause salivation, diarrhea, conjunctivitis, rhinitis, lowered body temperature, soreness of the pharynx, bronchitis and respiratory and cardiac failure.

Ingestion: May cause vomiting, diarrhea, convulsions, and coma.

Skin: May cause redness, itching, and inflammation.

Eye: May cause redness, itching and burning and watering.

Medical condition aggravated by exposure: Pre-existing respiratory disorders

Health Hazards (Acute and Chronic):

Vanadium compounds are considered to have variable toxicity. Vanadium compounds act chiefly as an irritant to the conjunctive and respiratory tract. Acute and chronic exposure can give rise to conjunctivitis, rhinitis, reversible irritation of the respiratory tract, and the bronchitis, bronchospasms, and asthma-like diseases in more severe cases. Industrial exposure is mostly acute and seldom chronic. Human vanadium poisoning symptoms mainly restricted to the conjunctive and respiratory systems. Poisoning by inhalation causes bleeding of the nose, and acute bronchitis. (Sax, Dangerous Properties of Industrial Materials, eighth edition)

Inhalation:

Acute: May cause irritation of the respiratory tract; compounds may cause nasal bleeding and acute bronchitis.

Chronic: Vanadium compounds may cause pneumonia and other pathologic symptoms.

Ingestion:

Acute: POISON. May cause gastrointestinal disturbances.

Chronic: No chronic health effects recorded.

Skin:

Acute: May cause irritation.

Chronic: May cause dermatitis.

Eye:

Acute: May cause irritation.

Chronic: May cause conjunctivitis.

Target organs: May affect the kidneys, respiratory system, skin and eyes

Carcinogenicity: No

Emergency and First Aid Procedures:

Inhalation: Remove victim to fresh air, keep warm and quiet, and give oxygen if breathing is difficult; seek medical attention

Ingestion: Give 1-2 glasses of milk or water and induce vomiting, seek medical attention. Never induce vomiting or give anything by mouth to an unconscious person

Skin: Remove contaminated clothing, brush material off skin, wash affected area with mild soap and water, and seek medical attention if symptoms persist

Eye: Flush eyes with lukewarm water, lifting upper and lower eyelids for at least 15 minutes and seek medical attention

SECTION VI - REACTIVITY DATA

Stability: Stable

Conditions to Avoid (stability): None

Incompatibility: None recorded

Hazardous Decomposition or Byproducts: Oxides of vanadium

Hazardous Polymerization: Will not occur

Conditions to avoid (hazardous polymerization): None

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be taken in case material is released or spilled:

Wear appropriate respiratory and protective equipment specified in section VIII. Isolate spill area, provide ventilation and extinguish sources of ignition. Vacuum up spill using a high efficiency particulate absolute (HEPA) air filter and place in a closed container for proper disposal. Take care not to raise dust.

Waste disposal method:

Dispose of in accordance with state, local, and federal regulations.

Hazard Label Information:

Store in cool, dry area and in tightly sealed container. Wash thoroughly after handling.

Other Precautions:

Reacts slowly with moisture to form vanadium pentoxide. Handle and store in a controlled, dry environment.

Transportation:

This material can be shipped on passenger and cargo aircraft.