

Plasmaterials, Inc.
 2268 Research Drive
 Livermore, CA 94550
 Ph: (925) 447-4030 Fx: (925) 447-4031
<http://plasmaterials.com>

SAFETY DATA SHEET

Section 1- IDENTIFICATION

COMPOSITION VO2		PRODUCT NAME Vanadium Oxide
SUPPLIER: Plasmaterials, Inc. 2268 Research Drive Livermore, CA 94550 Ph: 925-447-4030	RECOMMENDED USE: Laboratory Chemicals Scientific Research	EMERGENCY TELEPHONE NUMBERS US: 001-800-424-9300 Europe: 001-703-527-3887

Section 2- HAZARD(S) IDENTIFICATION

HEALTH HAZARDS:
 -Acute Toxicity (Oral): Category 4 (H302)
 -Acute Toxicity (Inhalation): Category 4 (H332)
 -Serious Eye Irritation/Eye Damage: Category 1 (H318)
 -Germ Cell Mutagenicity: Category 2 (H341)
 -Carcinogenicity: Category 2 (H351)
 -Reproductive Toxicity (Fertility, the unborn child): Category 2 (H361)
 -Specific Target Organ Toxicity, Single Exposure (Respiratory Tract irritation): Category 3 (H335)
 -Specific Target Organ Toxicity, Repeated Exposure: Category 1 (H372)

Physical Hazards: Not Classified

OSHA Defined Hazards: Not Classified

Environmental Hazards: Not Classified

LABEL ELEMENTS: Signal Word: Danger



HAZARD STATEMENTS

- H302: Harmful if swallowed.
- H318: Causes serious eye damage
- H332: Harmful if inhaled.
- H335: May cause respiratory irritation.
- H341: Suspected of causing genetic defects.
- H351: Suspected of causing cancer.
- H361: Suspected of damaging fertility or the unborn child.
- H372: Causes damage to organs through prolonged or repeated exposure.

PRECAUTIONARY STATEMENTS

- P201: Obtain special instructions before use
- P202: Do not handle until all safety precautions have been read and understood
- P260: Do not breathe dust/fume/gas/mist/vapors/spray.
- P261: Avoid breathing dust/fume/vapors
- P264: Wash thoroughly after handling.
- P270: Do not eat, drink, or smoke when using this product.

-P271: Use only outdoors or in a well-ventilated area
 -P280: Wear protective gloves/protective clothing/eye protection/face protection
 -P301+P312+P330: If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth.
 -P302+P352: If on skin: Wash with plenty of water.
 -P304+P340: If inhaled: Remove person to fresh air and keep comfortable for breathing.
 -P305+P351+P338+P310: If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor
 -P332+P313: If skin irritation occurs obtain medical attention.
 -P337+P313: If eye irritation persists get medical advice/attention
 -P362+P364: Take off contaminated clothing and wash it before reuse.
 -P403+P233: Store in a well-ventilated place. Keep container tightly closed.
 -P405: Store locked up.
 -P501: Dispose of contents/container in accordance with local/regional/national/international regulations

Hazards not otherwise classified (HNOC):
 -None identified.

Section 3- COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT	CAS-No	Molecular Weight
Vanadium Oxide	12036-21-4	82.94 g/mol

Section 4- FIRST AID MEASURES

GENERAL ADVICE: If exposed or concerned: get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

INHALATION: Remove victim from exposure to fresh air and keep at rest in a position comfortable for breathing. Give oxygen or artificial respiration if needed. Call a poison control center or doctor/physician if you feel unwell.

SKIN CONTACT: Take off all contaminated clothing. Wash off with soap and plenty of water. Get medical attention if irritation develops and/or persists. Wash work clothing and protective equipment to remove contaminants.

EYE CONTACT: Do not rub eyes. Immediately flush eyes with plenty of water, lifting upper and lower lids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

INGESTION: Rinse mouth thoroughly. If vomiting occurs, keep head low so that stomach content does not get into the lungs. Get medical advice/attention if you feel unwell. Seek medical attention.

MOST IMPORTANT SYMPTOMS/EFFECTS: Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. May cause respiratory irritation. Prolonged exposure may cause chronic effects.

NOTES TO PHYSICIAN: Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.

Section 5- FIREFIGHTING MEASURES

Suitable Extinguishing Media: Water Fog, Foam, Dry Chemical Powder, Carbon Dioxide (CO₂)

Unsuitable Extinguishing Media: Use fire-extinguishing media appropriate for surrounding materials. Dousing metallic fires with water may generate hydrogen gas, an extremely dangerous explosion hazard, particularly if fire is in a confined environment.

Specific Hazards Arising from the Chemical: During fire, gases hazardous to health may be formed.

Protective Equipment & Precautions for Firefighters: As in any fire, Firefighters must wear full face, self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective clothing to prevent contact with skin and eyes.

Firefighting Instructions/Specific Methods: Use standard firefighting procedures and consider the hazards of other involved materials. Use water spray to cool unopened containers.

General Fire Hazards: No unusual fire or explosion hazards noted.

Section 6- ACCIDENTAL RELEASE MEASURES

Personal Precautions: Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Avoid inhalation of dust. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see Section 8 of SDS.

Environmental Precautions: Avoid discharge into drains, water courses or onto the ground.

Methods for Containment & Clean Up: Avoid dispersal of the dust in the air (i.e., clearing dust surfaces with compressed air). Stop the flow of material if this is without risk.

-Large Spills: Wet down with water and dike for later disposal. Absorb in vermiculite, dry sand, or earth and place into containers. Shovel the material into waste container. Following product recovery, flush area with water.

-Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. Wipe up with absorbent material (e.g., cloth, fleece). Clean surface thoroughly to remove residual contamination.

-Never return spills to original containers for re-use.

-Put material in suitable, covered, labeled containers.

-For waste disposal, see Section 13 of SDS.

Section 7- HANDLING AND STORAGE

Handling: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Minimize dust generation and accumulation. Avoid breathing dust. Avoid prolonged exposure. Do not get this material in contact with eyes. Do not taste or swallow. When using, do not eat, drink, or smoke. Pregnant or breastfeeding women must not handle this product. Should be handled in closed systems, if possible. Use only outdoors or in a well-ventilated area. Wear appropriate personal protection equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.

Storage: Store locked up. Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of SDS)

Section 8- EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines:

Component	CAS-No.	Type	Control Parameters	Basis
Vanadium Oxide	12036-21-4	Ceiling	0.05 mg/m ³ (Dust)	US. NIOSH Pocket Guide to Chemical Hazards Materials

Biological Limit Values: No biological exposure limits noted for the ingredient(s)

Engineering Measures: Follow standard monitoring procedures. Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety practice. Keep away from food and drink. Wash thoroughly after handling and before eating, drinking and/or smoking. Wash hands before breaks and at the end of the workday. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

Personal Protective Equipment:

Eye/Face Protection: Wear safety glasses with side shields or goggles. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Skin and Body Protection: Handle with chemical resistant gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Wear appropriate chemical resistant protective clothing. Use of an impervious apron is recommended. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory Protection: In case of insufficient ventilation, wear suitable respiratory equipment. Where

protection from nuisance levels of dusts is desired, use type N95 (US) or type P1 (EN 143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Thermal Hazards: Wear appropriate thermal protective clothing, when necessary.

Section 9- PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Solid

Appearance: No information available

Odor: No information available

Odor Threshold: No information available

pH: No information available

Melting Point/Range: No information available

Boiling Point/Range: No information available

Flash Point: No information available

Evaporation Rate: No information available

Flammability (solid,gas): No information available

Flammability or Exposure Limits:

Upper: No information available

Lower: No information available

Vapor Pressure: No information available

Vapor Density: No information available

Relative Density: No information available

Solubility: No information available

Partition coefficient; n-octanol/water: No information available

Auto Ignition Temperature: No information available

Decomposition Temperature: No information available

Viscosity: No information available

Density: No information available

Specific Gravity: No information available

Explosive Properties: No information available

Oxidizing Properties: No information available

Section 10- STABILITY AND REACTIVITY

Reactive Hazard: Stable and non-reactive under normal conditions of use, storage, and transport.

Stability: Stable under normal conditions.

Conditions to Avoid: Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. Contact with incompatible materials

Incompatible Materials: Strong oxidizing agents

Hazardous Decomposition Products: No information available

Hazardous Polymerization: No information available

Hazardous Reactions: No information available

Section 11- TOXICOLOGICAL INFORMATION

Information on likely Routes of Exposure:

Inhalation: Harmful if inhaled.

Skin Contact: No adverse effects due to skin contact are expected

Eye Contact: Causes serious eye damage

Ingestion: Harmful if swallowed

Symptoms Related to the Physical, Chemical & Toxicological Characteristics: Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. May cause respiratory irritation.

Information on Toxicological Effects:

Acute Toxicity: Harmful if inhaled. Harmful if swallowed.

Skin Corrosion/Irritation: No information available
Serious Eye Damage/Eye Irritation: Causes serious eye damage
Respiratory or Skin Sensitization: No information available
Carcinogenicity: Suspected of causing cancer
 -IARC Monographs Overall Evaluation of Carcinogenicity: Not listed
 -OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052): Not regulated
 -US National Toxicology Program (NTP) Report on Carcinogens: Not listed
Germ Cell Mutagenicity: Suspected of causing genetic defects
Reproductive Toxicity: Suspected of damaging fertility or the unborn child.
Development Toxicity: No information available
Specific Target Organ Toxicity – single exposure: May cause respiratory irritation
Specific Target Organ Toxicity – repeated exposure: Causes damage to organs through prolonged or repeated exposure.
Aspiration Hazard: No information available
Chronic Effects: Causes damage to organs through prolonged or repeated exposure. Prolonged inhalation may be harmful.
-To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.



Section 12- ECOLOGICAL INFORMATION

Toxicity: The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and Degradability: No information available
Bioaccumulation/Accumulation: No information available
Mobility in Soil: No information available
Results of PBT and vPvB assessment: PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.
Other Adverse Effects: No information available

Section 13- DISPOSAL CONSIDERATIONS

Waste Disposal Methods: Collect and reclaim or dispose in sealed containers at a licensed waste disposal site. Dispose of empty containers and contaminated packaging as unused product. Dispose of contents/container in accordance with local/regional/national/international regulations.

Section 14- TRANSPORT INFORMATION

<p>DOT:</p> <p>UN-No: UN3285 Proper Shipping Name: Vanadium compound, n.o.s. (Vanadium Oxide) Transport Hazard Class: 6.1 (PGI, II, ot) Packing Group: Not available Special Precautions for User: Read safety instructions, SDS and emergency procedures before handling.</p>	
<p>IATA:</p> <p>UN-No: UN3285 Proper Shipping Name: Vanadium compound, n.o.s. (Vanadium oxide) Hazard Class: 6.1 (PGI, II, ot) Packing Group: Not available Environmental Hazards: No Special Precautions for User: Read safety instructions, SDS and emergency procedures before handling.</p>	

IMDG:

UN-No: UN3285
Proper Shipping Name: Vanadium compound, n.o.s. (Vanadium oxide)
Hazard Class: 6.1 (PGI, II, ot)
Packing Group: Not available
Environmental Hazards (Marine Pollutant): No
EmS: Not available
Special Precautions for User: Read safety instructions, SDS and emergency procedures before handling.

**Section 15- REGULATORY INFORMATION**

US Federal Regulations: This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D): Not regulated

CERCLA Hazardous Substance List (40 CFR 302.4): Not listed

U.S. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052): Not regulated

SARA 302 Extremely Hazardous Substance: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302

SARA 304 Emergency Release Notification: Not Regulated

SARA 311/312 Hazardous Chemical: Yes

SARA 313 (TRI Reporting):

Chemical Name	CAS-No	% by Weight
Vanadium Oxide	12036-21-4	100

Safe Drinking Water Act (SWDA): Contains component(s) regulated under the Safe Drinking Water Act

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List: Not regulated

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130): Not regulated

US California Proposition 65: WARNING: This product contains a chemical known to the State of California to cause cancer.

US California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3 subd. (a)): Vanadium oxide (CAS No. 12036-21-4)

Section 16- OTHER INFORMATION

The above information is accurate to the best of our knowledge. However, since data, safety standards and government regulations are subject to change, the conditions of handling and use, or misuse are beyond our control, Plasmaterials, Inc. makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Users should satisfy themselves that they have all current data relevant to their particular use.

The information in this SDS was obtained from sources, which we believe are reliable. However, the information is provided without any representation or warranty, expressed or implied, regarding the accuracy or correctness.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.

REVISION: 11-20-19