



# SAFETY DATA SHEET

**MATERION**

## 1. Identification

**Product identifier** Vanadium Oxide (VO<sub>2</sub>)

**Other means of identification**

SDS number 2DF

Materion Code 2DF

CAS number 12036-21-4

**Manufacturer/Importer/Supplier/Distributor information**

**Manufacturer**

**Company name** Materion Advanced Chemicals Inc.

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**Emergency phone number** Chemtrec 800.424.9300

## 2. Hazard(s) identification

**Physical hazards** Not classified.

**Health hazards**

|   |   |
|---|---|
| Acute toxicity, oral                              | Category 4                              |
| Acute toxicity, inhalation                        | Category 4                              |
| Serious eye damage/eye irritation                 | Category 1                              |
| Germ cell mutagenicity                            | Category 2                              |
| Carcinogenicity                                   | Category 2                              |
| Reproductive toxicity                             | Category 2                              |
| Specific target organ toxicity, single exposure   | Category 3 respiratory tract irritation |
| Specific target organ toxicity, repeated exposure | Category 1                              |

**Environmental hazards** Not classified.

**OSHA defined hazards** Not classified.

### Label elements



**Signal word** Danger

**Hazard statement** Harmful if swallowed or inhaled. Causes serious eye damage. May cause respiratory irritation. Suspected of causing genetic defects. Suspected of causing cancer. Causes damage to organs through prolonged or repeated exposure.

**Precautionary statement**

**Prevention** Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust/fume/gas/mist/vapors/spray. Avoid breathing dust. Avoid breathing dust/fume/vapors. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.

|  |   |
|--|---|
| <b>Response</b>                                  | If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. If on skin: Wash with plenty of water. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, consult a specialist. Remove and wash contaminated clothing before re-use. If inhaled: Remove person to fresh air and keep comfortable for breathing. 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. If skin irritation occurs, obtain medical attention. |
| <b>Storage</b>                                   | Store in a well-ventilated place. Keep container tightly closed. Store locked up.   |
| <b>Disposal</b>                                  | Dispose of contents/container in accordance with local/regional/national/international regulations.   |
| <b>Hazard(s) not otherwise classified (HNOC)</b> | None known.   |
| <b>Supplemental information</b>                  | 100% of the substance consists of component(s) of unknown acute dermal toxicity. 100% of the substance consists of component(s) of unknown acute hazards to the aquatic environment. 100% of the substance consists of component(s) of unknown long-term hazards to the aquatic environment.<br>For further information, please contact the Product Stewardship Department at +1.800.862.4118.  |

### 3. Composition/information on ingredients

#### Substances

| Chemical name  | Common name and synonyms | CAS number | %   |
|----------------|--------------------------|------------|-----|
| Vanadium Oxide |                          | 12036-21-4 | 100 |

### 4. First-aid measures

|   |   |
|---|---|
| <b>Inhalation</b>   | Remove victim to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Call a poison center or doctor/physician if you feel unwell.   |
| <b>Skin contact</b>   | Wash off with soap and water. Get medical attention if irritation develops and persists. Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse.  |
| <b>Eye contact</b>  | Do not rub eyes. Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.        |
| <b>Ingestion</b>  | Rinse mouth. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell. Seek medical attention.   |
| <b>Most important symptoms/effects, acute and delayed</b>                     | 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.  |
| <b>Indication of immediate medical attention and special treatment needed</b> | Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.  |
| <b>General information</b>  | 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. |

### 5. Fire-fighting measures

|  |  |
|--|--|
| <b>Suitable extinguishing media</b>                                  | Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).  |
| <b>Unsuitable extinguishing media</b>                                | 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. |
| <b>Specific hazards arising from the chemical</b>                    | During fire, gases hazardous to health may be formed.  |
| <b>Special protective equipment and precautions for firefighters</b> | Self-contained breathing apparatus and full protective clothing must be worn in case of fire.  |

|   |  |
|---|--|
| <b>Fire fighting equipment/instructions</b> | Use water spray to cool unopened containers.   |
| <b>Specific methods</b>                     | Use standard firefighting procedures and consider the hazards of other involved materials. |
| <b>General fire hazards</b>                 | No unusual fire or explosion hazards noted.  |

## 6. Accidental release measures

|  |  |
|--|--|
| <b>Personal precautions, protective equipment and emergency procedures</b> | 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 the SDS.   |
| <b>Methods and materials for containment and cleaning up</b>               | Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air). Stop the flow of material, if this is without risk.<br><br>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.<br><br>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.<br><br>Never return spills to original containers for re-use. Put material in suitable, covered, labeled containers. For waste disposal, see section 13 of the SDS. |
| <b>Environmental precautions</b>   | Avoid discharge into drains, water courses or onto the ground.   |

## 7. Handling and storage

|   |  |
|---|--|
| <b>Precautions for safe handling</b>                                | Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Minimize dust generation and accumulation. Do not get this material in contact with eyes. Do not taste or swallow. Avoid breathing dust. Avoid prolonged exposure. 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 protective equipment. Wash hands thoroughly after handling. |
| <b>Conditions for safe storage, including any incompatibilities</b> | Store locked up. Store in tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).  |

## 8. Exposure controls/personal protection

### Occupational exposure limits

The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

#### US. NIOSH: Pocket Guide to Chemical Hazards

| Material                        | Type    | Value                  | Form  |
|---------------------------------|---------|------------------------|-------|
| Vanadium Oxide (CAS 12036-21-4) | Ceiling | 0.05 mg/m <sup>3</sup> | Dust. |

|   |  |
|---|--|
| <b>Biological limit values</b>          | No biological exposure limits noted for the ingredient(s).   |
| <b>Appropriate engineering controls</b> | Good general ventilation 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. |

### Individual protection measures, such as personal protective equipment

|                            |   |
|----------------------------|---|
| <b>Eye/face protection</b> | Wear safety glasses with side shields (or goggles) and a face shield. |
| <b>Skin protection</b>     |   |
| <b>Hand protection</b>     | Wear appropriate chemical resistant gloves.                           |
| <b>Other</b>               | Use of an impervious apron is recommended.                            |

|                                       |   |
|---------------------------------------|---|
| <b>Respiratory protection</b>         | In case of insufficient ventilation, wear suitable respiratory equipment.   |
| <b>Thermal hazards</b>                | Wear appropriate thermal protective clothing, when necessary.   |
| <b>General hygiene considerations</b> | Observe any medical surveillance requirements. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. |

## 9. Physical and chemical properties

### Appearance

|  |                |
|--|----------------|
| <b>Physical state</b>                          | Solid.         |
| <b>Form</b>                                    | Solid.         |
| <b>Color</b>                                   | Not available. |
| <b>Odor</b>                                    | Not available. |
| <b>Odor threshold</b>                          | Not available. |
| <b>pH</b>                                      | Not available. |
| <b>Melting point/freezing point</b>            | Not available. |
| <b>Initial boiling point and boiling range</b> | Not available. |
| <b>Flash point</b>                             | Not available. |
| <b>Evaporation rate</b>                        | Not available. |
| <b>Flammability (solid, gas)</b>               | Not available. |

### Upper/lower flammability or explosive limits

|                                       |                |
|---------------------------------------|----------------|
| <b>Flammability limit - lower (%)</b> | Not available. |
| <b>Flammability limit - upper (%)</b> | Not available. |
| <b>Explosive limit - lower (%)</b>    | Not available. |
| <b>Explosive limit - upper (%)</b>    | Not available. |

|  |                |
|--|----------------|
| <b>Vapor pressure</b>                          | Not available. |
| <b>Vapor density</b>                           | Not available. |
| <b>Relative density</b>                        | Not available. |
| <b>Solubility(ies)</b>                         |                |
| <b>Solubility (water)</b>                      | Not available. |
| <b>Partition coefficient (n-octanol/water)</b> | Not available. |
| <b>Auto-ignition temperature</b>               | Not available. |
| <b>Decomposition temperature</b>               | Not available. |
| <b>Viscosity</b>                               | Not available. |

### Other information

|                             |                  |
|-----------------------------|------------------|
| <b>Explosive properties</b> | Not explosive.   |
| <b>Molecular formula</b>    | O <sub>2</sub> V |
| <b>Molecular weight</b>     | 82.94 g/mol      |
| <b>Oxidizing properties</b> | Not oxidizing.   |

## 10. Stability and reactivity

|   |   |
|---|---|
| <b>Reactivity</b>                         | The product is stable and non-reactive under normal conditions of use, storage and transport. |
| <b>Chemical stability</b>                 | Material is stable under normal conditions.   |
| <b>Possibility of hazardous reactions</b> | Hazardous polymerization does not occur.  |

|   |   |
|---|---|
| <b>Conditions to avoid</b>              | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. Contact with incompatible materials. |
| <b>Incompatible materials</b>           | Strong oxidizing agents.  |
| <b>Hazardous decomposition products</b> | No hazardous decomposition products are known.  |

## 11. Toxicological information

### Information on likely routes of exposure

|                     |  |
|---------------------|--|
| <b>Inhalation</b>   | Harmful if inhaled.                                  |
| <b>Skin contact</b> | No adverse effects due to skin contact are expected. |
| <b>Eye contact</b>  | Causes serious eye damage.                           |
| <b>Ingestion</b>    | Harmful if swallowed.                                |

**Symptoms related to the physical, chemical and 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

|  |   |
|--|---|
| <b>Acute toxicity</b>                    | Harmful if swallowed. Harmful if inhaled.                 |
| <b>Skin corrosion/irritation</b>         | Not available.  |
| <b>Serious eye damage/eye irritation</b> | Causes serious eye damage.                                |
| <b>Respiratory or skin sensitization</b> |   |
| <b>Respiratory sensitization</b>         | Not a respiratory sensitizer.                             |
| <b>Skin sensitization</b>                | This product is not expected to cause skin sensitization. |
| <b>Germ cell mutagenicity</b>            | Suspected of causing genetic defects.                     |
| <b>Carcinogenicity</b>                   | 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.

|   |  |
|---|--|
| <b>Reproductive toxicity</b>                              | Not available.   |
| <b>Specific target organ toxicity - single exposure</b>   | May cause respiratory irritation.  |
| <b>Specific target organ toxicity - repeated exposure</b> | Causes damage to organs through prolonged or repeated exposure.                                      |
| <b>Aspiration hazard</b>                                  | Not an aspiration hazard.  |
| <b>Chronic effects</b>                                    | Prolonged inhalation may be harmful. Causes damage to organs through prolonged or repeated exposure. |

## 12. Ecological information

|                                      |  |
|--------------------------------------|--|
| <b>Ecotoxicity</b>                   | 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. |
| <b>Persistence and degradability</b> | No data is available on the degradability of this product.   |
| <b>Bioaccumulative potential</b>     | No data available.   |
| <b>Mobility in soil</b>              | No data available.   |
| <b>Other adverse effects</b>         | No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.            |

### 13. Disposal considerations

|  |  |
|--|--|
| <b>Disposal instructions</b>                 | Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.                         |
| <b>Local disposal regulations</b>            | Dispose in accordance with all applicable regulations.   |
| <b>Hazardous waste code</b>                  | The waste code should be assigned in discussion between the user, the producer and the waste disposal company.   |
| <b>Waste from residues / unused products</b> | Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions). |
| <b>Contaminated packaging</b>                | Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.       |

### 14. Transport information

#### DOT

|                                     |   |
|-------------------------------------|---|
| <b>UN number</b>                    | UN3285  |
| <b>UN proper shipping name</b>      | Vanadium compound, n.o.s. (Vanadium dioxide)                            |
| <b>Transport hazard class(es)</b>   |   |
| <b>Class</b>                        | 6.1(PGI, II, ot)  |
| <b>Subsidiary risk</b>              | -   |
| <b>Packing group</b>                | Not available.  |
| <b>Special precautions for user</b> | Read safety instructions, SDS and emergency procedures before handling. |

#### IATA

|                                     |   |
|-------------------------------------|---|
| <b>UN number</b>                    | UN3285  |
| <b>UN proper shipping name</b>      | Vanadium compound, n.o.s. (Vanadium dioxide)                            |
| <b>Transport hazard class(es)</b>   |   |
| <b>Class</b>                        | 6.1(PGI, II, ot)  |
| <b>Subsidiary risk</b>              | -   |
| <b>Packing group</b>                | Not available.  |
| <b>Environmental hazards</b>        | No.   |
| <b>Special precautions for user</b> | Read safety instructions, SDS and emergency procedures before handling. |

#### IMDG

|                                     |   |
|-------------------------------------|---|
| <b>UN number</b>                    | UN3285  |
| <b>UN proper shipping name</b>      | Vanadium compound, n.o.s. (Vanadium dioxide)                            |
| <b>Transport hazard class(es)</b>   |   |
| <b>Class</b>                        | 6.1(PGI, II, ot)  |
| <b>Subsidiary risk</b>              | -   |
| <b>Packing group</b>                | Not available.  |
| <b>Environmental hazards</b>        |   |
| <b>Marine pollutant</b>             | No.   |
| <b>EmS</b>                          | Not available.  |
| <b>Special precautions for user</b> | Read safety instructions, SDS and emergency procedures before handling. |

#### DOT





## 15. Regulatory information

**US federal regulations** This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

### Toxic Substances Control Act (TSCA)

**TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**

Not regulated.

### CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

### SARA 304 Emergency release notification

Not regulated.

### OSHA Specifically Regulated Substances (29 CFR 1910.1001-1052)

Not regulated.

### Superfund Amendments and Reauthorization Act of 1986 (SARA)

#### SARA 302 Extremely hazardous substance

Not listed.

**SARA 311/312 Hazardous chemical** Yes

#### SARA 313 (TRI reporting)

| Chemical name  | CAS number | % by wt. |
|----------------|------------|----------|
| Vanadium Oxide | 12036-21-4 | 100      |

### Other federal regulations

#### 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.

**Safe Drinking Water Act (SDWA)** Contains component(s) regulated under the Safe Drinking Water Act.

**US state regulations** WARNING: This product contains a chemical known to the State of California to cause cancer.

#### 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 12036-21-4)

## 16. Other information, including date of preparation or last revision

**Issue date** 05-26-2015  
**Revision date** 09-20-2019  
**Version #** 05

**Disclaimer**

Materion Advanced Chemicals Inc. cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. This document has been prepared using data from sources considered to be technically reliable and the information is believed to be correct. Materion makes no warranties, expressed or implied, as to the accuracy of the information contained herein. Materion cannot anticipate all conditions under which this information and its products may be used and the actual conditions of use are beyond its control. The user is responsible to evaluate all available information when using this product for any particular use and to comply with all Federal, State, Provincial and Local laws, statutes and regulations.