

## 1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Vanadium Oxide Nanowires, Research Grade

Catalog Number: NovaWire-VO-40

Formula:  $V_2O_5$

Diameter: ~ 40 nm

Length: > 100  $\mu\text{m}$

Supplier: Novarials Corporation  
800 W Cummings Park, Suite 4600  
Woburn, MA 01801

Telephone: +1 617-276-5642

Fax: +1 781-995-0388

---

## 2. HAZARDS IDENTIFICATION

### Emergency Overview

#### GHS Classification

Acute toxicity, Oral (Category 2), H300

Acute toxicity, Inhalation (Category 2), H330

Serious eye damage (Category 1), H318

Germ cell mutagenicity (Category 2), H341

Reproductive toxicity (Category 2), H361

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

Specific target organ toxicity - repeated exposure (Category 1), H372

Acute aquatic toxicity (Category 2), H401

Chronic aquatic toxicity (Category 2), H411

#### GHS Label elements, including precautionary statements

Pictogram



Signal word Danger

Hazard statement(s)

H300 + H330 Fatal if swallowed or if inhaled

H318 Causes serious eye damage.

H335 May cause respiratory irritation.

H341 Suspected of causing genetic defects.  
H361 Suspected of damaging fertility or the unborn child.  
H372 Causes damage to organs through prolonged or repeated exposure.  
H411 Toxic to aquatic life with long lasting effects.

Precautionary statement(s)

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.  
P264 Wash skin thoroughly after handling.  
P270 Do not eat, drink or smoke when using this product.  
P271 Use only outdoors or in a well-ventilated area.  
P273 Avoid release to the environment.  
P280 Wear protective gloves/eye protection/face protection.  
P284 Wear respiratory protection.  
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.  
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P310 Immediately call a POISON CENTER or doctor/physician.  
P320 Specific treatment is urgent (see supplemental first aid instructions on this label).  
P330 Rinse mouth.  
P391 Collect spillage.  
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.  
P405 Store locked up.  
P501 Dispose of contents/ container to an approved waste disposal plant.

**NFPA Ratings**

**Health Hazard:** 3  
**Fire Hazard:** 0  
**Reactivity Hazard:** 0

**HMIS Ratings**

**Health Hazard:** 4  
**Chronic Health Hazard:** \*  
**Flammability:** 0  
**Physical Hazard:** 0

---

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Synonyms: Divanadium pentaoxide  
Formula: V<sub>2</sub>O<sub>5</sub>  
Molecular Weight: 181.88 g/mol

Component	Concentration
<b>Divanadium pentaoxide</b>	
CAS-No.	1314-62-1
EC-No.	215-239-8
Index-No.	023-001-00-8
<b>Water</b>	
CAS-No.	7732-18-5
EC-No.	231-791-2

---

#### 4. FIRST AID MEASURES

##### **General advice**

Move out of dangerous area. Consult a physician. Show this safety data sheet to the doctor in attendance.

##### **If inhaled**

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

##### **In case of skin contact**

Wash off with soap and plenty of water. Consult a physician.

##### **In case of eye contact**

Rinse thoroughly with plenty of water and consult a physician.

##### **If swallowed**

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

##### **Most important symptoms and effects, both acute and delayed**

The most important known symptoms and effects are described in the labeling (see section 2).

##### **Indication of any immediate medical attention and special treatment needed**

no data available

---

#### 5. FIREFIGHTING MEASURES

##### **Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

##### **Special protective equipment for firefighters**

Wear self-contained breathing apparatus for firefighting if necessary.

##### **Hazardous combustion products**

Hazardous decomposition products formed under fire conditions – Vanadium/vanadium oxides

---

#### 6. ACCIDENTAL RELEASE MEASURES

##### **Personal precautions**

Wear respiratory protection. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

##### **Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### **Methods and materials for containment and cleaning up**

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

---

## **7. HANDLING AND STORAGE**

### **Precautions for safe handling**

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs. Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.

### **Conditions for safe storage**

Keep container tightly closed in a cool, dry and well-ventilated place.

---

## **8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

### **Personal protective equipment**

#### **Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### **Hand protection**

Handle with 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.

#### **Eye/Face protection**

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### **Body protection**

Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### **Hygiene measures**

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

#### **Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

## **9. PHYSICAL AND CHEMICAL PROPERTIES**

### **APPEARANCE**

Form

suspension

Color

orange

**Safety data**

pH	no data available
Melting point/freezing point	no data available
Boiling point	no data available
Flash point	no data available
Ignition temperature	no data available
Auto ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	no data available
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

---

**10. STABILITY AND REACTIVITY****Reactivity**

no data available

**Chemical stability**

Stable under recommended storage conditions.

**Possibility of hazardous reactions**

no data available

**Conditions to avoid**

no data available

**Materials to avoid**

Strong acids

**Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions - Vanadium/vanadium oxides  
Other decomposition products -no data available

---

**11. TOXICOLOGICAL INFORMATION****Acute toxicity****Oral LD50**

LD50 Oral - rat - 10 mg/kg

Remarks: Behavioral: Coma.

**Inhalation LC50**

LC50 Inhalation - rat - 6 h - 126 mg/m<sup>3</sup>

Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste): Eye. Other. Behavioral: Ataxia. Lungs, Thorax, or Respiration: Dyspnea.

**Dermal LD50**

LC50 Dermal - rat - > 2,500 mg/kg  
(OECD Test Guideline 402)

no data available

**Skin corrosion/irritation**

no data available

**Serious eye damage/eye irritation**

Eyes - rabbit

Result: Risk of serious damage to eyes.  
(OECD Test Guideline 405)

**Respiratory or skin sensitization**

no data available

**Germ cell mutagenicity**

Laboratory experiments have shown mutagenic effects.  
In vitro tests showed mutagenic effects

**Carcinogenicity**

no data available

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Vanadium pentoxide).

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

Possible risk of congenital malformation in the fetus.  
Suspected human reproductive toxicant

no data available

**Specific target organ toxicity -single exposure (Globally Harmonized System)**

May cause respiratory irritation.

**Specific target organ toxicity -repeated exposure (Globally Harmonized System)**

Causes damage to organs through prolonged or repeated exposure.

**Aspiration hazard**

no data available

**Additional Information**

RTECS: Not available

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence

---

**12. ECOLOGICAL INFORMATION**

**Toxicity**

Toxicity to fish

LC50 - Oncorhynchus mykiss (rainbow trout) - 5.2 mg/l - 96.0 h

Toxicity to daphnia and other aquatic invertebrates LC50 - Daphnia magna (Water flea) - 1.52 mg/l - 48 h

**Persistence and degradability**

no data available

**Bioaccumulative potential**

no data available

**Mobility in soil**

no data available

**PBT and vPvB assessment**

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Toxic to aquatic life with long lasting effects

---

**13. DISPOSAL CONSIDERATIONS**

**Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION**

**DOT (US)**

UN number: 2862                      Class: 6.1                      Packing group: III  
Proper shipping name: Vanadium pentoxide  
Reportable Quantity (RQ): 1000 lbs  
Marine pollutant: No  
Poison Inhalation Hazard: No

**IMDG**

UN number: 2862                      Class: 6.1                      Packing group: III                      EMS-No: F-A, S-A  
Proper shipping name: Vanadium pentoxide  
Marine pollutant: No

**IATA**

UN number: 2862                      Class: 6.1                      Packing group: III  
Proper shipping name: Vanadium pentoxide

---

**15. REGULATORY INFORMATION**

**SARA 302 Components**

The following components are subject to reporting levels established by SARA Title III, Section 302:  
Vanadium pentoxide                      CAS-No.1314-62-1

**SARA 313 Components**

The following components are subject to reporting levels established by SARA Title III, Section 313:  
Vanadium pentoxide CAS-No.1314-62-1

**SARA 311/312 Hazards**

Acute Health Hazard, Chronic Health Hazard.

**Massachusetts Right To Know Components**

Vanadium pentoxide CAS-No.1314-62-1

**Pennsylvania Right To Know Components**

Vanadium pentoxide CAS-No.1314-62-1  
Water CAS-No. 7732-18-5

**New Jersey Right To Know Components**

Vanadium pentoxide CAS-No.1314-62-1  
Water CAS-No. 7732-18-5

**California Prop. 65 Components**

WARNING! This product contains a chemical known to the State of California to cause cancer.  
Vanadium pentoxide CAS-No.1314-62-1

---

**16. DISCLAIMER**

Novarials Corporation believes that the information in this Safety Data Sheet is accurate and represents the best and most current information available to us. Novarials Corporation makes no representations or warranties either express or implied, regarding the suitability of the materials for any purpose or the accuracy if the information contained within this document. Accordingly, Novarials Corporation and its affiliates shall not be held liable for any damage resulting from shipping, handling, storage, use of the above product.