


<a href="#">Vanadium(IV) Oxide</a>	<a href="#">Pricing &gt;</a>
<a href="#">Vanadium(IV) Oxide Sputtering Target</a>	<a href="#">Pricing &gt;</a>

<b>Linear Formula</b>	VO <sub>2</sub>
<b>Pubchem CID</b>	82849
<b>MDL Number</b>	MFCD00011456
<b>EC No.</b>	234-841-1
<b>IUPAC Name</b>	dioxovanadium
<b>Beilstein/Reaxys No.</b>	N/A
<b>SMILES</b>	O=[V]=O
<b>Inchl Identifier</b>	InChI=1S/2O.V
<b>Inchl Key</b>	GRUMUEUJTSXQOI-UHFFFAOYSA-N

<b>Signal Word</b>	Warning
<b>Hazard Statements</b>	H315-H319
<b>Hazard Codes</b>	Xi
<b>Precautionary Statements</b>	P305 + P351 + P338
<b>Flash Point</b>	Not applicable
<b>Risk Codes</b>	36/38
<b>Safety Statements</b>	26-37-39
<b>RTECS Number</b>	N/A
<b>Transport Information</b>	NONH
<b>WGK Germany</b>	3
<b>GHS Pictograms</b>	<b><u>GHS07</u></b> <b><u>Exclamation</u></b> <b><u>Point</u></b> 

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## SAFETY DATA SHEET

## SECTION 1. IDENTIFICATION

**Product Identifiers:** All applicable American Elements product codes for CAS #12036-21-4

**Relevant identified uses of the substance:**  
Scientific research and development

Supplier details:  
American Elements  
10884 Weyburn Ave.  
Los Angeles, CA 90024  
Tel: +1 310-208-0551  
Fax: +1 310-208-0351

Emergency telephone number:  
Domestic, North America +1 800-424-9300  
International +1 703-527-3887

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## SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture  
Classification according to Regulation (EC) No 1272/2008

GHS07

Acute Tox. 4 H302 Harmful if swallowed.

Acute Tox. 4 H332 Harmful if inhaled.

Skin Irrit. 2 H315 Causes skin irritation.

Eye Irrit. 2A H319 Causes serious eye irritation.

STOT SE 3 H335 May cause respiratory irritation.

Classification according to Directive 67/548/EEC or Directive 1999/45/EC

Xn; Harmful

R20/22: Harmful by inhalation and if swallowed.

Xi; Irritant

R36/37/38: Irritating to eyes, respiratory system and skin.

Information concerning particular hazards for human and environment:

N/A

Hazards not otherwise classified

No data available

Label elements

Labelling according to Regulation (EC) No 1272/2008

The product is classified and labeled according to the CLP regulation.

Hazard pictograms



GHS07

Signal word

Warning

Hazard-determining components of labeling:

Vanadium(IV) oxide

Vanadium(IV,V) oxide

Hazard statements

H302+H332 Harmful if swallowed or if inhaled.

H315 Causes skin irritation.

H319 Causes serious eye irritation.

H335 May cause respiratory irritation.

Precautionary statements

P261 Avoid breathing

dust/fume/gas/mist/vapors/spray.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P405 Store locked up.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

WHMIS classification

D1B - Toxic material causing immediate and serious toxic effects

D2B - Toxic material causing other toxic effects

Classification system

HMIS ratings (scale 0-4)

(Hazardous Materials Identification System)

HEALTH 2

FIRE 0

REACTIVITY 1

Health (acute effects) = 2

Flammability = 0

Physical Hazard = 1

Other hazards

Results of PBT and vPvB assessment

PBT:

N/A

vPvB:

N/A

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### **SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS**

Chemical characterization: Mixtures

Dangerous components:

12036-21-4 Vanadium(IV) oxide

Xn R20/22; Xi R36/37/38

Acute Tox. 4, H302; Acute Tox. 4, H332; Skin Irrit. 2,

H315; Eye Irrit. 2A, H319; STOT SE 3, H335  
74.0%  
12037-42-2 Vanadium(IV,V) oxide  
Xn R20/22; Xi R36/37  
Acute Tox. 4, H302; Acute Tox. 4, H332; Eye Irrit. 2A,  
H319; STOT SE 3, H335  
26.0%  
Additional information  
None known

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## **SECTION 4. FIRST AID MEASURES**

Description of first aid measures

If inhaled:

Supply patient with fresh air. If not breathing, provide artificial respiration. Keep patient warm.

Seek immediate medical advice.

In case of skin contact:

Immediately wash with soap and water; rinse thoroughly.

Seek immediate medical advice.

In case of eye contact:

Rinse opened eye for several minutes under running water. Consult a physician.

If swallowed:

Seek medical treatment.

Information for doctor

Most important symptoms and effects, both acute and delayed

No data available

Indication of any immediate medical attention and special treatment needed

No data available

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## **SECTION 5. FIREFIGHTING MEASURES**

Extinguishing media

Suitable extinguishing agents

Product is not flammable. Use fire-fighting measures that suit the surrounding fire.

Special hazards arising from the substance or mixture  
If this product is involved in a fire, the following can be released:

Vanadium oxides

Vanadium oxides

Advice for firefighters

Protective equipment:

Wear self-contained respirator.

Wear fully protective impervious suit.

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## **SECTION 6. ACCIDENTAL RELEASE MEASURES**

Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Keep unprotected persons away.

Ensure adequate ventilation

Environmental precautions:

Do not allow product to enter drains, sewage systems, or other water courses.

Do not allow material to penetrate the ground or soil.

Methods and materials for containment and cleanup:

Dispose of contaminated material as waste according to section 13.

Ensure adequate ventilation.

Prevention of secondary hazards:

No special measures required.

Reference to other sections

See Section 7 for information on safe handling

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

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## **SECTION 7. HANDLING AND STORAGE**

Handling

Precautions for safe handling

Keep container tightly sealed.

Store in cool, dry place in tightly closed containers.

Ensure good ventilation at the workplace.

Information about protection against explosions and fires:

The product is not flammable

Conditions for safe storage, including any incompatibilities

Requirements to be met by storerooms and receptacles:

No special requirements.

Information about storage in one common storage facility:

Store away from oxidizing agents.

Further information about storage conditions:

Keep container tightly sealed.

Store in cool, dry conditions in well-sealed containers.

Specific end use(s)

No data available

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

Additional information about design of technical

systems:

Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Control parameters

Components with limit values that require monitoring at the workplace:

None.

Additional information:

No data

Exposure controls

Personal protective equipment

Follow typical protective and hygienic practices for handling chemicals.

Keep away from foodstuffs, beverages and feed.

Remove all soiled and contaminated clothing immediately.

Wash hands before breaks and at the end of work.

Avoid contact with the eyes and skin.

Maintain an ergonomically appropriate working environment.

Breathing equipment:

Use suitable respirator when high concentrations are present.

Recommended filter device for short term use:

Use a respirator with type P100 (USA) or P3 (EN 143) cartridges as a backup to engineering controls. Risk assessment should be performed to determine if air-purifying respirators are appropriate. Only use equipment tested and approved under appropriate government standards.

Protection of hands:

Impervious gloves

Inspect gloves prior to use.

Suitability of gloves should be determined both by material and quality, the latter of which may vary by manufacturer.

Eye protection:

Safety glasses

Body protection:

Protective work clothing.

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

Information on basic physical and chemical properties

Appearance:

Form: Powder or solid in various forms

Color: Black

Odor: No data available

Odor threshold: No data available.

pH: N/A

Melting point/Melting range: 1967 °C (3573 °F)  
Boiling point/Boiling range: No data available  
Sublimation temperature / start: No data available  
Flammability (solid, gas)  
No data available.  
Ignition temperature: No data available  
Decomposition temperature: No data available  
Autoignition: Product is not selfigniting.  
Danger of explosion: No data available.  
Explosion limits:  
Lower: No data available  
Upper: No data available  
Vapor pressure: N/A  
  
Density at 20 °C (68 °F): 4.339 g/cm<sup>3</sup> (36.209 lbs/gal)  
Relative density  
No data available.  
Vapor density  
N/A  
Evaporation rate  
N/A  
Solubility in Water (H<sub>2</sub>O): Insoluble  
Partition coefficient (n-octanol/water): No data available.  
Viscosity:  
Dynamic: N/A  
Kinematic: N/A  
Solvent content:  
Organic solvents: 0.0 %  
Solids content: 100.0 %  
Other information  
No data available

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## **SECTION 10. STABILITY AND REACTIVITY**

Reactivity  
No data available  
Chemical stability  
Stable under recommended storage conditions.  
Thermal decomposition / conditions to be avoided:  
Decomposition will not occur if used and stored according to specifications.  
Possibility of hazardous reactions  
Reacts with strong oxidizing agents  
Conditions to avoid  
No data available  
Incompatible materials:  
Oxidizing agents  
Hazardous decomposition products:  
Vanadium oxides

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## **SECTION 11. TOXICOLOGICAL INFORMATION**

Information on toxicological effects

Acute toxicity:

Harmful if inhaled.

Harmful if swallowed.

LD/LC50 values that are relevant for classification:

No data

Skin irritation or corrosion:

Causes skin irritation.

Eye irritation or corrosion:

Causes serious eye damage.

Sensitization:

No sensitizing effects known.

Germ cell mutagenicity:

No effects known.

Carcinogenicity:

No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.

Reproductive toxicity:

No effects known.

Specific target organ system toxicity - repeated exposure:

No effects known.

Specific target organ system toxicity - single exposure:

May cause respiratory irritation.

Aspiration hazard:

No effects known.

Subacute to chronic toxicity:

No effects known.

Additional toxicological information:

To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

The product shows the following dangers according to internally approved calculation methods for preparations:

Harmful

Irritant

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## **SECTION 12. ECOLOGICAL INFORMATION**

Toxicity

Aquatic toxicity:

No data available

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available



Additional ecological information:

Do not allow undiluted product or large quantities to reach groundwater, water courses, or sewage systems.

Avoid transfer into the environment.

Results of PBT and vPvB assessment

PBT:

N/A

vPvB:

N/A

Other adverse effects

No data available

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## **SECTION 13. DISPOSAL CONSIDERATIONS**

Waste treatment methods

Recommendation

Consult official regulations to ensure proper disposal.

Uncleaned packagings:

Recommendation:

Disposal must be made according to official regulations.

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## **SECTION 14. TRANSPORT INFORMATION**

UN-Number

DOT, IMDG, IATA

UN3285

UN proper shipping name

DOT

Vanadium compound, n.o.s. (Vanadium (IV) oxide,  
Vanadium(IV,V) oxide)

IMDG, IATA

VANADIUM COMPOUND, N.O.S. (Vanadium(IV)  
oxide, Vanadium(IV,V) oxide)

Transport hazard class(es)

DOT

Class

6.1 Toxic substances.

Label

6.1

Class

6.1 (T5) Toxic substances

Label

6.1

IMDG, IATA

Class

6.1 Toxic substances.

Label

6.1

Packing group  
DOT, IMDG, IATA  
III  
Environmental hazards:  
Marine pollutant (IMDG): No  
Special precautions for user  
Warning: Toxic substances  
EMS Number: F-A,S-A  
Transport in bulk according to Annex II of  
MARPOL73/78 and the IBC Code  
N/A  
Transport/Additional information: DOT  
Marine Pollutant (DOT): No  
UN "Model Regulation":  
UN3285, Vanadium compound, n.o.s. (Vanadium(IV)  
oxide, Vanadium(IV,V) oxide), 6.1, III

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## **SECTION 15. REGULATORY INFORMATION**

Safety, health and environmental  
regulations/legislation specific for the substance or  
mixture

National regulations

This product is not listed in the U.S. Environmental  
Protection Agency Toxic Substances Control Act  
Chemical Substance Inventory. Use of this product is  
restricted to research and development only. This  
product must be used by or directly under the  
supervision of a technically qualified in  
dividual as defined by TSCA. This product must not  
be used for commercial purposes or in formulations  
for commercial purposes.

Some or all of the components of this product are not  
listed on the Canadian Domestic Substances  
List (DSL) or the Canadian Non-Domestic Substances  
List (NDSL).

SARA Section 313 (specific toxic chemical listings)

12036-21-4 Vanadium(IV) oxide

74.0%

12037-42-2 Vanadium(IV,V) oxide

26.0%

California Proposition 65

Prop 65 - Chemicals known to cause cancer

None of the ingredients are listed.

Prop 65 - Developmental toxicity

None of the ingredients are listed.

Prop 65 - Developmental toxicity, female

None of the ingredients are listed.

Prop 65 - Developmental toxicity, male

None of the ingredients are listed.

Information about limitation of use:

For use only by technically qualified individuals.

Other regulations, limitations and prohibitive regulations

Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.

None of the ingredients are listed.

The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.

None of the ingredients is listed.

Annex XIV of the REACH Regulations (requiring Authorisation for use)

None of the ingredients is listed.

REACH - Pre-registered substances

All ingredients are listed.

Chemical safety assessment:

A Chemical Safety Assessment has not been carried out.

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## 16. OTHER INFORMATION

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH). The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. American Elements shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. COPYRIGHT 1997-2022 AMERICAN ELEMENTS. LICENSED GRANTED TO MAKE UNLIMITED PAPER COPIES FOR INTERNAL USE ONLY.