

SECTION 1: Identification

1.1. Identification

Product form	: Substance
Trade name	: VANADIUM PENTOXIDE
Chemical name	: divanadium pentoxide
CAS-No.	: 1314-62-1
Formula	: V2O5
Other means of identification	: EC# 215-239-8 Index # 023-001-00-8

1.2. Recommended use and restrictions on use

No additional information available

1.3. Supplier

CellMark USA, LLC
2 Corporate Drive
Shelton, CT 06484 - USA
T +1 203 541 9200 - F +1 203-541-9191
chemicals@cellmark.com

1.4. Emergency telephone number

Emergency number : 1-800-535-5053 (US, Canada, Puerto Rico) or 1-352-323-3500 (international)

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS-US classification

Acute toxicity (oral), Category 4	H302	Harmful if swallowed.
Acute toxicity (inhalation:dust,mist) Category 4	H332	Harmful if inhaled.
Germ cell mutagenicity, Category 2	H341	Suspected of causing genetic defects.
Carcinogenicity, Category 2	H351	Suspected of causing cancer.
Reproductive toxicity, Category 2	H361	Suspected of damaging fertility or the unborn child.
Specific target organ toxicity — Single exposure, Category 3, Respiratory tract irritation	H335	May cause respiratory irritation.
Specific target organ toxicity — Repeated exposure, Category 1	H372	Causes damage to organs (respiratory system) through prolonged or repeated exposure (Inhalation).
Hazardous to the aquatic environment — Chronic Hazard, Category 2	H411	Toxic to aquatic life with long lasting effects.

Full text of H statements : see section 16

2.2. GHS Label elements, including precautionary statements

GHS US labelling

Hazard pictograms (GHS US) :



Signal word (GHS US) :

Danger

Hazard statements (GHS US) :

H302+H332 - Harmful if swallowed or if inhaled
H335 - May cause respiratory irritation.
H341 - Suspected of causing genetic defects.
H351 - Suspected of causing cancer.

VANADIUM PENTOXIDE

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Precautionary statements (GHS US)	: H361 - Suspected of damaging fertility or the unborn child. H372 - Causes damage to organs (respiratory system) through prolonged or repeated exposure (Inhalation). H411 - Toxic to aquatic life with long lasting effects. P201 - Obtain special instructions before use. P202 - Do not handle until all safety precautions have been read and understood. P260 - Do not breathe vapours P261 - Avoid breathing dust, fume, gas, mist, spray, vapours. 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, protective clothing, face protection, eye protection. P301+P312 - If swallowed: Call a POISON CENTER, a doctor if you feel unwell P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing P308+P313 - If exposed or concerned: Get medical advice/attention. P312 - Call a POISON CENTER, a doctor if you feel unwell P314 - Get medical advice/attention if you feel unwell. 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 in accordance with local/regional/national/international regulations
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2.3. Other hazards which do not result in classification

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%	GHS-US classification
VANADIUM PENTOXIDE US (Main constituent)	(CAS-No.) 1314-62-1	100	Acute Tox. 4 (Oral), H302 Acute Tox. 4 (Inhalation:dust,mist), H332 Muta. 2, H341 Carc. 2, H351 Repr. 2, H361 STOT SE 3, H335 STOT RE 1, H372 Aquatic Chronic 2, H411

Full text of hazard classes and H-statements : see section 16

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures general	: Keep under medical supervision for at least 48 hours. Symptoms of poisoning may not appear for several hours.
First-aid measures after inhalation	: Remove person to fresh air and keep comfortable for breathing. Give oxygen or artificial respiration if necessary. Call a POISON CENTER/doctor if you feel unwell.
First-aid measures after skin contact	: Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.
First-aid measures after eye contact	: Rinse immediately with plenty of water. Obtain medical attention if pain, blinking or redness persists.
First-aid measures after ingestion	: Induce vomiting if person is conscious. Get immediate medical advice/attention.

4.2. Most important symptoms and effects (acute and delayed)

Expected Symptoms/Effects, Acute and Delayed	: Breathing difficulty, fever, gastric or intestinal disorders, coughing, danger of pulmonary edema, danger of pneumonia.
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4.3. Immediate medical attention and special treatment, if necessary

Treat symptomatically.

VANADIUM PENTOXIDE

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

- Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.
- Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Specific hazards arising from the chemical

No additional information available

5.3. Special protective equipment and precautions for fire-fighters

- Firefighting instructions : Exercise caution when fighting any chemical fire. Prevent fire fighting water from entering the environment.
- Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection. Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- General measures : Use personal protective equipment (PPE). Avoid dust formation.

6.1.1. For non-emergency personnel

- Emergency procedures : Ventilate spillage area. Evacuate unnecessary personnel. Do not breathe vapours.

6.1.2. For emergency responders

- Protective equipment : Do not attempt to take action without suitable protective equipment. Equip cleanup crew with proper protection. For further information refer to section 8: "Exposure controls/personal protection".
- Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters. Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

- For containment : Collect spillage.
- Methods for cleaning up : Mechanically recover the product. On land, sweep or shovel into suitable containers. Minimise generation of dust. Mechanically ventilate the spillage area.
- Other information : Dispose of materials or solid residues at an authorized site.

6.4. Reference to other sections

Refer to protective measures listed in Sections 7 and 8. For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Precautions for safe handling : Ensure good ventilation of the work station. Avoid dust formation. Store in tightly closed container.
- Hygiene measures : Do not eat, drink or smoke when using this product. Always wash hands after handling the product. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Remove contaminated clothes. Wear personal protective equipment.

7.2. Conditions for safe storage, including any incompatibilities

- Storage conditions : Keep container tightly closed. Store in dry, cool, well-ventilated area. Store locked up.
- Incompatible products : Strong bases. Strong acids.
- Incompatible materials : Sources of ignition. Direct sunlight.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

VANADIUM PENTOXIDE (1314-62-1)	
USA - OSHA - Occupational Exposure Limits	
OSHA PEL (Ceiling) (mg/m ³)	0.5 mg/m ³ as V2O5 respirable dust; 0.1 mg/m ³ as V2O5 fume
USA - NIOSH - Occupational Exposure Limits	
NIOSH REL (ceiling) (mg/m ³)	0.5 mg/m ³ 15 min, except V metal and carbide
Remark (NIOSH)	TLV Long-term value: 0.05 mg/m ³ as inhalable fraction

VANADIUM PENTOXIDE

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

8.2. Appropriate engineering controls

- Appropriate engineering controls : Ensure good ventilation of the work station. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Handle in accordance with good industrial hygiene and safety practice.
- Environmental exposure controls : Avoid release to the environment.

8.3. Individual protection measures/Personal protective equipment

Personal protective equipment:

Avoid all unnecessary exposure.

Hand protection:

Wear chemically resistant protective gloves.

Eye protection:

tightly fitting safety goggles

Skin and body protection:

Wear suitable protective clothing

Respiratory protection:

In case of inadequate ventilation wear 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).

Other information:

Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Solid
Appearance	: Powder.
Colour	: dark orange
Odour	: characteristic
Odour threshold	: No data available
pH	: 2.7 0.92 g/l at 20 °C
Melting point	: 681 °C
Freezing point	: Not applicable
Boiling point	: 1750 °C
Flash point	: Not applicable
Relative evaporation rate (butylacetate=1)	: No data available
Flammability (solid, gas)	: Non flammable.
Vapour pressure	: No data available
Relative vapour density at 20 °C	: No data available
Relative density	: Not applicable
Density	: 3.65 g/cm ³
Molecular mass	: 181.88 g/mol
Solubility	: Water: 0.92 g/l at 20 °C
Log Pow	: No data available
Auto-ignition temperature	: Not applicable
Decomposition temperature	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
Explosive limits	: Not applicable
Explosive properties	: No data available

VANADIUM PENTOXIDE

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Oxidising properties : No data available

9.2. Other information

Bulk density : 1000 kg/m³

SECTION 10: Stability and reactivity

10.1. Reactivity

The product is non-reactive under normal conditions of use, storage and transport.

10.2. Chemical stability

Not established.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Direct sunlight. Extremely high or low temperatures.

10.5. Incompatible materials

Strong acids. Strong bases. aluminum.

10.6. Hazardous decomposition products

fume. Carbon monoxide. Carbon dioxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral) : Harmful if swallowed.

Acute toxicity (dermal) : Not classified

Acute toxicity (inhalation) : Harmful if inhaled.

VANADIUM PENTOXIDE (1314-62-1)	
LD50 oral rat	467 mg/kg ;LOAEL (repeated) - 5.36 mg/kg bw/day (rat)
LD50 dermal rat	> 2500 mg/kg
LC50 inhalation rat (mg/l)	2.21 mg/l/4h ;LOAEC (repeated) 0.5 mg/m ³ (rat)
ATE US (oral)	467 mg/kg bodyweight
ATE US (vapours)	2.21 mg/l/4h
ATE US (dust,mist)	2.21 mg/l/4h

Skin corrosion/irritation : Not classified (Based on available data, the classification criteria are not met)
pH: 2.7 0.92 g/l at 20 °C

Serious eye damage/irritation : Not classified
Causes serious eye damage.
pH: 2.7 0.92 g/l at 20 °C

Respiratory or skin sensitisation : Not classified (Based on available data, the classification criteria are not met)

Germ cell mutagenicity : Suspected of causing genetic defects.

Carcinogenicity : Suspected of causing cancer.

VANADIUM PENTOXIDE (1314-62-1)	
IARC group	2B - Possibly carcinogenic to humans

Reproductive toxicity : Suspected of damaging fertility or the unborn child.

STOT-single exposure : May cause respiratory irritation.

STOT-repeated exposure : Causes damage to organs (respiratory system) through prolonged or repeated exposure (Inhalation).

VANADIUM PENTOXIDE (1314-62-1)	
LOAEL (oral, rat, 90 days)	5.36 mg/kg bodyweight/day
LOAEC (inhalation, rat,dust/mist/fume, 90 days)	0.5 mg/l/6h/day

Aspiration hazard : Not classified

Viscosity, kinematic : No data available

VANADIUM PENTOXIDE

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Expected Symptoms/Effects, Acute and Delayed : Breathing difficulty, fever, gastric or intestinal disorders, coughing, danger of pulmonary edema, danger of pneumonia.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : Toxic to aquatic life with long lasting effects.
Ecology - water : Toxic to aquatic life with long lasting effects.

VANADIUM PENTOXIDE (1314-62-1)	
LC50 fish 1	1.24 mg/l Golden Orfe - 96h
LC50 other aquatic organisms 1	1.52 mg/l Daphnia Magna - 48h
EC50 Daphnia 1	4.27 mg/l Daphnia Magna - 48h
EC50 other aquatic organisms 1	2.907 mg/l Scenedesmus subspicatus - 72h
LC50 fish 2	0.693 mg/l Leuciscus idus - 96h
NOEC (acute)	1.51 mg/l 48h Daphnia
NOEC (chronic)	0.56 mg/l 14 week Daphnia

12.2. Persistence and degradability

VANADIUM PENTOXIDE (1314-62-1)	
Persistence and degradability	Not established.

12.3. Bioaccumulative potential

VANADIUM PENTOXIDE (1314-62-1)	
Bioconcentration factor (BCF REACH)	12.3 L/kg ww
Bioaccumulative potential	Low bioaccumulation potential.

12.4. Mobility in soil

VANADIUM PENTOXIDE (1314-62-1)	
Mobility in soil	log Kp = 2.66 L/kg
Ecology - soil	Not established.

12.5. Other adverse effects

Other information : Avoid release to the environment. No data available.

SECTION 13: Disposal considerations

13.1. Disposal methods

Waste treatment methods : Dispose of contents/container in accordance with licensed collector's sorting instructions. Dispose in a safe manner in accordance with local/national regulations.
Product/Packaging disposal recommendations : Offer surplus and non-recyclable solutions to a licensed disposal company.
Ecology - waste materials : Avoid release to the environment.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Transport document description : UN2862 Vanadium pentoxide, 6.1, III
UN-No.(DOT) : UN2862
Proper Shipping Name (DOT) : Vanadium pentoxide
Class (DOT) : 6.1 - Class 6.1 - Poisonous materials 49 CFR 173.132
Packing group (DOT) : III - Minor Danger
Hazard labels (DOT) : 6.1 - Poison



Dangerous for the environment : Yes

VANADIUM PENTOXIDE

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Marine pollutant : Yes



DOT Packaging Non Bulk (49 CFR 173.xxx) : 213
DOT Packaging Bulk (49 CFR 173.xxx) : 240
DOT Special Provisions (49 CFR 172.102) : IB8 - Authorized IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastics (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2, 31HZ1 and 31HZ2); Fiberboard (11G); Wooden (11C, 11D and 11F); Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 or 13M2).
IP3 - Flexible IBCs must be sift-proof and water-resistant or must be fitted with a sift-proof and water-resistant liner.
T1 - 1.5 178.274(d)(2) Normal..... 178.275(d)(2)
TP33 - The portable tank instruction assigned for this substance applies for granular and powdered solids and for solids which are filled and discharged at temperatures above their melting point which are cooled and transported as a solid mass. Solid substances transported or offered for transport above their melting point are authorized for transportation in portable tanks conforming to the provisions of portable tank instruction T4 for solid substances of packing group III or T7 for solid substances of packing group II, unless a tank with more stringent requirements for minimum shell thickness, maximum allowable working pressure, pressure-relief devices or bottom outlets are assigned in which case the more stringent tank instruction and special provisions shall apply. Filling limits must be in accordance with portable tank special provision TP3. Solids meeting the definition of an elevated temperature material must be transported in accordance with the applicable requirements of this subchapter.

DOT Packaging Exceptions (49 CFR 173.xxx) : 153
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 100 kg
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 200 kg
DOT Vessel Stowage Location : A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.
DOT Vessel Stowage Other : 40 - Stow "clear of living quarters"
Emergency Response Guide (ERG) Number : 151
Other information : No supplementary information available.

Transportation of Dangerous Goods

Transport by sea

Transport document description (IMDG) : UN 2862 VANADIUM PENTOXIDE, 6.1, III, MARINE POLLUTANT/ENVIRONMENTALLY HAZARDOUS
UN-No. (IMDG) : 2862
Proper Shipping Name (IMDG) : VANADIUM PENTOXIDE
Class (IMDG) : 6.1 - Toxic substances
Packing group (IMDG) : III - substances presenting low danger
Marine pollutant : Yes



Air transport

Transport document description (IATA) : UN 2862 Vanadium pentoxide, 6.1, III, ENVIRONMENTALLY HAZARDOUS
UN-No. (IATA) : 2862
Proper Shipping Name (IATA) : Vanadium pentoxide
Class (IATA) : 6.1 - Toxic Substances
Packing group (IATA) : III - Minor Danger

VANADIUM PENTOXIDE

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

SECTION 15: Regulatory information

15.1. US Federal regulations

VANADIUM PENTOXIDE (1314-62-1)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	1000 lb
RQ (Reportable quantity, section 304 of EPA's List of Lists)	1000 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	10000 lb 100lb if the substance is solid in powder form with particle size less than 100 microns, or is in solution or molten form

15.2. International regulations

CANADA

VANADIUM PENTOXIDE (1314-62-1)
Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

National regulations

VANADIUM PENTOXIDE (1314-62-1)
Listed on IARC (International Agency for Research on Cancer)

15.3. US State regulations

VANADIUM PENTOXIDE (1314-62-1)	
U.S. - California - Proposition 65 - Carcinogens List	Yes
U.S. - California - Proposition 65 - Developmental Toxicity	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Data sources : SDS of suppliers.

Other information : None.

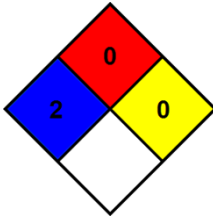
Full text of H-statements:

H302	Harmful if swallowed.
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.
H411	Toxic to aquatic life with long lasting effects.

VANADIUM PENTOXIDE

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

NFPA health hazard	: 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.	
NFPA fire hazard	: 0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.	
NFPA reactivity	: 0 - Material that in themselves are normally stable, even under fire conditions.	
Hazard Rating		
Health	: 2 Moderate Hazard - Temporary or minor injury may occur * - Chronic (long-term) health effects may result from repeated overexposure	
Flammability	: 0 Minimal Hazard - Materials that will not burn	
Physical	: 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.	

SDS US (GHS HazCom 2012)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.