

SAFETY DATA SHEET

Version
3.0 Revision Date
09/04/2017

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Vanadium(V) oxide

Brand : SAM

CAS-No. : 1314-62-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

1.3 Details of the supplier of the safety data sheet

Company : Stanford Advanced
Materials
23661 Birtcher Dr.
Lake Forest, CA
92630
UNITED STATES

Telephone : +1 (949) 407-8904

Fax : +1 (949) 812-6690

1.4 Emergency telephone number

Emergency Phone # : +1 (949) 407-8904

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Acute toxicity, Oral (Category 4), H302

Acute toxicity, Inhalation (Category 4), H332

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

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)
H302 + H332 : Harmful 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/ vapours/ 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/ protective clothing/ eye protection/ face protection. |
| P301 + P312 + P330 | IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth. |
| P304 + P340 + P312 | IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell. |
| 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. |
| P308 + P313 | IF exposed or concerned: Get medical advice/ attention. |
| 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. |

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

| | | |
|------------------|---|-------------------------------|
| Formula | : | O ₅ V ₂ |
| Molecular weight | : | 181.88 g/mol |
| CAS-No. | : | 1314-62-1 |
| EC-No. | : | 215-239-8 |
| Index-No. | : | 023-001-00-8 |

Hazardous components

| Component | Classification | Concentration |
|---------------------------|---|---------------|
| Vanadium pentoxide | Acute Tox. 4; Eye Dam. 1; Muta. 2; Repr. 2; STOT SE 3; STOT RE 1; Aquatic Acute 2; Aquatic Chronic 2; H302 + H332, H318, H335, H341, H361, H372, H411 | <= 100 % |

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

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

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. Take victim immediately to hospital. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

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

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES**5.1 Extinguishing media****Suitable extinguishing media**

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

5.2 Special hazards arising from the substance or mixture

Vanadium/vanadium oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

No data available

6. ACCIDENTAL RELEASE MEASURES**6.1 Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

For personal protection see section 8.

6.2 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.

6.3 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.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE**7.1 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 combu formation should be taken into consideration before additional processing

Provide appropriate exhaust ventilation at places where dust is formed.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

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

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

| Component | CAS-No. | Value | Control parameters | Basis |
|--------------------|-----------|---|--------------------|--|
| Vanadium pentoxide | 1314-62-1 | C | 0.100000 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | C | 0.500000 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | Remarks | Ceiling limit is to be determined from breathing-zone air samples. | | |
| | | TWA | 0.050000 mg/m3 | USA. ACGIH Threshold Limit Values (TLV) |
| | | Upper Respiratory Tract irritation Lower Respiratory Tract irritation Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans | | |
| | | C | 0.050000 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | 15 minute ceiling value | | |
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| | | 15 minute ceiling value | | |
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| | | 15 minute ceiling value | | |
| | | C | 0.050000 mg/m3 | USA. NIOSH Recommended Exposure Limits |
| | | 15 minute ceiling value | | |
| | | TWA | 0.05 mg/m3 | USA. ACGIH Threshold Limit Values (TLV) |
| | | Upper Respiratory Tract irritation Lower Respiratory Tract irritation Confirmed animal carcinogen with unknown relevance to humans | | |
| | | C | 0.1 mg/m3 | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| | | Ceiling limit is to be determined from breathing-zone air samples. | | |

| | | | | |
|--|--|---|------------------------|--|
| | | C | 0.5 mg/m ³ | USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants |
| Ceiling limit is to be determined from breathing-zone air samples. | | | | |
| | | C | 0.05 mg/m ³ | USA. NIOSH Recommended Exposure Limits |
| 15 minute ceiling value | | | | |
| | | C | 0.05 mg/m ³ | USA. NIOSH Recommended Exposure Limits |
| 15 minute ceiling value | | | | |

Biological occupational exposure limits

| Component | CAS-No. | Parameters | Value | Biological specimen | Basis |
|--------------------|-----------|---------------------------------|-------------|---------------------|-------|
| Vanadium pentoxide | 1314-62-1 | Vanadium | 0.0500 mg/g | In urine | |
| | Remarks | End of shift at end of workweek | | | |

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

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).

Skin 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.

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industria situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

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.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use (EN 143) respirator cartridges as a backup to engineering controls. If th full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

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

9.1 Information on basic physical and chemical properties

- | | |
|---|--|
| a) Appearance | Form: solid |
| b) Odour | No data available |
| c) Odour Threshold | No data available |
| d) pH | No data available |
| e) Melting point/freezing point | Melting point/range: 690 °C (1274 °F) - lit. |
| f) Initial boiling point and boiling range | No data available |
| g) Flash point | ()Not applicable |
| h) Evaporation rate | No data available |
| i) Flammability (solid, gas) | No data available |
| j) Upper/lower flammability or explosive limits | No data available |
| k) Vapour pressure | No data available |
| l) Vapour density | No data available |
| m) Relative density | 3.35 g/mL at 25 °C (77 °F) |
| n) Water solubility | 904 g/l at 20 °C (68 °F) - OECD Test Guideline 105 |
| o) Partition coefficient: n-octanol/water | No data available |
| p) Auto-ignition temperature | No data available |
| q) Decomposition temperature | No data available |
| r) Viscosity | No data available |
| s) Explosive properties | No data available |
| t) Oxidizing properties | The substance or mixture is not classified as oxidizing. |

9.2 Other safety information

- | | |
|------------------------------|---------------------|
| Solubility in other solvents | Ethanol - insoluble |
|------------------------------|---------------------|

10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

No data available

10.5 Incompatible materials

Strong acids

10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Vanadium/vanadium oxides

Other decomposition products - No data available

In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2) Vanadium pentoxide

LC50 Inhalation - Rat - female - 4 h - 2.21 mg/l (Vanadium pentoxide)

(OECD Test Guideline 403)

LC50 Dermal - Rat - > 2,500 mg/kg (Vanadium pentoxide)

(OECD Test Guideline 402)

No data available (Vanadium pentoxide)

Skin corrosion/irritation

Skin - in vitro assay (Vanadium pentoxide)

Result: No skin irritation

Serious eye damage/eye irritation

Eyes - Rabbit (Vanadium pentoxide)

Result: Risk of serious damage to eyes.

(OECD Test Guideline 405)

Respiratory or skin sensitisation

No data available (Vanadium pentoxide)

Germ cell mutagenicity

Laboratory experiments have shown mutagenic effects. (Vanadium pentoxide)

In vitro tests showed mutagenic effects (Vanadium pentoxide)

Carcinogenicity

No data available (Vanadium pentoxide)

(Vanadium pentoxide)

(Vanadium pentoxide)

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

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.

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.

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. (Vanadium pentoxide)

Suspected human reproductive toxicant (Vanadium pentoxide)

No data available (Vanadium pentoxide)

Specific target organ toxicity - single exposure

May cause respiratory irritation. (Vanadium pentoxide)

Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Specific target organ toxicity - repeated exposure

Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard

No data available(Vanadium pentoxide)

Additional Information

RTECS: Not available

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

Stomach - Irregularities - Based on Human Evidence

Stomach - Irregularities - Based on Human Evidence(Vanadium pentoxide)

12. ECOLOGICAL INFORMATION**12.1 Toxicity**

Toxicity to fish LC50 - Oncorhynchus mykiss (rainbow trout) - 5.2 mg/l - 96.0 h(Vanadium pentoxide)

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

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No data available

12.4 Mobility in soil

No data available(Vanadium pentoxide)

12.5 Results of PBT and vPvB assessment

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

12.6 Other adverse effects

Toxic to aquatic life with long lasting effects.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. DISPOSAL CONSIDERATIONS**13.1 Waste treatment methods****Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chem scrubber.

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

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 : yes

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:

| | CAS-No. | Revision Date |
|--------------------|-----------|---------------|
| Vanadium pentoxide | 1314-62-1 | 2007-07-01 |

SARA 313 Components

| | CAS-No. | Revision Date |
|--------------------|-----------|---------------|
| Vanadium pentoxide | 1314-62-1 | 2007-07-01 |

The following components are subject to reporting levels established by SARA Title III, Section 313:

| | CAS-No. | Revision Date |
|--------------------|-----------|---------------|
| Vanadium pentoxide | 1314-62-1 | 2007-07-01 |

SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

| | CAS-No. | Revision Date |
|--------------------|-----------|---------------|
| Vanadium pentoxide | 1314-62-1 | 2007-07-01 |

Pennsylvania Right To Know Components

| | CAS-No. | Revision Date |
|--------------------|-----------|---------------|
| Vanadium pentoxide | 1314-62-1 | 2007-07-01 |

New Jersey Right To Know Components

| | CAS-No. | Revision Date |
|--------------------|-----------|---------------|
| Vanadium pentoxide | 1314-62-1 | 2007-07-01 |

California Prop. 65 Components

| | CAS-No. | Revision Date |
|---|-----------|---------------|
| WARNING! This product contains a chemical known to the State of California to cause cancer. Vanadium pentoxide | 1314-62-1 | 2007-09-28 |

| | | |
|---|----------------------|-----------------------------|
| WARNING! This product contains a chemical known to the State of California to cause cancer. Vanadium pentoxide | CAS-No. 1314-62-1 | Revision Date 2007-09-28 |
|---|----------------------|-----------------------------|

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

| | |
|-------------|---|
| H302 | Harmful if swallowed. |
| H302 + H332 | Harmful if swallowed or if inhaled |
| H318 | Causes serious eye damage. |
| H332 | Harmful if inhaled. |
| 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. |
| H401 | Toxic to aquatic life. |

H411 Toxic to aquatic life with long lasting effects.

HMIS Rating

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

NFPA Rating

Health hazard: 3
Fire Hazard: 0
Reactivity Hazard: 0

Further information

This material safety data sheet is offered solely for your information, consideration, and investigation. Stanford Advanced Materials provides no warranties, either express or implied, and assumes no responsibility for the accuracy or completeness of the data contained herein.