

Material Safety Data Sheet

Molybdenum(IV) Oxide

Report No.: VIH240926015-1
Version: 2.1
Preparation Date: 26/09/2024
Revision Date: 26/09/2024

1. Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

| | |
|--------------|---------------------------------------|
| Product Name | Molybdenum(IV) Oxide |
| Product No. | 420801 |
| Formula | MoO ₃ |
| CAS No. | 1313-27-5 |
| Synonyms | Molybdenum oxide, Molybdenum trioxide |

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

| | |
|----------------------|---|
| Identified uses | Laboratory chemicals, Scientific research |
| Uses advised against | Consulting manufacturers |

1.3 Details of the supplier of the safety data sheet

| | |
|--------------|---|
| Company Name | VI HALBLEITERMATERIAL GmbH |
| Street | Bergener Straße 14., |
| City | Hannover |
| State | Niedersachsen |
| Zip Code | 30625 |
| Country | Germany |
| Tel | 0049 1626484175 |
| Email | info@vimaterial.de |
| Website | https://vimaterial.de/ |

1.4 Emergency telephone number

| | |
|-------------------|-----------------|
| Emergency Phone # | 0049 1626484175 |
|-------------------|-----------------|

2. Hazards Identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 (CLP).

Physical hazards

Not Classified

Health hazards

| | |
|--|-------------------|
| Serious eye damage/eye irritation | Category 2 (H319) |
| Carcinogenicity | Category 2 (H351) |
| STOT - single exposure(respiratory tract irritation) | Category 3 (H335) |

Environmental hazards

Not Classified

Full text of Hazard Statements: see section 16

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP)

| | |
|-------------|--|
| Signal Word | Warning |
| Pictograms |  |

Hazard Statements

| | |
|------|-----------------------------------|
| H319 | Causes serious eye irritation. |
| H351 | Suspected of causing cancer |
| H335 | May cause respiratory irritation. |

Precautionary Statements

| | |
|--------------------|---|
| Prevention | |
| P261 | Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray. |
| P280 | Wear protective gloves/ eye protection/ face protection. |
| Response | |
| P304 + P340 | IF INHALED: Remove person to fresh air and keep 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. |
| P308 + P313 | IF exposed or concerned: Get medical advice/attention |
| P337 + P313 | If eye irritation persists: Get medical advice/ attention. |
| Storage | |
| P403 + P233 | Store in a well-ventilated place. Keep container tightly closed. |
| P405 | Store locked up |
| Disposal | |

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

2.3 Other hazards

According to the results of its assessment, this substance is not a PBT or a vPvB.
This product does not contain any known or suspected endocrine disruptors.

3. Composition/information on ingredients

3.1 Substances

| | |
|-----------------|---------|
| Chemical Family | Ceramic |
|-----------------|---------|

| Component | CAS No. | EC No. | Concentration |
|--------------------------------------|-----------|-----------|---------------|
| Molybdenum oxide (MoO ₃) | 1313-27-5 | 215-204-7 | <=100% |

4. First aid measures

4.1 Description of first aid measures

| | |
|-------------------|--|
| General Treatment | If symptoms persist, call a physician. |
| Inhalation | Remove victim to fresh air. If breathing is irregular or stopped, immediately seek medical assistance and start first aid actions. |
| Skin | Take off immediately all contaminated clothing. Rinse skin with water/ shower. Seek medical attention. |
| Eyes | Rinse with pure water for at least 15 minutes. Remove contact lenses, if present and easy to do. Seek medical attention. |
| Ingestion | Rinse mouth with water, Do not induce vomiting. Seek medical attention if you feel unwell. |

4.2 Most important symptoms and effects, both acute and delayed

Irritation, Cough, Dyspnoea.

4.3 Indication of any immediate medical attention and special treatment needed

| | |
|---|--|
| 1 | Based on the symptoms that appear, provide targeted treatment. |
| 2 | Be aware that symptoms may be delayed. |

5. Firefighting Measures

5.1 Extinguishing Media

| | |
|--------------------------------|--|
| Suitable extinguishing media | Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. |
| Unsuitable extinguishing media | N/A |

5.2 Special hazards arising from the substance or mixture

| | |
|---|---|
| 1 | Molybdenum oxides |
| 2 | Non-flammable |
| 3 | Ambient fires may release harmful vapors. |

5.3 Advice for firefighters

| | |
|---|--|
| 1 | As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. |
| 2 | Fight fire from a safe distance and with adequate protection. |
| 3 | Do not allow firefighting water to enter drains or water courses. |
| 4 | Collect contaminated firefighting water separately. |

6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

| | |
|-----------------------------|--|
| For non-emergency personnel | Use personal protective equipment as required. Avoid contact with skin, eyes and clothes. Do not breathe dust. |
| For emergency responders | Wear breathing apparatus if exposed to vapours/dust/spray/gases. |

6.2 Environmental Precautions

| | |
|---|---|
| 1 | Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it. |
|---|---|

6.3 Methods and material for containment and cleaning up

| | |
|---|--|
| Advice on how to contain a spill | Covering of drains, Take up mechanically. |
| Advice on how to clean up a spill | Take up mechanically. Take care not to raise dust. |
| Other information relating to spills and releases | Place in appropriate containers for disposal. Ventilate affected area. |

6.4 Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

7. Handling and Storage

7.1 Precautions for safe handling

| | |
|------------------|--|
| Recommendations | Wear personal protective equipment/face protection. Ensure adequate ventilation. Avoid dust formation. Avoid ingestion and inhalation. Do not get in eyes, on skin, or on clothing. |
| Hygiene Measures | Handle in accordance with good industrial hygiene and safety practice. Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing and gloves, including the inside, before re-use. Wash hands before breaks and after work. |

7.2 Conditions for safe storage, including any incompatibilities

| | |
|--------------------------|--|
| Ventilation requirements | Keep containers tightly closed in a dry, cool and well-ventilated place. |
| Storage class | Class 13. |
| Incompatible materials | See section 10.5. |

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

| Substance | CAS No. | Source | TWA (8 h) | Remarks |
|---------------------------------|-----------|-----------------|--------------------------|----------------------------|
| molybdenum, insoluble compounds | 1313-27-5 | TRGS 900 (DE) | 10 mg/m ³ (i) | AGW; General dust limit; |
| molybdenum, insoluble compounds | 1313-27-5 | ACGIH TLV (USA) | 3 mg/m ³ (r) | TLV-TWA; Pulmonary effects |
| molybdenum, insoluble compounds | 1313-27-5 | NIOSH REL (USA) | 10 mg/m ³ | Recommended exposure limit |
| molybdenum, insoluble compounds | 1313-27-5 | OSHA PEL (USA) | 15 mg/m ³ | PEL-TWA; Nuisance dust |

Notes:

i: Inhalable fraction

r: Respirable fraction

TWA: Time-weighted average (long-term exposure limit): measured or calculated in relation to a reference period of 8 hours time-weighted average (unless otherwise specified)

Biological limit values:

No biological limit values established.

Derived No Effect Level (DNEL) / Derived Minimum Effect Level (DMEL)

| Exposure scenario | Route of exposure | Population | DNEL / DMEL value |
|----------------------------|-------------------|-------------------|------------------------------|
| chronic - systemic effects | inhalatory | worker (industry) | DNEL=16,76 mg/m ³ |
| chronic - local effects | inhalatory | worker (industry) | DNEL=3 mg/m ³ |

8.2 Exposure controls

Appropriate engineering controls

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly.

Personal protective equipment

Eye/face protection

No specific eye protection required during normal use. Large Spillages: wear safety glasses with side shields (or goggles) (European standard - EN166) and face protection.

Skin protection

-Hand Protection

Protective gloves (The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.)

-Other protection measures

Wear appropriate protective gloves and clothing to prevent skin exposure. Wash hands thoroughly after handling.

Respiratory Protection

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly

| | |
|-----------------------------------|--|
| Large scale/emergency use | Use a NIOSH/MSHA or European Standard EN 136 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced Recommended Filter type: Particulates filter conforming to EN 143 |
| Small scale/Laboratory use | Use a NIOSH/MSHA or European Standard EN 149:2001 approved |

| | |
|--|--|
| | respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. Recommended half mask:- Particle filtering: EN149:2001 When RPE is used a face piece Fit Test should be conducted |
|--|--|

Environmental exposure controls

No information available.

9. Physical and Chemical Characteristics

9.1 Information on basic physical and chemical properties

| | |
|---|-----------------------------|
| Physical State | Powder. Solid |
| Colour | Yellowish, grey, blue-black |
| Odor | Odorless |
| Melting Point/Range | 795 °C |
| Boiling Point/Range | 1.155 °C |
| Flammability (liquid) | Not applicable |
| Flammability (solid, gas) | No data available |
| Explosion limits | No data available |
| Flash Point | No data available |
| Autoignition Temperature | No data available |
| Decomposition Temperature | No data available |
| pH | No data available |
| Viscosity | Not applicable |
| Water Solubility | 1 g/L (20°C) |
| Solubility in other solvents | No data available |
| Partition Coefficient (n-octanol/water) | No data available |
| Vapor Pressure | No data available |
| Density / Specific Gravity | 4,69 g/cm ³ |
| Vapor Density | Not applicable |
| Particle characteristics | No data available |

9.2 Other information

| | |
|-------------------|------------------|
| Molecular formula | MoO ₃ |
| Molecular weight | 143,94 g/mol |
| Evaporation Rate | Not applicable |

10. Stability and reactivity

10.1 Reactivity

None known, based on information available.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Hazardous Polymerization: No information available

Hazardous Reactions: No information available

10.4 Conditions to avoid

Incompatible products. Excess heat. Avoid dust formation.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

In the event of fire: see section 5

11. Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

| | | |
|-----------------------------------|-----------------------------------|--|
| Acute toxicity | Oral: | LD50 - Rat - male - 2.689 mg/kg LD50 - Rat - female - 3.830 mg/kg |
| | Dermal: | LD50 Dermal - Rat - male and female - > 2.000 mg/kg |
| | Inhalation: | LC50 - Rat - male and female - 4 h - > 5,05 mg/l - dust/mist |
| Skin corrosion/irritation | No data available. | |
| Serious eye damage/irritation | Causes serious eye irritation. | |
| Respiratory or skin sensitization | Respiratory | No data available. |
| | Skin | No data available. |
| Germ cell mutagenicity | No data available. | |
| Carcinogenicity | Suspected of causing cancer. | |
| Reproductive toxicity | No data available. | |
| STOT - single exposure | May cause respiratory irritation. | |
| STOT - repeated exposure | No data available. | |
| Aspiration hazard | Not applicable. Solid | |

11.2 Information on other hazards

Endocrine Disrupting Properties: Assess endocrine disrupting properties for human health. This product does not contain any known or suspected endocrine disruptors.

12. Ecological Information

12.1 Toxicity

| | |
|---|---|
| Toxicity to fish | LC50 (Pimephales promelas (fathead minnow)): 577 mg/l - 96h |
| Toxicity to daphnia and other aquatic invertebrates | LC50 (Daphnia magna (Water flea)): 206,8 mg/ - 48h |
| Toxicity to microorganisms | EC50 (Sludge Treatment): 820 mg/l - 3h |

12.2 Persistence and degradability

| | |
|---------------|-------------------|
| Persistence | No data available |
| Degradability | No data available |

12.3 Bioaccumulative potential

| | |
|---------------------------|-------------------|
| Bioaccumulative potential | No data available |
|---------------------------|-------------------|

12.4 Mobility in soil

| | |
|------------------|--------------------|
| Mobility in soil | No data available. |
|------------------|--------------------|

12.5 Results of PBT and vPvB assessment

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|------------------------------------|--|
| Results of PBT and vPvB assessment | In accordance with Annex XIII of the REACH Regulation, inorganic substances do not require assessment. |
|------------------------------------|--|

12.6 Endocrine disrupting properties

| | |
|---------------------------------|--|
| Endocrine Disruptor Information | This product does not contain any known or suspected endocrine disruptors. |
|---------------------------------|--|

12.7 Other adverse effects

| | |
|------------------------------|--|
| Persistent Organic Pollutant | This product does not contain any known or suspected substance |
| Ozone Depletion Potential | This product does not contain any known or suspected substance |

13. Disposal Considerations

13.1 Waste treatment methods

Dispose of in accordance with all applicable local and national regulations. Use recovery/recycling where feasible, otherwise incineration is the recommended method of disposal. Empty containers may contain hazardous residues. Do not cut, puncture or weld on or near to the

container. Labels should not be removed from containers until they have been cleaned. Contaminated containers must not be treated as household waste. Containers should be cleaned by appropriate methods and then re-used or disposed of by landfill or incineration as appropriate. Do not incinerate closed containers.

14. Transport information

IMDG

| | |
|----------------------------------|--|
| 14.1. UN number | Not applicable |
| 14.2. UN Proper shipping name | Not classified as hazardous for transport. |
| 14.3. Transport hazard class(es) | Not applicable |
| 14.4. Packaging group | Not applicable |

ADR/RID/ADN

| | |
|----------------------------------|--|
| 14.1. UN number | Not applicable |
| 14.2. UN Proper shipping name | Not classified as hazardous for transport. |
| 14.3. Transport hazard class(es) | Not applicable |
| 14.4. Packaging group | Not applicable |

ICAO-IATA/DGR

| | |
|----------------------------------|--|
| 14.1. UN number | Not applicable |
| 14.2. UN Proper shipping name | Not classified as hazardous for transport. |
| 14.3. Transport hazard class(es) | Not applicable |
| 14.4. Packaging group | Not applicable |

| | |
|---|---------------------------------|
| 14.5. Environmental hazards | No hazards identified |
| 14.6. Special precautions for user | No special precautions required |
| 14.7. Maritime transport in bulk according to IMO instruments | Not applicable, packaged goods |

15. Regulatory information

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

This Safety Data Sheet is prepared in accordance with Commission Regulation (EC) 1907/2006,

amended by Commission Regulation (EU) 2020/878.

Authorisations/Restrictions

| | |
|--|----------------|
| Regulation (EC) 1907/2006, REACH, Annex XIV list of substances subject to authorisation: | Not applicable |
| Regulation (EC) 1907/2006, REACH, Annex XVII restrictions on the manufacture, placing on the market and use of certain dangerous substances: | Not applicable |
| Regulation (EC) 1005/2009 on substances that deplete the ozone layer: | Not applicable |
| Regulation (EC) 850/2004 on persistent organic pollutants, amended by (EU) No 2019/1021: | Not applicable |

15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out for this substance.

16. Other information

Revision information

| | |
|------------------|------------|
| Preparation date | 26/09/2024 |
| Revision date | 26/09/2024 |
| Revision reason | Creation. |

Abbreviations and acronyms

| | |
|------|---|
| CAS | Chemical Abstracts Service |
| ADR | European Agreement concerning the International Carriage of Dangerous Goods by Road |
| RID | Regulation concerning the International Carriage of Dangerous Goods by Rail |
| IATA | International Air Transportation Association |
| IMDG | International Maritime Dangerous Goods |
| LC50 | Lethal Concentration 50% |
| LD50 | Lethal Dose 50% |
| TWA | Time Weighted Average |
| STOT | Specific target organ toxicity |
| PBT | Persistent, Bioaccumulative, Toxic |
| vPvB | Very Persistent, very Bioaccumulative |
| WEL | Workplace exposure limit |

References

- [1] CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>

- [2] ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>
- [3] eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
- [4] Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>
- [5] HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>
- [6] IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>
- [7] IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>
- [8] ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>

List of relevant phrases (code and full text as stated in chapter 2 and 3)

| | |
|------|-----------------------------------|
| H319 | Causes serious eye irritation. |
| H351 | Suspected of causing cancer. |
| H335 | May cause respiratory irritation. |

Disclaimer

The information of this safety data sheet is based on our knowledge of this product, at the time of publication. It is given in good faith. The attention of the user is drawn to the possible risks incurred by using the product for any other purpose other than that for which it was intended. This does not in any way excuse the user from knowing and applying all the regulations governing his activity. It is the sole responsibility of the user to take all precautions required in handling the product. The aim of the mandatory regulations mentioned is to help the user to fulfill his obligations regarding the use of hazardous products. For further information please contact info@vimaterial.de.