North Metal and Chemical Company

Molybdenum Trioxide
Safety Data Sheet

1. Company Identification and Product Hazard Overview:

Product Name: Molybdenum Trioxide
Synonyms: Pure oxide, sublimed oxide, POS
Recommended Use:
Production of molybdenum-containing chemicals; reduction to molybdenum dioxide (MoO$_2$); use in the production of massive or powder alloys (e.g., low alloys, super alloys, Al/Ti alloys, ferromolybdenum); use in the production of massive or powder steels (e.g., stainless, high-speed tool, and special steels); lubricant applications; manufacture of frits and enamels; manufacture and use of catalyst, including regeneration and recycling; manufacture of liquid industrial paints; metal surface treatment; manufacture of pigments; additive to sintered metals; and, formulation of water treatment chemicals.

Manufactured for: NORTH Metal and Chemical Company
P. O. Box 1985
York, PA USA 17405
Tel: 717-845-8646
Fax: 717-846-7350
Email: north@nmc-nic.com
Website: www.nmc-nic.com

In Case of Emergency Call CHEMTREC (24 Hours): 1-800-424-9300

2. Hazard Identification:

GHS Classification:
Acute Toxicity, Inhalation (Category 4)
Acute Toxicity, Oral (Category 4)
Respiratory Irritation (Category 3)
Eye Irritation (Category 2A)
Carcinogenicity (Category 2)

Signal Word: Warning

Pictograms:

Hazard Statements:
- H333: May be harmful if inhaled
- H303: May be harmful if swallowed
- H305: May be harmful if swallowed and enters airways
- H319: Causes serious eye irritation
- H335: May cause respiratory irritation
- H351: Suspected of causing cancer
## 2. Hazard Identification:

### Precautionary Statements:

- **P261**: Avoid breathing dust/fume/gas/mist/vapors/spray
- **P264**: Wash contact area thoroughly after handling
- **P271**: Use only outdoors or in a well-ventilated area
- **P280**: Wear protective gloves/protective clothing/eye protection/face protection.
- **P281**: Use personal protective equipment as required
- **P305 + P351 + P338**: IF IN EYES: rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- **P301 + P330 + P331 +P311**: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Call a POISON Center or doctor/physician.
- **P304 + P340**: IF INHALED: Remove person to fresh air and keep in position comfortable for breathing
- **P337 + P313**: If eye irritation persists: Get medical advice/attention
- **P312**: Call a POISON CENTER or doctor/physician if you feel unwell
- **P403 + P235**: Store in a well-ventilated place. Keep cool.
- **P501**: Dispose of contents/container in accordance with local/state/federal regulations.

## 3. Composition/Information on Ingredient:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Molybdenum Trioxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Family</td>
<td>Soluble Molybdenum Compounds</td>
</tr>
<tr>
<td>Chemical Formula</td>
<td>MoO$_3$</td>
</tr>
<tr>
<td>Index No.</td>
<td>042-001-00-9</td>
</tr>
<tr>
<td>(Regulation (EC) No 1272/2008)</td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td>≥ 98%</td>
</tr>
<tr>
<td>CAS No.</td>
<td>1313-27-5</td>
</tr>
<tr>
<td>EC No.</td>
<td>215-204-7</td>
</tr>
</tbody>
</table>

## 4. First Aid Measures:

**Eyes**: Flush eyes with running water for at least fifteen minutes. Remove any contact lenses. If irritation persists, get medical aid.

**Skin**: Flush skin with running water for fifteen minutes. If irritation persists, get medical attention.

**Ingestion**: Seek medical advice/attention. If vomiting occurs, keep head lower than hips to prevent aspiration.

**Inhalation**: If safe to do so, remove individual from further exposure. Supply fresh air. If cough or other symptoms develop, call doctor/poison center immediately.

**PPE first responders**: Wear suitable personal protective equipment (see Section 8) in case of insufficient ventilation or possible inhalation or eye contact.
5. Fire Fighting Measures:

**Fire/Explosion Hazard**: Negligible fire hazard when exposed to flame.

**Extinguishing Media**: Use any extinguishing media suitable for type of surrounding fire. Molybdenum Trioxide is not considered flammable or combustible.

**General Hazard**: Evacuate personnel downwind in-order to avoid inhalation of irritating and/or harmful fumes and smoke.

**Fire Fighting Procedures**: This product is a non-flammable substance. No acute hazard.

**Fire Fighting Equipment**: Full protective equipment (bunker gear) and self-contained breathing apparatus (SCBA) should be used for all indoor fires and any significant outdoor fires. If possible, firefighters should control run-off water to prevent environmental contamination.

**Special Hazards Arising from the Substance or Mixture**: Above ca. 700°C sublimation starts to take place and fumes of MoO$_3$ can become airborne, which should not be inhaled and which can contaminate the surroundings.

6. Accidental Release Measures:

**For non-emergency personnel**: Avoid formation and inhalation of dust. Seek to ensure ventilation that maintains airborne concentrations below Occupational Exposure Limits. Keep unprotected persons away. Although the substance has no acute toxicity, it is advised to avoid contact with skin, eyes, and clothing—wear suitable protective equipment.

**For emergency responders**: Avoid formation and inhalation of dust. Seek to ensure ventilation that maintains airborne concentrations below Occupational Exposure Limits. Keep unprotected persons away. Although the substance has no acute toxicity, it is advised to avoid contact with skin, eyes, and clothing—wear suitable protective equipment.

**Environmental Precautions**: Although the substance is not classified as dangerous to the environment, it is advised that in the event of an accidental release, the product should be prevented from reaching the sewage system or any water course, and from penetrating the ground/soil. Dispose of spilled material in accordance with the relevant local regulations. See section 13 for disposal considerations.

**Methods and Material for Containment and Cleaning up**: Avoid formation and inhalation of dust. Use an appropriate industrial vacuum cleaner equipped with ULPA or HEPA filters. Collect spilled material in suitable containers or bags for recovery or disposal. In the case of disposal, spilled material or contaminated material should be disposed of as waste as described in Section 13.

7. Handling and Storage:

**Conditions for Safe Storage, Including any Incompatibilities**: Store in a well-ventilated area. Do not store in open inadequate mislabeled packaging. Molybdenum Trioxide should not be stored together with highly reactive substances and strong reducing agents. (see section 10).
8. Exposure Controls and Personal Protection:

**PNECs and DNELs**

<table>
<thead>
<tr>
<th>Exposure Pattern</th>
<th>Route</th>
<th>Descriptor</th>
<th>DNEL / PNEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-term - local effects</td>
<td>Inhalation</td>
<td>DNEL (Derived No Effect Level)</td>
<td>3 mg MoO₃ / m³³</td>
</tr>
<tr>
<td>Long-term - systemic effects</td>
<td>Inhalation</td>
<td>DNEL (Derived No Effect Level)</td>
<td>11.17 mg Mo/m³³ (included for formal reason only, covered by compliance with DNEL for long-term local effects above)</td>
</tr>
<tr>
<td>Long-term – chronic effects</td>
<td>Freshwater</td>
<td>PNEC (Predicted No Effect Concentration)</td>
<td>12.7 mg Mo /L; equivalent to 19.05 mg MoO₃/L</td>
</tr>
<tr>
<td>Long-term – chronic effects</td>
<td>Marine</td>
<td>PNEC (Predicted No Effect Concentration)</td>
<td>1.9 mg Mo/L; equivalent to 2.85 mg MoO₃/L</td>
</tr>
<tr>
<td>Long-term – chronic effects</td>
<td>Freshwater Sediment</td>
<td>PNEC (Predicted No Effect Concentration)</td>
<td>22.6 g Mo/kg dw; equivalent to 33.9 g MoO₃/kg dw</td>
</tr>
<tr>
<td>Long-term – chronic effects</td>
<td>Marine Sediment</td>
<td>PNEC (Predicted No Effect Concentration)</td>
<td>1.98 g Mo/kg dw; equivalent to 2.97 g MoO₃/kg dw</td>
</tr>
<tr>
<td>Long-term – chronic effects</td>
<td>Soil</td>
<td>PNEC (Predicted No Effect Concentration)</td>
<td>11.8 – 188 mg Mo/kg dw; equivalent to 17.7 – 282 mg MoO₃/kg dw (dependent upon soil type):</td>
</tr>
<tr>
<td>Long-term – chronic effects</td>
<td>STP (Sewage Treatment Plant)</td>
<td>PNEC (Predicted No Effect Concentration)</td>
<td>27.1 mg Mo/L equivalent to 40.65 mg MoO₃/L</td>
</tr>
</tbody>
</table>

**Exposure Controls**

* Molybdenum Trioxide is not classified as a hazardous substance. High airborne dust concentrations require mechanical ventilation or a respirator mask.

**Engineering Controls**

* Use appropriate engineering controls to minimize exposure to dust generated via routine use. Maintain adequate ventilation of workplace and storage areas.

**Personal Protective Equipment**

* **Eyes and face**: Wear safety glasses with side shields or goggles when handling this material.
  * **Skin**: Wear protective clothing when handling this product to prevent prolonged skin contact.
  * **Respiratory**: Avoid breathing dust or mist. Use NIOSH approved respiratory protection equipment when air borne exposure is excessive.

**Work Hygienic Practices**

* Facilities storing or using this material should be equipped with emergency eyewash, and a safety shower. Good personal hygiene practices should always be followed.
9. Chemical and Physical Properties:

Appearance/Color : Solid, powder, white-yellowish to bluish
Odor : Odorless
Odor threshold : Not applicable
pH : Not applicable
Melting Point : 802 °C at 1013 hPa [23]
Initial Boiling Point and boiling range : 1155 °C at 1013 hPa [23]
Flash Point : Not applicable
Evaporation Rate : Negligible at ambient temperatures (At >700°C MoO₃ starts to sublime)
Flammability : Not Flammable
Lower Explosive Limit : Not explosive
Upper Explosive Limit : Not explosive
Vapor Pressure : Not applicable
Vapor Density : At >700°C MoO₃ starts to sublime
Relative Density : 4.66 at 20°C [24]
Solubility : 1.0 g/l at 20°C [25]
Partition coefficient n-octanol/water : Not applicable for inorganic substances
Auto-ignition Temp : Not applicable (MoO₃ is not combustible/flammable and thus does not auto-ignite)
Decomposition Temp : At 700°C MoO₃ starts to sublime
Viscosity : Not applicable (solid)
Explosive Properties : Not explosive
Oxidizing Properties : Not oxidizing [26]

10. Stability and Reactivity:

Reactivity : Under certain conditions (e.g., heat, large quantities), molybdenum trioxide has been found to react violently (fire/incandescence/explosion) with bromine pentafluoride (BrF₅), chlorine trifluoride (ClF₃) and reducing agents, e.g., carbon/graphite, sodium, potassium, magnesium, and lithium [22]. Hazardous polymerization will not occur.

Chemical Stability : Under normal conditions of use and storage, molybdenum trioxide is stable.

Possibility of Hazardous Reactions : Under certain conditions (e.g., heat, large quantities), molybdenum trioxide has been found to react violently (fire/incandescence/explosion) with bromine pentafluoride (BrF₅), chlorine trifluoride (ClF₃) and reducing agents, e.g., carbon/graphite, sodium, potassium, magnesium, and lithium [22]. Hazardous polymerization will not occur.

Conditions to Avoid : Avoid dust formation. Avoid conditions under which hazardous reactions may occur (See above)

Hazardous Decomposition Products : Above 700°C: sublimation of molybdenum trioxide can result in molybdenum trioxide vapors. Avoid inhalation.
11. Toxicological Information:

Information on Toxicological Effects:
The information provided in this section is consistent with the information provided in the REACH Chemical Safety Report (CSR) for molybdenum trioxide. Further information can be obtained from the REACH Molybdenum Consortium, an initiative of the International Molybdenum Association (IMOA).

<table>
<thead>
<tr>
<th>Toxicity endpoints</th>
<th>Description of effects</th>
</tr>
</thead>
</table>
| **Toxicokinetics: Absorption, Distribution, Metabolism and Excretion** | Molybdenum is an essential element. Uptaken molybdenum trioxide dissolves and exists predominantly in the form of the molybdate ion (MoO₄²⁻).
  - Oral absorption: Rapid and almost complete absorption through GI tract.
  - Inhalation absorption: Well absorbed based on animal data. Absorption in humans dependent on particle size, deposition/clearance.
  - Dermal absorption: Low to negligible.
  - Metabolism: No metabolism. Molybdenum compounds transform quickly to molybdate anions (MoO₄²⁻) upon dissolution.
  - Excretion: Rapidly eliminated from plasma predominantly via renal excretion (>80%), and faeces (<10%). |
| (a) acute toxicity | Low acute toxicity:
  - LD₅₀ oral, rat: 2689 / 3830 mg/kg bw (male/female) [27]
  - LD₅₀ dermal, rat: > 2000 mg/kg bw (male/female) [28]
  - LD₅₀ inhalation, rat (4h): > 5.84 mg/L (male/female) [29] |
| (b) skin corrosion/irritation | Not irritating / not corrosive to the skin [30] |
| (c) serious eye damage/irritation | Classified - Eye Irritant 2; H319 – Annex VI Commission Regulation (EC) No 1272/2008 (1st ATP).
  (However, basis for classification appears unwarranted as mean scores of data in OECD 405 study [31] are below the cut-off values for eye irritant classification, i.e. not an eye irritant. Despite this, the classification shown above must be adhered to.) |
| (d) respiratory or skin sensitisation | Not a skin sensitiser [32].
  No data indicating respiratory sensitisation. |
| (e) germ-cell mutagenicity | Not a germ cell mutagen.
  Negative test results in bacterial reverse mutation assay with molybdenum trioxide [33]. Read across from negative test results on sodium molybdate for: bacterial reverse mutation assay [34], in vitro micronucleus assay in human lymphocytes [35], and in vitro gene mutation assay (bkat) in mouse lymphoma cells [36]. |
  Basis: “some evidence of carcinogenic activity” of molybdenum trioxide in female mice based on increased incidences of alveolar/bronchiolar adenoma and adenoma or carcinoma (combined) [37]. Effects restricted to local effects in the respiratory tract. |
| (g) reproductive toxicity | There are currently no reliable scientific data available indicating adverse effects on reproduction or fertility. |
  Basis for classification is unclear. (However, new data in extended OECD 403/EU B.2 study, with extended histopathology of respiratory tract, indicated no respiratory irritation [29]. Despite this, the classification above must be adhered to.). |
| (i) STOT-repeated exposure | No reliable scientific data available indicating adverse systemic effects after repeated exposure to molybdenum substances. |
| (j) aspiration hazard | Not applicable (not an aerosol/mist). |
12. Ecological Information:

**Toxicity:** Reliable acute aquatic toxicity test results (tests conducted with molybdenum trioxide unless indicated otherwise):

<table>
<thead>
<tr>
<th>Test Organisms:</th>
<th>End-point</th>
<th>Range of Values</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshwater fish: <em>Pimephales promelas</em></td>
<td>96h-LC₅₀</td>
<td>577 mg Mo/L (= 865.5 mg MoO₃/L)</td>
<td>[1]</td>
</tr>
<tr>
<td>Invertebrates: <em>Daphnia magna</em></td>
<td>48h-LC₅₀</td>
<td>203.2 mg Mo/L (= 304.8 mg MoO₃/L)</td>
<td>[1]</td>
</tr>
<tr>
<td>Algae: <em>Pseudokirchneriella subcapitata</em></td>
<td>72h-EC₅₀ (growth rate)</td>
<td>295.0 – 390.9 mg Mo/L 289.2 – 369.6 mg Mo/L Geom. mean: 333.1 mg Mo/L (= 499.7 mg MoO₃/L)</td>
<td>[2] [3]</td>
</tr>
</tbody>
</table>

(a) Test conducted with sodium molybdate; UV-spectra of aqueous solutions of molybdenum trioxide demonstrated that the only dissolved molybdenum species, originating directly from molybdenum trioxide is molybdate.

Reference 1: Test conducted according to the methods outlined in OECD test guidelines.
References 2 & 3: Tests conducted in accordance with OECD test guidelines.

Reliable chronic toxicity test results (read-across from tests with sodium molybdate; UV spectra of aqueous solutions of molybdenum trioxide demonstrated that the only dissolved molybdenum species, originating directly from molybdenum trioxide is molybdate):

<table>
<thead>
<tr>
<th>Test Organisms</th>
<th>Range of Values (EC₁₀ or NOEC)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Oncorhynchus mykiss</em>, <em>Pimephales promelas</em>, <em>Pseudokirchneriella subcapitata</em>, <em>Ceriodaphnia dubia</em>, <em>Daphnia magna</em>, <em>Chironomus riparius</em>, <em>Brachionus calyciflorus</em>, <em>Lymnaea stagnalis</em>, <em>Xenopus laevis</em>, <em>Lemna minor</em></td>
<td>43.3–241.5 mg Mo/L = 64.8–362.3 mg MoO₃/L</td>
<td>[2], [3], [4], [5], [6], [7], [8]</td>
</tr>
</tbody>
</table>

Most sensitive species were the fish *O. mykiss* (43.3 mg Mo/L) and *P. promelas* (60.2 mg Mo/L). Symptoms of toxicity were effects on biomass growth, reproduction, (population) growth rate and malformation during development.

<table>
<thead>
<tr>
<th>Aquatic marine toxicity data</th>
<th>Range of Values</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Mytilus edulis</em>, <em>Acartia tonsa</em>, <em>Phaeodactylus tricornutum</em>, <em>Cyprinodon variegatus</em>, <em>Americamysis bahia</em>, <em>Crassostrea gigas</em>, <em>Dendrodoton excentricus</em>, <em>Dunaliella tertiolecta</em>, <em>Ceratium tenuicornes</em>, <em>Strongylacentrotus purpuratus</em>,</td>
<td>4.4–1,174 mg Mo/L = 6.6 – 1761 mg MoO₃/L</td>
<td>[9], [10], [11], [12], [13], [14], [15], [16]</td>
</tr>
</tbody>
</table>

Most sensitive species were the mussel *M. edulis* (4.4 mg Mo/L) and the copepod *A. tonsa* (7.96 mg Mo/L). Symptoms of toxicity include effects on biomass growth, growth rate, reproduction and malformation during development.

**Chronic sediment toxicity**

No reliable acute/chronic sediment data for molybdenum available. PNEC derivation was based on the equilibrium partitioning method, taking into account the PNECfreshwater and the sediment Kₐ given in section 12.4.
12. Ecological Information continued:

Tests were conducted according to international test guidelines (e.g., OECD, ASTM, ISO, EPA).

**Toxicity data for micro-organisms (for STP):** (values were determined using molybdenum trioxide unless indicated otherwise):

<table>
<thead>
<tr>
<th>Test Organisms:</th>
<th>End Point:</th>
<th>Range of Values</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic activated sludge population</td>
<td>3h-EC&lt;sub&gt;50&lt;/sub&gt; (respiration inhibition)</td>
<td>1,926 mg Mo/L (=2,889 mg MoO&lt;sub&gt;3&lt;/sub&gt;/L)</td>
<td>[20]</td>
</tr>
<tr>
<td>Domestic activated sludge population</td>
<td>3h-EC&lt;sub&gt;50&lt;/sub&gt; (respiration inhibition)</td>
<td>216.5 mg Mo/L (=324.8 mg MoO&lt;sub&gt;3&lt;/sub&gt;/L)</td>
<td>[20]</td>
</tr>
<tr>
<td>Domestic activated sludge population</td>
<td>30-min-NOEC (O&lt;sub&gt;2&lt;/sub&gt; utilization)</td>
<td>&gt;950 mg Mo/L (= &gt;1,425 mg MoO&lt;sub&gt;3&lt;/sub&gt;/L)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>[21]</td>
</tr>
</tbody>
</table>

Tests were conducted according to international test guidelines (e.g., OECD, ASTM, ISO, EPA).

For an overview of PNECs for the different compartments, see section 8.

Conclusion on the environmental classification and labeling: **molybdenum trioxide is not hazardous to the aquatic environment as:**

- The lowest acute reference values for fish, invertebrates and algae are > 100 mg Mo/L
- The lowest aquatic NOEC for these three trophic levels is > 1 mg Mo/L (i.e., 43.2 mg Mo/L for the rainbow trout).
- No evidence for bioaccumulation or bio magnification in the environment.
12. Ecological Information continued:

Persistence and Degradability:
Molybdenum disulfide is ubiquitous in the environment and is the naturally-occurring base mineral from which molybdenum trioxide is produced. Molybdenum trioxide, in turn, transforms to the non-toxic molybdate species under normal environmental conditions.

Bio accumulative Potential:
Available BCF/BAF data for the aquatic environment show a distinct inverse relationship with the exposure concentration. This finding demonstrates that molybdenum is homeostatically controlled by these organisms, and this is up to the milligram range of exposure. Available information on transfer of molybdenum through the food chain indicates that it does not bio magnify in aquatic food chains.

Although not homeostatically controlled in terrestrial plants and invertebrates, molybdenum is not largely concentrated from soil into plants or soil to invertebrates. There is no significant concentration increase from diet to mammals or birds. It is concluded that bio magnification is not significant in the terrestrial food chain.

Mobility and Sediment in Soil:
Molybdenum trioxide is soluble in water and with its relatively low Kd value, the resulting molybdate ions are leachable through normal soil and are mobile in sediment. Typical log Kd-values of 3.25 and 2.94 have been determined for sediment and soil, respectively.

Results of PBT and vPvB Assessment:
The PBT and vPvB of Annex XIII to the Regulation do not apply to inorganic substances, such as molybdenum trioxide. Therefore, a PBT and vPvB is not required.

Other Adverse Effects:
Molybdate originating from molybdenum trioxide can contribute to the onset of molybdenosis (a molybdenum –induced copper deficiency) in ruminants such as cattle, deer, and sheep. The level and bioavailability of copper in the animal diet are critical factors in the onset of molybdenosis. The recommended minimum dietary Cu : Mo ratio threshold to prevent molybdenosis is 1.30, i.e. there should be 30% more copper than molybdenum in the diet. Cu & Mo in the diet can be monitored, and if the ratio is < 1.3, then provide Cu supplements such as copper sulphate enriched feeds or copper sulphate enriched salt blocks for ruminants to use ad libitum. If there are ruminants in the vicinity of the minimization measures. Have an animal health check program in place (e.g., blood tests for copper) to verify that the measures are effective.

Molybdenum trioxide is not expected to contribute to ozone depletion, ozone formation, global warming or acidification.

13. Disposal Considerations:

Disposal Method: Dispose of waste at an appropriate waste disposal facility according to current applicable laws and regulations.

Product Disposal: Recycle or reuse whenever possible. Uncontaminated waste may be returned to the manufacturer. Dispose of any contaminated waste product as non-hazardous waste, unless contamination is hazardous in nature.

Packaging Disposal: Dispose of at a supervised incineration facility or an appropriate waste disposal facility.
14. Transport Information:

<table>
<thead>
<tr>
<th>Regulation (abbreviation)</th>
<th>Regulation (title)</th>
<th>MoO₃ transport classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADR</td>
<td>European Agreement concerning the International Carriage of Dangerous Goods by Road</td>
<td>none</td>
</tr>
<tr>
<td>RID</td>
<td>Regulations concerning the International Carriage of Dangerous Goods by Rail</td>
<td>none</td>
</tr>
<tr>
<td>ADN</td>
<td>European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways</td>
<td>none</td>
</tr>
<tr>
<td>IMDG</td>
<td>International Maritime Dangerous Goods</td>
<td>none</td>
</tr>
<tr>
<td>IATA</td>
<td>Technical Instructions for the Safe Transport of Dangerous Goods by Air</td>
<td>none</td>
</tr>
<tr>
<td>USDOT</td>
<td>49 CFR addressing Transportation of Hazardous Substances</td>
<td>none</td>
</tr>
</tbody>
</table>

**UN Number:**
Not applicable

**UN Proper Shipping Name:**
Not applicable

**Transport Hazard Class:**
Not applicable

**Packing Group:**
Not applicable

**Environmental Hazards:**
Not applicable

**Special Precautions for User:**
Not Applicable

**Transport in Bulk according to Annex II of MARPOL 73/78 and IBC Code:**
Not applicable

15. Regulatory Information:

**Safety, Health, and Environmental Regulations/Legislation Specific for the Substance**

**Worldwide chemical inventories:**
Molybdenum trioxide is listed in the following international chemical inventories:

- EC inventory (EU): 215-204-7
- TSCA (USA): Listed
- DSL (Canada): Listed
- AICS (Australia): Listed
- NZIoC (New Zealand): Listed
- ENCS (Japan): Listed
- ECL (Korea): Listed
- PICCS (Philippines): Listed
- IECSC (China): Listed

Molybdenum trioxide is not a SEVESO substance, not an ozone-depleting substance and not a organic pollutant.
### 15. Regulatory Information continued:

Other regulatory information:

- **TSCA Status:** Y

Other Regulatory Information Available:

- CERCLA Section 103 (40 CFR 302.4): N
- SARA Section 302 (40 CFR 355.30): N
- SARA Section 304 (40 CFR 355.40): N
- SARA Section 313 (40 CFR 372.65): Y
- CALIFORNIA PROPOSITION 65: N

**SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40 CFR 370.21):**

- **ACUTE HAZARD:** Y
- **CHRONIC HAZARD:** N
- **FIRE HAZARD:** N
- **REACTIVITY HAZARD:** N
- **SUDDEN RELEASE HAZARD:** N

Chemical Safety Assessment:

A Chemical Safety Assessment has been carried out by the Molybdenum Consortium for its members in the context of the REACH registration.

### 16. Other Information:

This new extended Safety Data Sheet was developed to satisfy REACH and is in compliance with regulation (EC) No. 1907/2006 (“REACH”). The information provided in the SDS is consistent with the information provided in the REACH chemical safety report (CSR) for RMC, submitted to the European Chemical Agency in September 2010.

### Abbreviations and acronyms used in this safety data sheet

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(e-)SDS</td>
<td>(Extended) Safety Data Sheet</td>
</tr>
<tr>
<td>CSA</td>
<td>Chemical Safety Assessment</td>
</tr>
<tr>
<td>CSR</td>
<td>Chemical Safety Report</td>
</tr>
<tr>
<td>DNEL</td>
<td>Derived No Effect Level</td>
</tr>
<tr>
<td>ECHA</td>
<td>European Chemicals Agency</td>
</tr>
<tr>
<td>PBT</td>
<td>Persistent, bio accumulative and toxic</td>
</tr>
<tr>
<td>PNEC</td>
<td>Predicted No Effect Concentration</td>
</tr>
<tr>
<td>STP</td>
<td>Sewage Treatment Plant</td>
</tr>
<tr>
<td>vPvB</td>
<td>Very persistent and very bio accumulative</td>
</tr>
</tbody>
</table>
16. Other Information continued:

Literature Reference and sources of data:

The information provided in this SDS is consistent with the information provided in the REACH chemical safety report (CSR) for MoO$_3$. Non confidential data from REACH registration dossier is published by the European Chemicals Agency (ECHA), see http://apps.echa.europa.eu/registered/registered-sub.aspx.

The REACH registration, CSA, CSR, and Exposure scenarios have been prepared by the REACH Molybdenum Consortium, an initiative of the International Molybdenum Association (IMOA). For further information, please refer to http://www.molybdenumconsortium.org/ and http://www.imoa.info.

<table>
<thead>
<tr>
<th>HMIS Rating:*</th>
<th>*HMIS Key:</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEALTH 1</td>
<td>HEALTH 1 Can cause irritation or minor reversible injury.</td>
</tr>
<tr>
<td>FLAMMABILITY 0</td>
<td>FLAMMABILITY 0- Will not burn</td>
</tr>
<tr>
<td>PHYSICAL HAZARD 0</td>
<td>PHYSICAL HAZARD 0—Product stable under ambient temperature and condition.</td>
</tr>
<tr>
<td>PERSONAL PROTECTION D</td>
<td>PERSONAL PROTECTION D —Face shield, gloves, and apron</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NFPA Rating:*</th>
<th>*NFPA Key:</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEALTH 1</td>
<td>HEALTH 1 Can cause significant irritation</td>
</tr>
<tr>
<td>FLAMMABILITY 0</td>
<td>FLAMMABILITY 0- Will not burn</td>
</tr>
<tr>
<td>REACTIVITY 0</td>
<td>REACTIVITY 0—Normally stable</td>
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<tr>
<td>SPECIFIC HAZARD —None</td>
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</tr>
</tbody>
</table>

Revision Date: April 15, 2015

Reasons for Revision: Add necessary data to meet GHS requirements.

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Revision Date: July 28, 2014