

# THE CHEM-MET COMPANY

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## SAFETY DATA SHEET

### SODIUM MOLYBDATE DIHYDRATE

#### PRODUCT INFORMATION DATA SHEET

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#### SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

##### 1.1. Product identifier.

Substance name:	Sodium Molybdate Dihydrate.
Chemical formula:	$\text{Na}_2\text{MoO}_4 \cdot 2 \text{H}_2\text{O}$ .
Synonyms/trade names:	Sodium Molybdate Dehydrate. Disodium Molybdate Dihydrate. Sodium Molybdate Crystals
Index No. (Regulation (EC) No 1272/2008):	None.
CAS Numbers:	10102-40-6. 7631-95-0 (for the anhydrous $\text{Na}_2\text{MoO}_4$ ).
EC No.:	231-551-7 (assumed to cover both dihydrate and anhydrous form).

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

###### 1.2.1. Relevant identified uses:

- Micronutrient in manufacture and use of fertilizers.
- Micronutrient in feed additives.
- Corrosion inhibitor.
- Manufacture of pigments.
- Industrial detergent for metal surface treatment.
- Cleaning & maintenance material.
- As coolant/anti-freeze/heat transfer fluid.
- Metal working fluids.
- Industrial formulation & use of lubrication additives, lubricants and greases.
- Manufacture of enamels frits, ceramics.
- Manufacture & use of water treatments chemicals, inc. water softener.
- Polymer preparations & compounds.
- Industrial chemical products such as pH regulator, flocculants, precipitants, neutralization agents
- Extraction agents.
- Photochemicals.
- Manufacture and use of catalysts, inc. regeneration & recycling.

###### 1.2.2. Uses advised against:

There are no identified uses advised against.

##### 1.3. Details of the supplier of the safety data sheet:

THE CHEM-MET COMPANY

6419 YOCHELSON PLACE/ P.O. BOX 819

CLINTON, MARYLAND 20735 USA

Tel: 301.868.3355 Fax: 301.868.8946

Email: [vfox@chem-metco.com](mailto:vfox@chem-metco.com) (Victor Fox, President); [bhickey@chem-metco.com](mailto:bhickey@chem-metco.com) (Brendan Hickey, Vice President)

1.4. Emergency telephone number:  
301.868.3355/ Monday – Friday/ 8AM – 4:30 PM.  
571.338.9730/ After Regular Business Hours.

## SECTION 2: HAZARDS IDENTIFICATION

**GHS Classification:** Acute Toxicity—Dust Inhalation Category 4

**Signal Word: Warning**

**Pictogram:**



2.1 Classification of the substance or mixture:

2.1.1 Classification according to Regulation (EC) No. 1272/2008 (CLP/GHS): Not classified.

2.1.2 Classification according to Directive 67/548/EEC: Not classified.

2.2 Label elements:

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

Sodium Molybdate (Dihydrate) is not classified as a hazardous substance and does not require specific label elements (such as Hazard Pictograms or a Signal Word).

2.2.2 Labelling according to Directive 67/548/EEC.

Sodium Molybdate (Dihydrate) is not classified as a hazardous substance and does not require specific label elements.

2.3 Other hazards:

The substance does not meet the criteria for a PBT or vPvB substance.  
No environmental, toxicological or physico-chemical hazards identified.

Hazard Statements: Harmful if inhaled.

Precautionary Statements: Avoid breathing dust. Use only in a well-ventilated area.

Response Statements: IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.

Storage: None.

Disposal: None.

Potential Health Effects:

Eyes: May cause irritation to the eyes.

Skin: May cause skin irritation.

Inhalation: Do not inhale. May cause respiratory tract irritation.

Ingestion: Do not swallow. May be harmful if swallowed.

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substance:

Content:	100%
Chemical name:	Disodium Molybdate Dihydrate
Chemical formula:	$\text{Na}_2\text{MoO}_4 \cdot 2 \text{H}_2\text{O}$
CAS Numbers.:	10102-40-6 7631-95-0 (for the anhydrous $\text{Na}_2\text{MoO}_4$ ).
EC No.:	231-551-7 (assumed to cover the dihydrate and anhydrous form).

#### SECTION 4: FIRST AID MEASURES

##### 4.1 Description of first aid measures:

Note: Sodium Molybdate is not classified as a hazardous substance and no substance-specific toxicological hazards are expected. Nevertheless, the following generic first aid measures should be applied as usual when handling any chemical substance.

##### General Advice:

First-aid responders should wear suitable personal protective equipment in case of insufficient ventilation or possible inhalation or eye contact.

##### Following Inhalation:

Remove patient from exposure and bring to fresh air. If breathing has stopped, perform artificial respiration and get medical advice/attention immediately.

##### Following skin contact:

Wash skin with water and soap, and rinse thoroughly. If skin irritation occurs, get medical advice/attention.

##### Following eye contact:

Check for and remove contact lenses. Immediately flush eyes with plenty of water, occasionally lifting upper and lower eyelids, for several minutes. If irritation occurs, get medical advice/attention.

##### After ingestion:

Seek medical advice/attention if feeling unwell.

##### 4.2 Most important symptoms and effects, both acute and delayed

Acute or delayed effects are not anticipated for Sodium Molybdate.

##### 4.3 Indication of any immediate medical attention and special treatment needed.

##### 4.4 No specific treatment expected to be required.

**PPE first responders:** Dust mask, safety goggles and gloves and are recommended.

#### SECTION 5: FIREFIGHTING MEASURES

Note: Sodium Molybdate is not flammable / combustible and it does not support fires (no oxidising properties). Nevertheless, below some general fire fighting measures are given, which should be adjusted to the surroundings (e.g. other, hazardous chemicals involved, packaging materials).

##### 5.1 Extinguishing media:

##### 5.1.1 Suitable extinguishing media:

Standard extinguishing media such as water, sand, foam. Use fire fighting measures that suit the location and surroundings. Sodium Molybdate is not considered flammable or combustible.

##### 5.1.2 Unsuitable extinguishing media:

None. Use fire fighting measures that suit the location and surroundings.

##### 5.2 Special hazards arising from the substance or mixture:

None.

##### 5.3 Advice for firefighters:

Standard extinguishing media such as water, sand, foam. Use fire fighting measures that suit the location and surroundings. Sodium Molybdate is not considered flammable or combustible.

#### SECTION 6: ACCIDENTAL RELEASE MEASURES

Note: Sodium Molybdate is not classified as a hazardous substance and no substance-specific toxicological or ecotoxicological hazards are expected. Nevertheless, the following generic accidental release measures should be applied as usual when handling any chemical substance.

6.1 Personal precautions, protective equipment and emergency procedures:

6.1.1 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.

6.1.2 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.

6.2 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.

6.3 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.

6.4 Reference to other sections:

For more information on exposure controls/personal protection or disposal considerations, check Sections 8 and 13 of this Data Sheet.

## SECTION 7: HANDLING AND STORAGE

Note: Sodium Molybdate is not classified as a hazardous substance and no substance-specific toxicological or ecotoxicological hazards are expected. Nevertheless, the following generic advice on handling and storage should be followed as for any chemical substance.

7.1 Precautions for safe handling:

7.1.1 Protective measures:

Avoid formation of dust, inhalation and ingestion. General occupational hygiene practice should always be followed (see 7.1.2 below).

7.1.2 Advice on general occupational hygiene:

Avoid formation of dust, inhalation and ingestion. General occupational hygiene measures are required to ensure safe handling of the substance. These measures involve good personal and housekeeping practices (i.e. regular cleaning with suitable cleaning devices), no eating, drinking and smoking at the workplace and wearing standard working clothes and shoes unless otherwise stated. Wash hands after contact with the powder or fume. Remove contaminated clothing and protective equipment before entering eating areas. Shower and change clothes at end of work shift. Do not wear contaminated clothing at home. Do not blow dust off with compressed air.

7.2 Conditions for safe storage, including any incompatibilities:

Store in closed container in a dry area. Do not store in open, inadequate or mislabelled packaging.

7.3 Specific end use(s):

See the Identified Uses in Section 1.2 of this Data Sheet.

## SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters/ Occupational Exposure Limits (OELS):

Exposure Limits: Soluble Molybdenum

5 mg/m<sup>3</sup> OSHA TWA; 5 mg/m<sup>3</sup> ACGIH TWA; 5 mg/m<sup>3</sup> DFG MAK TWA (total dust).

50 mg/m<sup>3</sup> DFG MAK 30 minimum peak, average value, 1 time/shift.

Exposure Controls: Sodium Molybdate 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:

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

Hygienic Practices: Facilities storing or using this material should be equipped with emergency eyewash, and a safety shower.

#### 8.1.2 PNECs and DNELs

Exposure pattern	Route	Descriptor	DNEL / PNEC
Long-term - systemic effects	Inhalation	DNEL (Derived No Effect Level)	11.17 mg Mo/m <sup>3</sup> Corresponding to 28 mg Na <sub>2</sub> MoO <sub>4</sub> · 2 H <sub>2</sub> O / m <sup>3</sup>
Long-term - chronic effects	Freshwater	PNEC (Predicted No Effect Concentration)	12.7 mg Mo/L, equivalent to 32.0 mg Na <sub>2</sub> MoO <sub>4</sub> · 2 H <sub>2</sub> O/L
Long-term - chronic effects	Marine	PNEC (Predicted No Effect Concentration)	1.9 mg Mo/L, equivalent to 4.8 mg Na <sub>2</sub> MoO <sub>4</sub> · 2 H <sub>2</sub> O/L
Long-term - chronic effects	Freshwater sediment	PNEC (Predicted No Effect Concentration)	22.6 g Mo/kg dw, equivalent to 57.0 g Na <sub>2</sub> MoO <sub>4</sub> · 2 H <sub>2</sub> O/kg dw
Long-term - chronic effects	Marine sediment	PNEC (Predicted No Effect Concentration)	1.98 g Mo/kg dw, equivalent to 4.99 g Na <sub>2</sub> MoO <sub>4</sub> · 2 H <sub>2</sub> O/kg dw
Long-term - chronic effects	Soil	PNEC (Predicted No Effect Concentration)	11.8-188 mg Mo/kg dw, equivalent to 29.8 - 474 mg Na <sub>2</sub> MoO <sub>4</sub> · 2 H <sub>2</sub> O/ kg dw (dependent upon soil type)
Long-term – chronic effects	STP	PNEC (Predicted No Effect Concentration)	21.7 mg Mo/L, equivalent to 54.7 mg Na <sub>2</sub> MoO <sub>4</sub> · 2 H <sub>2</sub> O/L

#### 8.2 Exposure controls

This substance is not classified as a hazardous substance and no substance-specific toxicological or ecotoxicological hazards are expected. Nevertheless, in some circumstances high airborne dust concentrations may require local or general ventilation to control worker exposure in general. Where ventilation is unable to control the workplace dust levels to below the OEL, then respirator controls must be used. However, no exposure controls specific to this substance are required, other than good hygiene practice and adherence to national and regional provisions with regards to exposure to dusts in the workplace. National, regional or local provisions or limit values may also apply for emissions to air or water. The generic advice on accidental release measures and on handling and storage given in sections 6 and 7 above should be followed to minimize release/exposure.

### SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1. Information about basic physical and chemical properties:

(a) Appearance/ Color:	Solid, crystalline, colourless to white, odourless, inorganic.
(b) Odor:	Odorless.
(c) Odor threshold:	Not applicable as odorless.
(d) pH (neat):	7.0 - 10.0
(e) Melting point:	Sodium Molybdate Dihydrate decomposes at ca. 100°C (loss of water of crystallisation). For the anhydrous, a melting point of 687°C has been reported.
(f) Boiling point and Range:	Not available.

(g) Flash point:	Not applicable as only relevant for liquids or low melting point solids.
(h) Evaporation rate:	Negligible at ambient temperatures.
(i) Flammability (solid, gas)	Not flammable.
(j) Upper/lower flammability or explosive limits:	Not explosive.
(k) Vapour pressure:	Low to negligible.
(l) Vapour density:	Not applicable (there are no Sodium Molybdate vapours).
(m) Relative density:	2.59 at 20°C.
(n) Solubility:	654 g/L in water at 20°C.
(o) Partition coefficient n-octanol/water:	Not applicable for inorganic substances.
(p) Auto-ignition temperature:	Not applicable (Sodium Molybdate is not combustible/flammable and thus does not auto-ignite).
(q) Decomposition temperature:	Sodium Molybdate Dihydrate decomposes at ca. 100°C (loss of water of crystallisation, formation of Anhydrous Sodium Molybdate).
(r) Viscosity:	Not applicable. (Solid).
(s) Explosive properties:	Non explosive.
(t) Oxidising properties:	Not oxidising. Read-across from study with pure molybdenum trioxide (MoO <sub>3</sub> ), which also contains molybdenum in its highest oxidation state (+VI).

## SECTION 10: STABILITY AND REACTIVITY

### 10.1 Reactivity:

Stable under ambient temperatures and pressures.

### 10.2 Chemical stability:

Stable under ambient temperatures and pressures.

### 10.3 Possibility of hazardous reactions :

Molybdates react violently or explosively when reduced to molybdenum by heating with zirconium.

Furthermore, in the preparation of dyestuffs from aniline, nitrobenzene (as oxidant), hydrochloric acid and sodium hydroxide, ferric chloride is often used as catalyst, but Sodium Molybdate was substituted as a more effective catalyst. The materials were charged into a 4.5 m<sup>3</sup> reactor and heating was started after addition of nitrobenzene, but the temperature controller was mis-set, and overheating at a high rate ensued. The exothermic reaction was much higher than normal because of the more effective catalyst, and partial failure of the cooling water led to an uncontrollable exothermic reaction.

Other hazardous reactions have not been identified.

### 10.4 Conditions to avoid:

Avoid exposure to extreme temperatures, contact with incompatible chemicals, uncontrolled contact with accelerants. Sodium Molybdate will explode on contact with molten magnesium.

### 10.5 Incompatible materials:

It is incompatible with oxidizing agents and alkali metals. Sodium Molybdate will violently react with interhalogens (e.g., bromine pentafluoride; chlorine trifluoride).

### 10.6 Hazardous decomposition products:

No hazardous decomposition products have been identified.

## SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects:

Toxicity endpoints	Description of effects
Toxicokinetics: Absorption, Distribution, Metabolism and Excretion:	Molybdenum is an essential element. Uptaken Sodium Molybdate dissolves and exists predominantly in the form of the molybdate ion (MoO <sub>4</sub> <sup>2-</sup> ). 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 ( $\text{MoO}_4^{2-}$ ) upon dissolution. Excretion: Rapidly eliminated from plasma predominantly via renal excretion (>80%), and faeces (<10%).
(a) Acute toxicity:	Low acute toxicity $\text{LD}_{50}$ , oral, rat: between 2733 and 6556 mg/kg bw (male/female). $\text{LD}_{50}$ , dermal, rat: > 2000 mg/kg bw (male/female). $\text{LD}_{50}$ , inhalation, rat (4h): > 1.93 mg/L (male/female).
(b) Skin corrosion/irritation:	Not irritating / not corrosive to the skin.
(c) Serious eye damage/irritation:	Not irritant / not corrosive to the eyes.
(d) Respiratory or skin sensitisation:	Sodium Molybdate is not sensitising to the skin. There is no data indicating respiratory sensitisation.
(e) Germ-cell mutagenicity:	Not a germ cell mutagen. Negative test results three tests with Sodium Molybdate for: Bacterial reverse mutation assay, in vitro micronucleus assay in human lymphocytes, and in vitro gene mutation assay (tk) in mouse lymphoma cells. Change inhibition capacity - Escherichia coli 16 mmol/L; sex chromosome Loss and non-disjunction - Saccharomyces cerevisiae 80 mmol/L.
(f) Carcinogenicity:	Not a carcinogen. (Read-across for absence of systemic carcinogenicity, based on chronic toxicity and carcinogenicity studies with molybdenum trioxide. Local effects in the lung observed in these molybdenum trioxide studies are specific to molybdenum trioxide and not read-across to Sodium Molybdate).
(g) Reproductive toxicity:	There are currently no reliable scientific data available indicating adverse effects on human reproduction or fertility. 16474 ug/kg intratesticular - mouse TDLo 1 day male.
(h) STOT-single exposure:	There are no specific target organ effects after single exposure to Sodium Molybdate.
(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).

## SECTION 12: ECOLOGICAL INFORMATION

### 12.1 Toxicity:

Reliable acute aquatic toxicity test results (tests conducted with Sodium Molybdate; UV-spectra of aqueous solutions of Sodium Molybdate Dihydrate demonstrated that the only dissolved molybdenum species, originating directly from Sodium Molybdate Dihydrate is Molybdate); critical values for classification are also expressed as mg  $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$ )

Test Organisms:	End-point	Range of values
Freshwater fish: Pimephales promelas	96h-LC <sub>50</sub>	609 – 681.4 mg Mo/L (1,536-1,718 mg $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$ /L)
Freshwater fish: Oncorhynchus mykiss	96h-LC <sub>50</sub>	7600 mg Mo/L
Freshwater fish: Oncorhynchus mykiss	96h-LC <sub>50</sub>	781 – 1339 mg Mo/L (recalculated – logistic fit)
Invertebrates: Daphnia magna	48h-LC <sub>50</sub>	1680.4 – 1776.6 mg Mo/L
Invertebrates: Daphnia magna	48h-LC <sub>50</sub>	2729.4 mg Mo/L
Invertebrates: Daphnia magna	48h-LC <sub>50</sub>	2847.5 mg Mo/L
Invertebrates: Daphnia magna	48h-LC <sub>50</sub>	130.9 mg Mo/L (330.1 mg $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$ /L)
Invertebrates: Ceriodaphnia dubia	48h-LC <sub>50</sub>	1005.5 – 1024.6 mg Mo/L
Invertebrate (aq. worm): Girardia dorotocephala	96h-LC <sub>50</sub>	1226 mg Mo/L
Algae: Pseudokirchneriella subcapitata	72h-ErC <sub>50</sub> (growth rate)	295.0 – 390.9 mg Mo/L 289.2 – 369.6 mg Mo/L Geom. mean: 333.1 mg Mo/L ( 840 mg $\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$ /L)

Tests were conducted according to international test guidelines (e.g., OECD) or scientifically acceptable methods.

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

Test organisms	Range of values (EC <sub>10</sub> or NOEC)
Oncorhynchus mykiss, Pimephales promelas, Pseudokirchneriella subcapitata, Ceriodaphnia dubia, Daphnia magna, Chironomus riparius, Brachionus calyciflorus, Lymnaea stagnalis, Xenopus laevis, Lemna minor	43.3–241.5 mg Mo/L
Mytilus edulis, Acartia tonsa, Phaeodactylus tricorutum, Cyprinodon variegatus, Americamysis bahia, Crassostrea gigas, Dendraster excentricus, Dunaliella tertiolecta, Ceramium tenuicorne, Strongylocentrotus purpuratus,	4.4–1,174 mg Mo/L
Annelid worms: Enchytraeus crypticus, Eisenia andrei	7.88-1661 mg Mo/kg dw (n=11)
Arthropod: Folsomia candida	37.9– >3,395 mg Mo/kg dw
Plants: Hordeum vulgare, Brassica napus, Trifolium pratense, Lolium perenne, Lycopersicon esculentum	4–3,476 mg Mo/kg dw
Soil micro-organisms (nitrification, glucose-induced respiration, plant residue mineralisation)	10–3,840 mg Mo/kg dw

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; UV-spectra of aqueous solutions of molybdenum trioxide demonstrated that the only dissolved molybdenum species, originating directly from molybdenum trioxide is also the molybdate anion):

Test Organisms:	End-point:	Range of values
Domestic activated sludge population	3h-EC <sub>50</sub> (respiration inhibition)	1,926 mg Mo/L
Domestic activated sludge population	3h-EC <sub>50</sub> (respiration inhibition)	216.5 mg Mo/L
Domestic activated sludge population	30 min-NOEC (O <sub>2</sub> utilization)	> 950 mg Mo/L <sup>(1)</sup>

Test conducted with Sodium Molybdate.

Tests were conducted according to international accepted test guidelines or scientifically acceptable methods.

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

Conclusion on the environmental classification and labelling: Sodium Molybdate Dihydrate 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).
- There is no evidence for bioaccumulation or biomagnification in the environment.

#### 12.2 Persistence and degradability:

Sodium Molybdate – when released into the environment - will rapidly dissolve and will be present as the molybdate species under normal environmental conditions.

#### 12.3 Bioaccumulative 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 up to the milligram range of exposure. Available information on transfer of molybdenum through the food chain indicates that molybdenum does not biomagnify 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 biomagnification is not significant in the terrestrial foodchain.



## 12.4 Mobility in soil:

Molybdate originating from sodium molybdate dihydrate is soluble in water and with its relatively low  $K_d$  value, the molybdate ions are leachable through normal soil and are mobile in sediment. Typical log  $K_d$ -values of 3.25 and 2.94 have been determined for sediment and soil, respectively.

## 12.5 Results of PBT and vPvB assessment:

The PBT and vPvB criteria of Annex XIII to the REACH Regulation do not apply to inorganic substances, such as Sodium Molybdate. Therefore a PBT and vPvB assessment is not required.

## 12.6 Other adverse effects:

Molybdate originating from Sodium Molybdate Dihydrate can contribute to the onset of molybdenosis (which is a molybdenum-induced copper deficiency) in ruminants such as cattle, deer, and sheep. The level and bio-availability of copper in the animal diet are critical factors in the onset of molybdenosis. The recommended minimum dietary Cu:Mo mass ratio threshold to prevent molybdenosis is 1.30, i.e. there should be 30% more copper than molybdenum in the (note: mass ratio, not molar ratio). Cu & Mo content 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 plant, identify direct and diffuse air emission sources at the plant and carry out and record emission minimisation measures. Have an animal health check programme in place (e.g. blood tests for copper) to verify that the measures are effective.

Sodium Molybdate Dihydrate is not expected to contribute to ozone depletion, ozone formation, global warming or acidification.

**SECTION 13: DISPOSAL CONSIDERATIONS**

## 13.1. Waste treatment methods:

Waste (substance and container material) shall be recycled/recovered or disposed of as applicable and in accordance with community and local legislation.

**SECTION 14: TRANSPORT INFORMATION**

Shipping Name: Not D.O.T regulated. Hazard Class: Not Dangerous for Transport. UN Number: None.

Regulation (abbreviation)	Regulation (title)	RMC transport classification
ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road	None
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail	None
ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways	None
IMDG	International Maritime Dangerous Goods	None
IATA	Technical Instructions for the Safe Transport of Dangerous Goods by Air	None

## 14.1. UN number:

Not dangerous for transport.

## 14.2. UN proper shipping name:

Not dangerous for transport.

## 14.3. Transport hazard class(es):

Not dangerous for transport.

## 14.4. Packing group:

Not dangerous for transport.

## 14.5. Environmental hazards:

Not dangerous for transport.

## 14.6. Special precautions for user:

Not dangerous for transport.

## 14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code:

Not dangerous for transport.

**SECTION 15: REGULATORY INFORMATION**

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

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U.S. Federal Regulations: TSCA Inventory Status: All components listed on the TSCA inventory.

TSCA 12b Export Notification: Not listed. EINECS listed: 231-551-7 CERCLA Section 103: No  
 SARA TITLE III (EPCRA) Section 302/304: Not Listed. SARA TITLE III (EPCRA) Section 311/312: Not Listed.  
 California Proposition 65: Not listed. OSHA process Safety (29CFR1910.119): Not listed.  
 WHMIS: Non-controllable

15.1.1 Worldwide Chemical Inventories:

Sodium Molybdate is listed in following international chemical inventories (Source: database CHEMLIST)

For CAS 10102-40-6 (Sodium Molybdate Dihydrate):

EU/REACH list of pre-registered substances  
 AICS – Australian Inventory of Chemical Substance  
 PICCS - Philippines Inventory of Chemicals and Chemical Substances  
 ASIA-PAC  
 NZIoC: New Zealand Inventory of Chemicals. This substance has HSNO approval.

For CAS 7631-95-0 (Sodium Molybdate):

EU/REACH list of pre-registered substances  
 EU EINECS (European Inventory of Existing Chemical Substances)  
 AICS – Australian Inventory of Chemical Substance  
 PICCS – Philippines Inventory of Chemicals and Chemical Substances  
 ASIA-PAC  
 NZIoC: New Zealand Inventory of Chemicals. This substance has HSNO approval.  
 DSL, Canada: Domestic Substances List  
 ENCS, Japan: Existing Notified Chemical Substances  
 ECL, Korean Existing Chemicals List

Sodium Molybdate is not a SEVESO substance, not an ozone-depleting substance and not a persistent organic pollutant.

15.1.2 Other regulatory information:

Germany: Water Hazard class, WGK = 1 (low hazard to water)

15.2. Chemical safety assessment:

A Chemical Safety Assessment has been carried out by the Molybdenum Consortium for its members for the purpose of GHS Compliance and REACH registration.

**SECTION 16: OTHER INFORMATION**

**HMIS Rating:\***

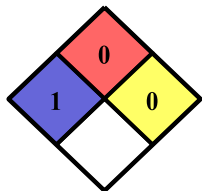
<b>HEALTH</b>	<b>1</b>
<b>FLAMMABILITY</b>	<b>0</b>
<b>PHYSICAL HAZARD</b>	<b>0</b>
<b>PERSONAL PROTECTION</b>	<b>D</b>

**\*HMIS Key:**

<b>HEALTH</b>	-1 Can cause irritation or minor reversible injury.
<b>FLAMMABILITY</b>	0- Will not burn
<b>PHYSICAL HAZARD</b>	0—Product stable under ambient temperature and condition.
<b>PERSONAL PROTECTION</b>	D —Face shield, gloves, and apron

**NFPA Rating:\***

**\*NFPA Key:**



HEALTH	-1 Can cause significant irritation
FLAMMABILITY	0- Will not burn
REACTIVITY	0—Normally stable
SPECIFIC HAZARD	—None

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