1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY / UNDERTAKING

Product identifier:

Product name: SODIUM MOLYBDATE

Chemical name: SODIUM MOLYBDATE DIHYDRATE

Synonyms; trade names: Sodium molybdate anhydrous (CAS# 7631-95-0).
Sodium molybdate dihydrate (CAS# 10102-40-6)

REACH registration number: 01-2119489495-21-XXXX

CAS number: 10102-40-6

EC number: 231-551-7

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

Identified uses: Fertilisers. Corrosion inhibitor. Manufacture of pigments. Industrial detergent for metal surface treatment. Cleaning and maintenance material. Use as coolant/antifreeze/heat transfer fluid. Metal working fluids. Industrial formulation and use of lubrication additives, lubricants and greases. Manufacture of enamels, frits, ceramics. Manufacture and use of water treatment chemicals, including water softener. Polymer preparations and compounds. Products such as pH-regulators, flocculants, precipitants, neutralization agents. Extraction agents. Photo chemicals. Manufacture and use of catalysts, including regeneration and recycling. Some grades of this substance are available for feed/food use; Feed additive. (E7)

Uses advised against: None.

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2. HAZARDS IDENTIFICATION

Classification of the substance or mixture:

Classification (EC 1272/2008):

Physical hazards: Not Classified.

Health hazards: Not Classified.

Environmental hazards: Not Classified.

Label elements:

EC number: 231-551-7

Hazard statements: NC Not Classified.

Other hazards: This substance is not classified as PBT or vPvB according to current EU criteria. [cont…]

3. COMPOSITION / INFORMATION ON INGREDIENTS

Substances:

Product name:	SODIUM MOLYBDATE
Chemical name:	SODIUM MOLYBDATE DIHYDRATE
REACH registration number:	01-2119489495-21-XXXX
CAS number:	10102-40-6
EC number:	231-551-7
Chemical formula:	Na2MoO4.2H2O

4. FIRST AID MEASURES

Description of first aid measures:

Inhalation:	Remove affected person from source of contamination. Move affected person to fresh air at once. Get medical attention if any discomfort continues. If breathing stops, provide artificial respiration.
Ingestion:	Rinse mouth thoroughly with water. Get medical attention if any discomfort continues. Do not induce vomiting.
Skin contact:	Remove affected person from source of contamination. Remove contaminated clothing. Wash skin thoroughly with soap and water. Get medical attention if irritation persists after washing.
Eye contact:	Remove affected person from source of contamination. Rinse with water. Remove any contact lenses and open eyelids wide apart. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

Most important symptoms and effects, both acute and delayed:

Inhalation:	Dust may irritate the respiratory system. Symptoms following overexposure may include the following: Coughing.
Ingestion:	Nausea, vomiting. Diarrhoea. Stomach pain.
Skin contact:	Redness.
Eye contact:	Particles in the eyes may cause irritation and smarting.

Indication of any immediate medical attention and special treatment needed:

Notes for the doctor:	No specific recommendations.

5. FIRE-FIGHTING MEASURES

Extinguishing media:

Suitable extinguishing media:	The product is not flammable. Use fire-extinguishing media suitable for the surrounding fire. Extinguish with alcohol-resistant foam, carbon dioxide, dry powder or water fog.
Unsuitable extinguishing media:	Do not use water jet as an extinguisher, as this will spread the fire.

Special hazards arising from the substance or mixture:

Specific hazards:	None known.

[cont…]

Advice for firefighters:

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and appropriate protective clothing. Firefighter's clothing conforming to European standard EN469 (including helmets, protective boots and gloves) will provide a basic level of protection for chemical incidents.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:

Personal precautions: Wear protective clothing as described in Section 8 of this safety data sheet. Provide adequate ventilation.

For non-emergency personnel: Keep unnecessary and unprotected personnel away from the spillage.

Environmental precautions: Avoid the spillage or runoff entering drains, sewers or watercourses. Stop leak if possible, without any risk.

Methods and material for containment and cleaning up:

Methods for cleaning up: Avoid generation and spreading of dust.
Collect powder using special dust vacuum cleaner with particle filter or carefully sweep into suitable waste disposal containers and seal securely. Label the containers containing waste and contaminated materials and remove from the area as soon as possible.
Flush contaminated area with plenty of water.

Reference to other sections: Wear protective clothing as described in Section 8 of this safety data sheet. For waste disposal, see Section 13.

7. HANDLING AND STORAGE

Precautions for safe handling:

Usage precautions: Avoid spilling. Avoid contact with skin and eyes. Avoid handling which leads to dust formation. Provide adequate ventilation. Avoid inhalation of dust.

Advice on general occupational hygiene: Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash it before reuse. Wash at the end of each work shift and before eating, smoking and using the toilet.

Conditions for safe storage, including any incompatibilities:

Storage precautions: Store in tightly-closed, original container in a dry, cool and well-ventilated place.

Specific end use(s): The identified uses for this product are detailed in Section 1.2.

[cont…]

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters:

Occupational exposure limits:

Long-term exposure limit (8-hour TWA): WEL 5 mg/m³

Short-term exposure limit (15-minute): WEL 10 mg/m³

as Mo

WEL = Workplace Exposure Limit.

DNEL:

Workers - Inhalation; Long term systemic effects: 23.97 mg/m³
General population - Inhalation; Long term systemic effects: 7.15 mg/m³
General population - Oral; Long term systemic effects: 7.3 mg/kg/day
Sodium molybdate.
Workers - Inhalation; Long term systemic effects: 28 mg/m³
General population - Inhalation; Long term systemic effects: 8.39 mg/m³
General population - Oral; Long term systemic effects: 8.57 mg/kg/day
Sodium molybdate dihydrate.

PNEC:

Fresh water; 27.25 mg/l
Marine water; 4.89 mg/l
Sediment (Freshwater); 48.5 g/l
Sediment (Marine water); 5.08 g/l
Soil; 21.29 - 22.56 mg/kg
STP; 46.57 mg/l
Sodium molybdate.
Fresh water; 32.0 mg/l
Marine water; 5.75 mg/l
Sediment (Freshwater); 57.0 g/l
Sediment (Marine water); 5.98 g/l
Soil; 25 - 26.5 mg/kg
STP; 54.7 mg/l
Sodium molybdate dihydrate.

Exposure controls:

Protective equipment:

Appropriate engineering controls: Provide adequate ventilation. Avoid inhalation of dust.
Observe any occupational exposure limits for the product or ingredients.
Mechanical ventilation or local exhaust ventilation may be required.

Eye/face protection: Eyewear complying with an approved standard should be worn if a risk assessment indicates eye contact is possible. The following protection should be worn: Dust-resistant, chemical splash goggles. Personal protective equipment for eye and face protection should comply with European Standard EN166. [cont…]

Hand protection: Wear protective gloves. To protect hands from chemicals, gloves should comply with European Standard EN374.

Other skin and body protection: Provide eyewash station and safety shower. Wear appropriate clothing to prevent skin contamination.

Respiratory protection: Respiratory protection must be used if the airborne contamination exceeds the recommended occupational exposure limit.

Wear a respirator fitted with the following cartridge: Particulate filter, type P2. Particulate filters should comply with European Standard EN143 or wear a suitable dust mask. Disposable filtering half mask respirators should comply with European Standard EN149 or EN405.

Environmental exposure controls: Avoid releasing into the environment. Do not discharge into drains or watercourses or onto the ground. Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties:

Appearance: Crystals.

Colour: White.

Odour: Odourless.

Odour threshold: Not applicable.

pH: Not applicable.

Melting point: 687°C (Anhydrous.)

~100°C (Dihydrate.)

Initial boiling point and range: Endpoint waived according to REACH Annex VII, IX or XI.

Flash point: Endpoint waived according to REACH Annex VII, IX or XI.

Evaporation rate: No information available.

Flammability (solid, gas): The product is not flammable.

Upper/lower flammability or explosive limits: Not applicable.

Vapour pressure: Endpoint waived according to REACH Annex VII, IX or XI.

Vapour density: No information available.

Relative density: 2.59 @ 23.3°C

Test method(s): OECD 109.

Solubility(ies): Soluble in water.

654.2 g/l water @ pH 8.8, 20°C

Test method(s): OECD 105.

Partition coefficient: Not applicable. Substance is inorganic.

Auto-ignition temperature: Not applicable.

Decomposition Temperature: No information available.

Viscosity: Not applicable.

Explosive properties: Not considered to be explosive.

There are no chemical groups present in the product that are associated with explosive properties.

Oxidising properties: Does not meet the criteria for classification as oxidising.

Read-across data. Molybdenum trioxide.

Other information:

Molecular weight: 205.92. Sodium molybdate. 241.95. Sodium molybdate dihydrate.

[cont…]

10. STABILITY AND REACTIVITY

Reactivity: The following materials may react violently with the product: Halogens.

Chemical stability: Stable at normal ambient temperatures and when used as recommended.

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 m3 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.

Conditions to avoid: Avoid excessive heat for prolonged periods of time. Water, moisture.

Incompatible materials:

Materials to avoid: Strong oxidising agents. Halogens.

Hazardous decomposition products:

Oxides of the following substances: Sodium.

11. TOXICOLOGICAL INFORMATION

Information on toxicological effects:

Toxicological effects: Molybdenum is an essential element. Up taken sodium molybdate dissolves and exists predominantly in the form of the molybdate ion (MoO4 2-).
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 (MoO4 2-) upon dissolution.
Excretion: Rapidly eliminated from plasma predominantly via renal excretion (>80%), and faeces (<10%).

Acute toxicity – oral:

Notes (oral LD_{50}): LD_{50} 2733 - 6556 mg/kg, Oral, Rat

Test method(s): OECD 401.
Based on available data the classification criteria are not met.

Acute toxicity – dermal:

Notes (dermal LD_{50}): LD_{50} > 2000 mg/kg, Dermal, Rat

Test method(s): OECD 402.
Based on available data the classification criteria are not met.

[cont…]

Acute toxicity – inhalation:

Notes (inhalation LC_{50}): LC_{50} (4h) > 1.93 mg/l, Inhalation, Rat

Test method(s): Equivalent or similar to OECD 403.

Based on available data the classification criteria are not met.

Skin corrosion/irritation:

Animal data: Not irritating.

Erythema/eschar score: No erythema (0).

Oedema score: No oedema (0).

Test method(s): OECD 404.

Based on available data the classification criteria are not met.

Serious eye damage/irritation:

Serious eye damage/irritation: Not irritating.

Test method(s): OECD 405.

Based on available data the classification criteria are not met.

Skin sensitisation:

Skin sensitisation: Guinea pig maximization test (GPMT) - : Not sensitising.

Test method(s): OECD 406.

Based on available data the classification criteria are not met.

Germ cell mutagenicity:

Genotoxicity - in vitro: Bacterial reverse mutation test: Negative.

Test method(s): OECD 471.

Gene mutation: Negative.

Test method(s): OECD 476.

Based on available data the classification criteria are not met.

Genotoxicity - in vivo: Data lacking.

Carcinogenicity:

Carcinogenicity: Based on available data the classification criteria are not met.

IARC carcinogenicity: Not listed.

Reproductive toxicity:

Reproductive toxicity – fertility: Data lacking.

Reproductive toxicity – development:

Developmental toxicity: NOAEL: >40 mg Mo/kg bw/day, Oral, Rat

Test method(s): OECD 414.

Based on available data the classification criteria are not met.

Specific target organ toxicity - repeated exposure:

STOT - repeated exposure: NOAEL 17 mg Mo/kg bw/day, Oral, Rat

Test method(s): OECD 408.

Based on available data the classification criteria are not met.

[cont…]

Aspiration hazard:

Aspiration hazard: Not relevant.

General information: No specific health hazards known.

Ingestion: May cause discomfort if swallowed.

Skin contact: Powder may irritate skin.

Eye contact: Particles in the eyes may cause irritation and smarting.

12. ECOLOGICAL INFORMATION

Toxicity: Based on available data the classification criteria are not met. However, large or frequent spills may have hazardous effects on the environment.

Acute aquatic toxicity:

Acute toxicity – fish: LC_{50}, 96 hour: 1536 mg/l, Pimephales promelas (Fat-head Minnow)

LC_{50}, 96 hours: 609.1 mg Mo/l, Pimephales promelas (Fat-head Minnow)

Test method(s): OECD 203.

Acute toxicity – aquatic invertebrates: EC_{50}, 48 hour: 330.1 mg/l, Daphnia magna

EC_{50}, 48 hour: 130.9 mg Mo/l, Daphnia magna

Test method(s): OECD 202.

Acute toxicity - aquatic plants: LC_{50}, 72 hour: 840 mg/l, Pseudokirchneriella subcapitata

EC_{50}, 72 hour: 333.1 mg Mo/l, Pseudokirchneriella subcapitata

Test method(s): OECD 201.

Chronic aquatic toxicity:

Chronic toxicity - fish early life stage: NOEC, 78 day: 48.9 mg Mo/l, Oncorhynchus mykiss (Rainbow trout)

Test method(s): OECD 210.

Chronic toxicity – aquatic invertebrates: NOEC, 21 day: 89.5 mg/l, Daphnia magna

Test method(s): OECD 211.

Persistence and degradability: When released into the environment, will rapidly dissolve and will be present as the molybdate species under normal environmental conditions.

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 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 biomagnification is not significant in the terrestrial food chain.

Partition coefficient: Not applicable. Substance is inorganic.

[cont…]

Mobility in soil:

Mobility: The product is water-soluble and may spread in water systems.

Adsorption/desorption coefficient: Soil - log kd: 2.94 @ 20°C

Results of PBT and vPvB assessment: This product does not contain any substances classified as PBT or vPvB.

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 copper (Cu):molybdenum (Mo) mass ratio threshold to prevent molybdenosis is 1.30, i.e. there should be 30% more copper than molybdenum in the diet (note: mass ratio, not molar ratio). Cu and 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.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods:

Disposal methods: Dispose of waste to licensed waste disposal site in accordance with the requirements of the local Waste Disposal Authority.

14. TRANSPORT INFORMATION

General: The product is not covered by international regulations on the transport of dangerous goods (IMDG, IATA, ADR/RID).

UN number: Not applicable.

UN proper shipping name: Not applicable.

Transport hazard class(es): Not applicable.

Packing group: Not applicable.

Environmental hazards:

Environmentally hazardous substance/marine pollutant: No.

Special precautions for user: Not applicable.

Transport in bulk according to Annex II of MARPOL and the IBC Code:

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable.

[cont…]

15. REGULATORY INFORMATION

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

EU legislation: Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (as amended).
Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures (as amended).

Guidance: Introduction to Local Exhaust Ventilation HS(G)37.
Workplace Exposure Limits EH40.

Chemical safety assessment: A chemical safety assessment has been carried out.

Note: The regulatory information given above only indicates the principal regulations specifically Applicable to the product described in the safety data sheet. The user's attention is drawn to the possible existence of additional provisions which complete these regulations. Refer to all applicable national, international and local regulations or provisions.

16. OTHER INFORMATION

Abbreviations and acronyms used in the safety data sheet:

ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.
ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.
ATE: Acute Toxicity Estimate.
BCF: Bioconcentration Factor.
CAS: Chemical Abstracts Service.
DNEL: Derived No Effect Level.
EC_{50}: 50% of maximal Effective Concentration.
IATA: International Air Transport Association.
ICAO: Technical Instructions for the Safe Transport of Dangerous Goods by Air.
IMDG: International Maritime Dangerous Goods.
LC_{50}: Lethal Concentration to 50 % of a test population.
LD_{50}: Lethal Dose to 50% of a test population (Median Lethal Dose).
LOAEC: Lowest Observed Adverse Effect Concentration.
LOAEL: Lowest Observed Adverse Effect Level.
LOEC: Lowest Observed Effect Concentration.
MARPOL 73/78: International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978.
IBC: International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code).
NOAEC: No Observed Adverse Effect Concentration.
NOAEL: No Observed Adverse Effect Level.
NOEC: No Observed Effect Concentration.

[cont…]

OECD: Organisation for Economic Co-operation and Development.
PBT: Persistent, Bioaccumulative and Toxic substance.
RID: European Agreement concerning the International Carriage of Dangerous Goods by Rail.
SVHC: Substances of Very High Concern.
UN: United Nations.
vPvB: Very Persistent and Very Bioaccumulative.

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