

MOLYBDENUM METAL POWDER 99.9%

GHS Safety Data Sheet

Version No:2.0

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

MOLYBDENUM METAL POWDER 99.9%

OTHER NAMES

Mo, molybdate

PRODUCT USE

In the form of ferromolybdenum for manufacturing special steels for tools, boiler plate, rifle barrels, propeller shafts; electrical contacts, spark plugs, x-ray tubes; in the production of tungsten; glass-to-metal seals. Used in non-ferrous alloys; in colloidal form as lubricant additive.

SUPPLIER

Company: S D FINE- CHEM LIMITED

Address:

315- 317, T.V. INDUSTRIAL ESTATE,
248, WORLI,

MUMBAI- 400030.INDIA.

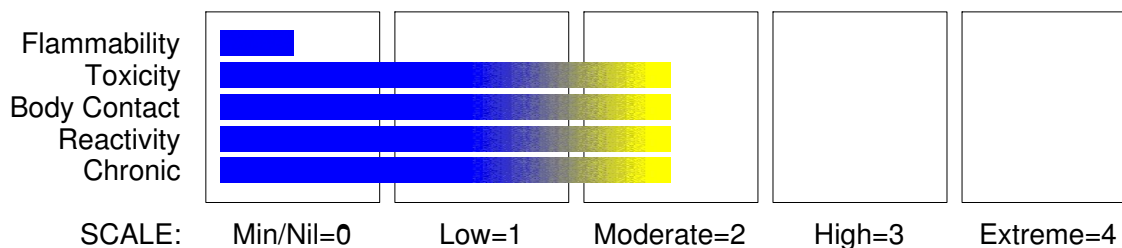
technical@sdfine.com

Telephone: 91- 22- 24959898

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HAZARD RATINGS



Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Eye Irritation Category 2B

Organ Damage Category 2

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Section 2 - HAZARDS IDENTIFICATION



EMERGENCY OVERVIEW

HAZARD

WARNING

Determined by using GHS criteria:

H320 H373

Causes eye irritation

May cause damage to organs through prolonged or repeated exposure.

PRECAUTIONARY STATEMENTS

Prevention

Wash hands thoroughly after handling.

Do not breathe dust/fume/gas/mist/vapours/spray.

Response

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

If eye irritation persists, get medical advice/attention.

Get medical advice/attention if you feel unwell.

Disposal

Dispose of contents and container in accordance with relevant legislation.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
molybdenum	7439-98-7	>99

Section 4 - FIRST AID MEASURES

SWALLOWED

- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

EYE

If this product comes in contact with the eyes:

- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

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Section 4 - FIRST AID MEASURES

SKIN

If skin or hair contact occurs:

- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If dust is inhaled, remove from contaminated area.
- Encourage patient to blow nose to ensure clear passage of breathing.
- If irritation or discomfort persists seek medical attention.

NOTES TO PHYSICIAN

Long term exposure to high dust concentrations may cause changes in lung function (i.e. pneumoconiosis) caused by particles less than 0.5 micron penetrating and remaining in the lung. A prime symptom is breathlessness. Lung shadows show on X-ray.

* Preemployment and periodic physical examinations should include irritant effects to eyes or respiratory tract and the general health of the worker.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Metal dust fires need to be smothered with sand, inert dry powders.

DO NOT USE WATER, CO₂ or FOAM.

- Use DRY sand, graphite powder, dry sodium chloride based extinguishers, G-1 or Met L-X to smother fire.
- Confining or smothering material is preferable to applying water as chemical reaction may produce flammable and explosive hydrogen gas.
- Chemical reaction with CO₂ may produce flammable and explosive methane.
- If impossible to extinguish, withdraw, protect surroundings and allow fire to burn itself out.

FIRE FIGHTING

Alert Fire Brigade and tell them location and nature of hazard.

- Wear breathing apparatus plus protective gloves.
 - Prevent, by any means available, spillage from entering drains or water courses.
- Cool fire exposed containers with water spray from a protected location.
If safe to do so, remove containers from path of fire.

FIRE/EXPLOSION HAZARD

- Metal powders, while generally regarded as non-combustible, may burn when metal is finely divided and energy input is high.
- DO NOT use water or foam as generation of explosive hydrogen may result.
- May be ignited by friction, heat, sparks or flame.
- Metal dust fires are slow moving but intense and difficult to extinguish.
- Will burn with intense heat.
- DO NOT disturb burning dust. Explosion may result if dust is stirred into a cloud, by providing oxygen to a large surface of hot metal.
- Containers may explode on heating.
- Dusts or fumes may form explosive mixtures with air.
- May REIGNITE after fire is extinguished.
- Gases generated in fire may be poisonous, corrosive or irritating.

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Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

Clean up all spills immediately.
Wear impervious gloves and safety glasses.
Avoid contact with skin and eyes.
Avoid generating and breathing dust.
Remove all ignition sources.
Vacuum up or sweep up.
Place in suitable containers for disposal.

MAJOR SPILLS

Clear area of personnel and move upwind.
· Wear breathing apparatus plus protective gloves.
· Prevent, by any means available, spillage from entering drains or water courses.
Shut off all possible sources of ignition and increase ventilation.
Stop leak if safe to do so.
Use dry clean up procedures and avoid generating dust.
Recover uncontaminated product in clean, dry, labelled containers.
Place spilled material in clean, dry, sealable, labelled container.
Wash spill area with large quantities of water.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:
molybdenum 500 mg/m³

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:
molybdenum 50 mg/m³

other than mild, transient adverse effects without perceiving a clearly defined odour is:
molybdenum 30 mg/m³

The threshold concentration below which most people will experience no appreciable risk of health effects:
molybdenum 10 mg/m³

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	>= 0.1%	Toxic (T)	>= 3.0%
R50	>= 0.25%	Corrosive (C)	>= 5.0%
R51	>= 2.5%		
else	>= 10%		

where percentage is percentage of ingredient found in the mixture

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+



+



+



+



+



+

continued...

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Section 6 - ACCIDENTAL RELEASE MEASURES

+: May be stored together
O: May be stored together with specific preventions
X: Must not be stored together

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
Use good occupational work practice.
Avoid contact with skin and eyes.
Avoid generating and breathing dust.
Use in a well-ventilated area.
Avoid sources of heat.
Avoid all ignition sources.
Avoid contact with, oxidising agents, halogens.
Avoid physical damage to containers.
Keep containers securely sealed when not in use.
When handling, DO NOT eat, drink or smoke.
Wash hands with soap and water after handling.
Work clothes should be laundered separately: NOT at home.

SUITABLE CONTAINER

Glass container.
Plastic drum.
Polyethylene or polypropylene container.
Metal can.
Metal drum.
· Check that containers are clearly labelled.

STORAGE INCOMPATIBILITY

Segregate from strong oxidising agents, bromine trifluoride, chlorine trifluoride, lead dioxide, fluorine, nitric acid, sulfuric acid.

STORAGE REQUIREMENTS

Observe manufacturer's storing and handling recommendations.
Store in a cool, dry place.
Store in a well-ventilated area.
Store away from sources of heat or ignition / naked lights.
Store away from incompatible materials.
Protect containers against physical damage.
Keep dry.
Keep containers securely sealed.
Check regularly for spills and leaks.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records
• molybdenum: CAS:7439- 98- 7

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
molybdenum	5, 000	

MATERIAL DATA

An increased incidence of non-specific symptoms including headache, weakness, fatigue, anorexia and joint and muscle weakness has been reported to occur in mining and metallurgy workers exposed to 60-600 mg (as Mo). Some investigators have attributed gout and elevated uric acid concentration found in some Armenians to result from exposures to Armenian soils rich in molybdenum, whilst exposure has been implicated as a cause of bone disease amongst Indians. "These involvements are speculative". [US National Research Council]. As far as it is known, the recommended TLV-TWA incorporates a large margin of safety against potential pulmonary or systemic effects.

PERSONAL PROTECTION



EYE

- Safety glasses.
- Full face shield.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

HANDS/FEET

Impervious gloves.
Rubber gloves.
Rubber boots.

OTHER

- Overalls.
- Eyewash unit.

Daily change of clothes advisable with showering before changing to street clothes.

RESPIRATOR

Protection Factor	Half- Face Respirator	Full- Face Respirator	Powered Air Respirator
10 x ES	P1 Air- line*	- -	PAPR- P1 -
50 x ES	Air- line**	P2	PAPR- P2
100 x ES	-	P3	-
		Air- line*	-
100+ x ES	-	Air- line**	PAPR- P3

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

* - Negative pressure demand ** - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

For further information consult your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

Metal dusts must be collected at the source of generation as they are potentially explosive.

- Vacuum cleaners, of flame-proof design, should be used to minimise dust accumulation.
- Metal spraying and blasting should, where possible, be conducted in separate rooms. This minimises the risk of supplying oxygen, in the form of metal oxides, to potentially reactive finely divided metals such as aluminium, zinc, magnesium or titanium.
- Work-shops designed for metal spraying should possess smooth walls and a minimum of obstructions, such as ledges, on which dust accumulation is possible.
- Wet scrubbers are preferable to dry dust collectors.
- Bag or filter-type collectors should be sited outside the workrooms and be fitted with explosion relief doors.
- Cyclones should be protected against entry of moisture as reactive metal dusts are capable of spontaneous combustion in humid or partially wetted states.
- Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the worker, of 0.5 metre/sec.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:
welding, brazing fumes (released at relatively low velocity into moderately still air)

Air Speed:
0.5- 1.0 m/s (100- 200 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

- 1: Room air currents minimal or favourable to capture
- 2: Contaminants of low toxicity or of nuisance value only.
- 3: Intermittent, low production.
- 4: Large hood or large air mass in motion

Upper end of the range

- 1: Disturbing room air currents
- 2: Contaminants of high toxicity
- 3: High production, heavy use
- 4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Silver-white metal or grey-black powder. Insoluble in water.
Soluble in hot concentrated nitric and sulfuric acid.
Brinell hardness: 140-185

PHYSICAL PROPERTIES

Solid.
Does not mix with water.
Sinks in water.

Molecular Weight: 95.94
Melting Range (°C): 2610
Solubility in water (g/L): Immiscible
pH (1% solution): Not applicable.
Volatile Component (%vol): Not applicable.
Relative Vapour Density (air=1): Not applicable.
Lower Explosive Limit (%): Not applicable
Autoignition Temp (°C): 720 (cloud); 36
State: Divided solid

Boiling Range (°C): 5560
Specific Gravity (water=1): 10.2
pH (as supplied): Not applicable
Vapour Pressure (kPa): 1.3 @ 3535 deg.
Evaporation Rate: Not applicable
Flash Point (°C): Not applicable
Upper Explosive Limit (%): Not applicable
Decomposition Temp (°C): Not available

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

Presence of heat source and ignition source.
Presence of incompatible materials.
Product is considered stable under normal handling conditions.
Hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Accidental ingestion of the material may be damaging to the health of the individual. Molybdenum is of biological importance as an essential trace element in the Mo-flavoprotein enzyme, xanthine oxidase. It is also necessary for nitrogen-fixation by soil bacteria; livestock poisoning has been recorded in animals feeding on herbage containing high levels of molybdenum. Signs of molybdenum poisoning include loss of appetite, listlessness, diarrhoea and reduced growth rate. Anaemia is characteristic of molybdenum toxicity with low haemoglobin concentration and reduced red blood cell count. Livers and kidneys of severely poisoned animals show fatty degeneration. Other symptoms include achromotrichia (loss of hair pigment), testicular degeneration, poor conception and deficient lactation, dyspnoea, incoordination and irritation of the mucous membranes. Molybdenum depresses liver sulfide oxidase activity and the resulting sulfide accumulation leads to the formation of highly insoluble cupric sulfide and the subsequent appearance of copper deficiency. Symptoms of molybdenosis described above are similar to those of hypocuprosis.

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Section 11 - TOXICOLOGICAL INFORMATION

EYE

Limited evidence exists, or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals and/or is expected to produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.

The dust may produce eye discomfort and abrasive eye inflammation.

SKIN

The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

INHALED

The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

Bronchial and alveolar exudate are apparent in animals exposed to molybdenum by inhalation. Molybdenum fume may produce bronchial irritation and moderate fatty changes in liver and kidney.

CHRONIC HEALTH EFFECTS

Principal routes of exposure are by accidental skin and eye contact and inhalation of generated dusts.

Metallic dusts generated by the industrial process give rise to a number of potential health problems. The larger particles, above 5 micron, are nose and throat irritants. Smaller particles however, may cause lung deterioration. Particles of less than 1.5 micron can be trapped in the lungs and, dependent on the nature of the particle, may give rise to further serious health consequences.

Cattle, rabbits, and chicks on high dietary levels of molybdenum exhibited deformities of joints of the extremities. Chronic exposure of workers in Russian molybdenum-copper plant resulted in a fall in the albumin/globulin ratio owing to a rise in globulins (particularly alpha-globulins) which is interpreted as evidence of liver dysfunction with hyperbilirubinaemia. Hepatotoxic effects are also found in animals given molybdenum salts with a rise in alpha-globulin levels, hypoalbuminaemia and increased serum bilirubin reported. Other reported biochemical effects include an early depletive effect on tissue nicotinamide nucleotides, hyperaminoaciduria, reduction in red blood cell life-span and hyper-thyroidism. Industrial exposure to some insoluble molybdenum compounds is thought to have resulted in an increased incidence of weakness, fatigue, anorexia, headache and joint and muscular pain. Animals exposed to certain insoluble molybdenum compounds show anorexia, diarrhoea, weight loss, listlessness, and liver and kidney damage. Molybdenum disturbs bone metabolism, giving rise to lameness, bone joint abnormalities, osteoporosis and high serum phosphatase levels. Low molybdenum intake has been attributed to the high incidence of oesophageal cancer in South Africa among the Bantu of Transkei, in China and in Russia. Under the conditions of a 2-year inhalation study* there was equivocal evidence of carcinogenic activity of molybdenum trioxide in male rats, male mice and female mice based on a marginally significant positive trend of alveolar/bronchiolar adenoma or carcinoma. There was no evidence of carcinogenic activity in female rats exposed to 10, 30 and 100 mg/m³. Exposure of male and female rats to molybdenum trioxide by inhalation resulted in increased incidences of chronic alveolar inflammation, hyaline degeneration of the olfactory epithelium (females), hyaline degeneration of the respiratory epithelium and squamous metaplasia of the epiglottis. Exposure of female and

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Section 11 - TOXICOLOGICAL INFORMATION

male mice to molybdenum trioxide resulted in an increased incidence of metaplasia of the alveolar epithelium, histiocyte cellular inflammation (males), hyaline degeneration of the respiratory epithelium, hyaline degeneration of the olfactory epithelium (females), squamous metaplasia of the epiglottis, and hyperplasia of the larynx. Molybdenum trioxide was not mutagenic in any of five strains of *Salmonella typhimurium* and did not induce sister chromatid exchanges or chromosomal aberrations in cultured Chinese hamster ovary cells in vitro. All tests were conducted with or without S9 metabolic activation enzymes. National Toxicology Program: Technical Report Series 462, April 1997.

TOXICITY AND IRRITATION

No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

No data for molybdenum.

Section 13 - DISPOSAL CONSIDERATIONS

Consult manufacturer for recycling options.
Bury residue in an authorised landfill.
Recycle containers if possible, or dispose of in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION

HAZCHEM: None

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS:UN, IATA,
IMDG

Section 15 - REGULATORY INFORMATION

REGULATIONS

molybdenum (CAS: 7439-98-7) is found on the following regulatory lists;
OECD Representative List of High Production Volume (HPV) Chemicals
WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water

Section 16 - OTHER INFORMATION

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

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