

Material Safety Data Sheet

Section 1 - Chemical Product and Company Identification

Product/Chemical Name : **Ferromolybdenum.**
Synonym : Molybdenum – iron alloy
Chemical Formula : Not applicable
Chemical Family : Inert material/metal
General Use : Industrial applications. Steel, cast iron and alloys.
Manufacturer : Molibdenos y Metales S.A., Huérfanos 812, 6th Floor, Santiago, Chile, Phone 56-2-368 3600, FAX 56-2-368 3653

Section 2 – Composition / Information on Ingredients

Ingredient Name	CAS Number	%wt
First Ingredient : Molybdenum	7439-98-7	60 - 72
Second Ingredient : Iron	7439-89-6	28 – 40

Section 3 – Hazards Identification

★★★★★ **Emergency Overview** ★★★★★

HMIS
H (1)
F (0)
R (0)
PPE ^{†(a)}
[†] Sec. 8

Potential Health Effects

Primary Entry Routes : Inhalation
Target Organs : Eyes, nose, throat and skin
Potential Acute Health Effects : As shipped, this product does not present any special health hazards. Conditions and work practices which generate dusts or fumes should be avoided or controlled. Dusts and fumes may cause health effects.
Potential Chronical Health Effects

Carcinogenic effects	: not applicable.
Mutagenic effects	: not applicable.
Teratogenic effects	: not applicable. Toxicity of the product to the reproductive system: not applicable. There is no known effect from chronic exposure to this product.

Physiological Effects and Health Information

Inhalation	: Contact with dusts may develop irritation of the nose and throat.
Eye	: Contact with dusts may be irritating, causing tearing and redness
Skin	: Contact with dusts may irritate the skin.
Ingestion	: Accidental ingestion may develop irritation of the digestive tract.

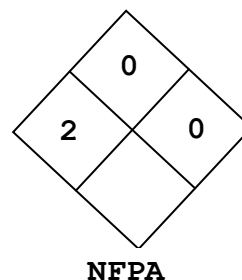
Section 4 – First Aid Measures

Inhalation	: Remove patient from exposure and bring to fresh air. If breathing is difficult, give oxygen. In this case get immediate medical attention.
Eye Contact	: Check for and remove any contact lenses. Immediate flush eyes with plenty of water, holding eyelids open for at least 20 minutes. If irritation or redness develop, seek medical attention
Skin Contact	: Wash skin with water and soap.
Ingestion	: Rare in industry. Induce vomiting. To an unconscious person, do not induce vomiting or give any liquid. Consult a physician.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Section 5 – Fire – Fighting Measures

Flash Point	: Not applicable.
Flash Point Method	: Not applicable.
Burning Rate	: Not applicable.
Autoignition Temperature	: Not applicable.
LEL	: Not applicable.
UEL	: Not applicable.
Flammability Classification	: Non – flammable.
Extinguishing Media	: In its actual form, this product is non-flammable.



Unusual Fire or Explosion Hazards	: Dust explosion is possible if dust concentration rises to critical values and if a source of ignition is present.
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- Hazardous Combustion Products** : When heated to decomposition, ferromolybdenum may release toxic fumes of molybdenum and iron oxides.
- Fire-Fighting Instructions** : Do not release runoff from fire control methods to sewers or waterways.
- Fire-Fighting Equipment** : Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode.

Section 6 – Accidental Release Measures

- Spill/Leak Procedures** : Clean spills first by shovel then sweep up or vacuum, avoid dusty conditions and place in appropriate containers for recycling to process.
- Containment** : For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways.
- Cleanup** : Clean up using procedures which will minimize dust generation such as vacuuming or wet sweeping. Place materials in suitable containers for reclamation or disposal.
- Regulatory Requirements** : Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 – Handling and Storage

- Handling Precautions** : Do not ingest and/or breathe dust. Wear suitable protective clothing. If ingested, seek medical attention immediately and show the label or the MSDS.
- Storage Requirements** : Keep in a dry, well-ventilated place. Storage away from incompatible substances.

Section 8 – Exposure Controls / Personal Protection

- Engineering Controls** : Use process enclosures, local exhaust ventilation or other engineering controls to keep airborne levels below recommended exposure limits.
- Ventilation** : Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.
- Exposure Limits** : **Molybdenum**
- TLV-TWA 5 mg/m³ from OSHA (soluble compounds).
- TLV-TWA 10 mg/m³ from OSHA (insoluble molybdenum compounds)

Iron

TL-TWA 5 mg/m³ from ACGIH (iron oxide fumes).

Consult local authorities for acceptable exposure limits.

Respiratory Protection

: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or non routine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Protective Clothing/Equipment

: Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protective devices. Appropriate eye protection must be worn instead of, or in conjunction with contact lenses.

Safety Stations

: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Contaminated Equipment

: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments

: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 – Physical and Chemical Properties

<p>Physical State : Solid (metal solid)</p> <p>Appearance and Odor: Silver gray or gray. Odorless</p> <p>Odor Threshold : Not applicable</p> <p>Vapor Pressure : Not available.</p> <p>Vapor Density (Air=1) : Not available</p> <p>Formula Weight : Not applicable</p> <p>Specific Gravity (H₂O=1, at 4 °C): 9.46 (weighted average)</p> <p>pH (1% solution/water): Not applicable.</p>	<p>Water Solubility : Insoluble in cold water.</p> <p>Boiling Point : Not available.</p> <p>Freezing/Melting Point : 2622 °C (4751.6 °F) based on data from molybdenum.</p> <p>Viscosity : Not applicable.</p> <p>Refractive Index : Not available.</p> <p>Surface Tension : Not applicable.</p> <p>% Volatile : Not available.</p> <p>Evaporation Rate : Not applicable.</p>
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Section 10 – Stability and Reactivity

Stability	: Ferromolybdenum is stable at room temperature in closed containers under normal storage and handling conditions.
Polymerization	: Hazardous polymerization cannot occur.
Chemical Incompatibilities	: In its actual form this product presents a low reactivity risk.
Corrosivity	: None.
Hazardous Decomposition Products	: Thermal oxidative decomposition of ferromolybdenum can produce toxic fumes of molybdenum and iron oxides.
Special remarks on reactivity	:
Molybdenum	: Avoid contact with strong oxidizers (such as chlorine, bromine, and fluorine) since violent reaction may occur.

Section 11 – Toxicological Information

Iron	: can react violently or explode with chloric acid, chlorine trifluoride, chloroformamidinium nitrate, air+oil (with iron dust), sodium acetylide
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Toxicity Data:

<p>Routes of Entry: Ingestion and inhalation.</p> <p>Eye Effects : This product may be irritating on humans, causing tearing and redness.</p>	<p>Acute Inhalation Effects : Contact with dusts may cause irritation of the nose and throat. Human systemic effects by inhalation are pulmonary fibrosis and cough. Human, inhalation,</p>
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<p>Skin Effects : This product may irritate the skin on humans.</p> <p>Special Remarks on Other Toxic Effects on Humans:</p>	<p style="text-align: right;">TC_{Lo}: Not available.</p> <p>Acute Oral Effects : Rat, oral, LD₅₀: > 5000 mg/kg for the rat (molybdenum).</p> <p>Chronic Effects : None. However chronic respiratory disease and gout may be aggravated by exposure to this material.</p> <p>Carcinogenicity : Ferromolybdenum is not listed as a carcinogenic by IARC. Industrial toxicology reports indicate that in general, molybdenum compounds exhibit a low order of toxicity.</p> <p>Mutagenicity : Not applicable.</p> <p>Teratogenicity : Not applicable.</p> <p>Molybdenum : is not listed as a carcinogen by IARC. Industrial toxicology reports indicate that in general molybdenum compounds exhibit a low order of toxicity. The trioxide and ammonium molybdate are generally more toxic than the ore (molybdenite), the metal, or the dioxide. Abnormal liver function tests have occurred in molybdenum workers. Biochemical changes may predispose workers to gout. Anemia and hypotiroidism may also occur. Molybdenum trioxide is an irritant to the eyes and mucous membranes. Repeated exposure to molybdenum may cause headaches, backaches and joints pains.</p> <p>Iron : may cause a benign pneumoconiosis: siderosis. NIOSH (90-117) reports the following target organ for acute and chronic overexposure: respiratory system.</p> <p>Eating, drinking and smoking must be prohibited in areas where this material is handled, stored, and processed. Workers must wash hands and face before eating, drinking and smoking.</p>
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Section 12 – Ecological Information

Ecotoxicity	: Molybdenum is not generally considered to be a serious pollutant. It is an essential micronutrient for both plants and animals. Molybdenum poses little risk to the general population.
Environmental Fate	: Not applicable.

Environmental Degradation	: Not applicable.
Soil Absorption/Mobility	: Not available.
Special Remarks on Environment	: Molybdenum is generally considered to have low toxicity to aquatic species and a low potential to bioaccumulate.

Section 13 - Disposal Considerations

Disposal	: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable federal, state, and local regulations.
Disposal Regulatory Requirements	: Recycle to process, if possible. Consult the local or regional authorities.
Container Cleaning and Disposal	: Dispose in plastic container, or plastic lined drums, in authorized lands or according to local state and federal regulations.

Section 14 - Transport Information

<p>Shipping Name: Ferromolybdenum.</p> <p>Shipping Symbols: Not applicable.</p> <p>Hazard Class: Not a DOT controlled material (U.S.A).</p> <p>ID No.: Not applicable (PIN and PG).</p> <p>Packing Group: Not applicable.</p> <p>Label: None special.</p> <p>Special Provisions (172.102): not applicable.</p>	<p>Packaging Authorizations</p> <p>a) Exceptions: Not applicable.</p> <p>b) Non-bulk Packaging: Not applicable.</p> <p>c) Bulk Packaging: Not applicable.</p>	<p>Quantity Limitations</p> <p>a) Passenger, Aircraft, or Railcar: Not applicable.</p> <p>b) Cargo Aircraft Only: Not applicable.</p> <p>Vessel Stowage Requirements</p> <p>a) Vessel Stowage: Not applicable.</p> <p>b) Other: None.</p>
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Section 15 – Regulatory Information

EPA Regulations :

RCRA Hazardous Waste Number: Not listed (40 CFR 261.33)

Hazardous Material information (U.S.A.): See section 3.

National Fire Protection Association (U.S.A.): See Section 5.

SARA Toxic Chemical (40 CFR 372.65): Not listed

SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed, Threshold Planning Quantity (TPQ)

OSHA Regulations:

Permissible Exposure Limit (PEL) for molybdenum and insoluble molybdenum compounds is 15 milligrams of molybdenum and insoluble molybdenum compounds per cubic meter of air (mg/m³).

ACGIH Regulations:

The ACGIH has recommended for molybdenum and insoluble molybdenum compounds a Threshold Limit Value of 10 mg/m³

Section 16 – Other Information

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References

- International Molybdenum Association, Ecotoxicology of Molybdenum Compounds, June 14th, 1994.
- Barltrop, D., The Acute Toxicity of Certain Compounds of Molybdenum, London, April, 1991.
- OSHA, Occupational Health Guideline for Molybdenum and Insoluble Molybdenum, September, 1978.
- Climax Molybdenum Company, Molybdenum Chemicals, Bulletin Cdb-1, August 1969.
- Lener, J. and Bibr, B., Effect of Molybdenum on the Organism (A Review). Journal of Hygiene, Epidemiology, Microbiology, and Immunology, Vol. 28, N°4, pages 405 – 419.
- Genium Publishing Corporation, MSDS Pocket Dictionary, 1994.
- Sax's Dangerous Properties of Industrial Materials, Richard J. Lewis, Eight Edition, 1992, Van Nostrand Reinhold, New York, Vol. I.
- EPA, CFR40, Protection of Environment, Parts 260 – 299, Revised as a July 1, 1995.

Additional Hazard Rating Systems : No additional remarks.

Disclaimer : Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for information, consideration and investigation. Molibdenos y Metales S.A. extends no warranty and assumes no responsibility for the accuracy of the content and expressly disclaim all liability for reliance thereon. This material safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations, therefore, the specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.