

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

SDS ID: 00230872

## \*\*\* Section 1 - PRODUCT AND COMPANY IDENTIFICATION \*\*\*

**Material Name:** MOLYBDENUM CONCENTRATE

### Manufacturer Information

CMC Cometals  
CONTACT:  
2050 Center Avenue, Suite 250  
Ft. Lee, NJ 07024  
Mfg Contact: CMC Cometals

EMERGENCY

### Synonyms

## \*\*\* Section 2 - HAZARDS IDENTIFICATION \*\*\*

### EMERGENCY OVERVIEW

**Color:** dark, green

**Physical Form:** dust

**Odor:** odorless

**Health Hazards:** harmful if swallowed, respiratory tract irritation, eye irritation, nerve damage, kidney damage, birth defects, suspect cancer hazard (in animals)

**Physical Hazards:** Dust/air mixtures may ignite or explode.

### POTENTIAL HEALTH EFFECTS

#### Inhalation

**Short Term:** irritation, metal fume fever, nausea, vomiting, diarrhea, constipation, stomach pain, chest pain, difficulty breathing, fatigue, sleep disturbances, emotional disturbances, muscle cramps, visual disturbances, lung damage, kidney damage, liver damage, paralysis, brain damage, convulsions

**Long Term:** irritation, nausea, vomiting, diarrhea, constipation, stomach pain, chest pain, fatigue, sleep disturbances, emotional disturbances, muscle cramps, visual disturbances, black lines on the gums, metallic taste, changes in blood pressure, metal fume fever, loss of appetite, weight loss, difficulty breathing, headache, disorientation, joint pain, eye damage, hormonal disorders, impotence, sterility, lung damage, blood disorders, kidney damage, liver damage, nerve damage, paralysis, reproductive effects, brain damage, birth defects, convulsions, coma

#### Skin

**Short Term:** irritation

**Long Term:** irritation

#### Eye

**Short Term:** irritation, tearing, blurred vision

**Long Term:** irritation

#### Ingestion

**Short Term:** irritation, metallic taste, nausea, vomiting, digestive disorders, disorientation, tingling sensation, diarrhea, weight loss, difficulty breathing, headache, bluish skin color, lung congestion, paralysis, effects on the brain, kidney damage, liver damage, convulsions, coma

**Long Term:** black lines on the gums, headache, visual disturbances, impotence, digestive disorders, sterility, kidney damage, nerve damage, liver damage, reproductive effects, coma

## \*\*\* Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS \*\*\*

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CAS	Component	Percent	Symbol(s)	Risk Phrase(s)
7439-98-7	MOLYBDENUM 231-107-2	80 - 90	---	---
1317-37-9	FERROUS SULFIDE 215-268-6	3 - 12	---	---
1308-56-1	CHALCOPYRITE 603-441-2	3 - 8	---	---
7440-50-8	COPPER 231-159-6	1 - 3	Xn Xi	R:22-36-37
7429-90-5	ALUMINUM, METALLIC, POWDER 231-072-3	1 - 1.75	F	R:11-15
1314-87-0	LEAD SULFIDE 215-246-6	0.1 - 1.1	Xn N T	R:20/22-33-50-53-61-62
7439-92-1	LEAD 231-100-4	0.1 - 1	Xn N T	R:20/22-33-50-53-61-62
7440-66-6	ZINC 231-175-3	0.1 - 0.5	---	---
7440-69-9	BISMUTH 231-177-4	0.01 - 0.3	---	---
7440-38-2	ARSENIC 231-148-6	0.01000 - 0.03000	T N	R:23/25-50-53
7440-22-4	SILVER 231-131-3	0.00100 - 0.01000	T	R:25
7631-86-9	SILICON DIOXIDE 231-545-4	<0.00100	---	---
14808-60-7	QUARTZ 238-878-4	<0.00100	T	R:49
7440-41-7	BERYLLIUM 231-150-7	<0.0003	T T+ Xi	R:25-48/23-26-36/37/38-43-49

## Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Molybdenum compounds, n.o.s., Copper, inorganic compounds, Copper compounds, n.o.s., Aluminium compounds, Aluminum, welding fumes, Lead compounds, Lead, inorganic compounds, Zinc compounds, Bismuth compounds (inorganic), Arsenic compounds, n.o.s., Arsenic, inorganic compounds, Silver compounds (inorganic), Silver compounds, Beryllium compounds, n.o.s..

## \* \* \* Section 4 - FIRST AID MEASURES \* \* \*

### Inhalation

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

### Skin

Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

### Eyes

Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

### Ingestion

If a large amount is swallowed, get medical attention.

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## \*\*\* Section 5 - FIRE FIGHTING MEASURES \*\*\*

See Section 9 for Flammability Properties

**NFPA Ratings: Health: 2 Fire: 0 Reactivity: 0**

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

### Flammable Properties

Negligible fire hazard. Dust/air mixtures may ignite or explode.

### Extinguishing Media

Use extinguishing agents appropriate for surrounding fire.

### Fire Fighting Measures

Move container from fire area if it can be done without risk. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

### Thermal Decomposition Products

**Combustion:** oxides of sulfur, oxides of metal

## \*\*\* Section 6 - ACCIDENTAL RELEASE MEASURES \*\*\*

### Water Release

Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

### Occupational spill/release

Large spills: Collect spilled material in appropriate container for disposal. Avoid generating dust. Clean up residue with a high-efficiency particulate filter vacuum. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

## \*\*\* Section 7 - HANDLING AND STORAGE \*\*\*

### Handling Procedures

Use methods to minimize dust.

### Storage Procedures

Store and handle in accordance with all current regulations and standards. Store in a well-ventilated area. See original container for storage recommendations. Keep separated from incompatible substances.

## \*\*\* Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION \*\*\*

### Exposure Guidelines

If an employee is exposed to lead for more than 8 hours in any work day, the permissible exposure limit, as a time weighted average (TWA) for that day, shall be reduced according to the following formula: Maximum permissible limit (in ug/m<sup>3</sup>) = 400 divided by hours worked in the day. If an employee is exposed to lead for more than 8 hours in any work day, the permissible exposure limit, as a time weighted average (TWA) for that day, shall be reduced according to the following formula: Maximum permissible limit (in ug/m<sup>3</sup>) = 400 divided by hours worked in the day.

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## Component Exposure Limits

### MOLYBDENUM (7439-98-7)

**ACGIH:** 10 mg/m<sup>3</sup> TWA (inhalable fraction); 3 mg/m<sup>3</sup> TWA (respirable fraction)

**NIOSH:** 5000 mg/m<sup>3</sup> IDLH

### COPPER (7440-50-8)

**ACGIH:** 0.2 mg/m<sup>3</sup> TWA (fume)

**NIOSH:** 1 mg/m<sup>3</sup> TWA (dust and mist); 0.1 mg/m<sup>3</sup> TWA (fume)

100 mg/m<sup>3</sup> IDLH (dust, fume and mist)

**OSHA (US):** 0.1 mg/m<sup>3</sup> TWA (fume); 1 mg/m<sup>3</sup> TWA (dust and mist)

**Mexico:** 0.2 mg/m<sup>3</sup> TWA (as Cu, fume); 1 mg/m<sup>3</sup> TWA (as Cu, dust and mist)  
2 mg/m<sup>3</sup> STEL (as Cu, fume); 2 mg/m<sup>3</sup> STEL (as Cu, dust and mist)

### ALUMINUM, METALLIC, POWDER (7429-90-5)

**ACGIH:** 1 mg/m<sup>3</sup> TWA (respirable fraction)

**NIOSH:** 10 mg/m<sup>3</sup> TWA (total dust); 5 mg/m<sup>3</sup> TWA (respirable dust)

**OSHA (US):** 15 mg/m<sup>3</sup> TWA (total dust); 5 mg/m<sup>3</sup> TWA (respirable fraction)

**Mexico:** 10 mg/m<sup>3</sup> TWA (dust)

### LEAD SULFIDE (1314-87-0)

**ACGIH:** 0.05 mg/m<sup>3</sup> TWA (as Pb)

**NIOSH:** 0.050 mg/m<sup>3</sup> TWA (as Pb)

100 mg/m<sup>3</sup> IDLH (as Pb)

**Europe:** 0.15 mg/m<sup>3</sup> TWA

**OSHA (US):** 30 µg/m<sup>3</sup> Action Level (Poison, See 29 CFR 1910.1025, as Pb); 50 µg/m<sup>3</sup> TWA (as Pb)  
50 µg/m<sup>3</sup> TWA (as Pb)

**Mexico:** 0.15 mg/m<sup>3</sup> TWA (as Pb, dust and fume)

### LEAD (7439-92-1)

**ACGIH:** 0.05 mg/m<sup>3</sup> TWA

**NIOSH:** 0.050 mg/m<sup>3</sup> TWA

100 mg/m<sup>3</sup> IDLH

**Europe:** 0.15 mg/m<sup>3</sup> TWA

**OSHA (US):** 30 µg/m<sup>3</sup> Action Level (Poison, See 29 CFR 1910.1025); 50 µg/m<sup>3</sup> TWA  
50 µg/m<sup>3</sup> TWA

**Mexico:** 0.15 mg/m<sup>3</sup> TWA (as Pb, dust and fume)

### ARSENIC (7440-38-2)

**ACGIH:** 0.01 mg/m<sup>3</sup> TWA

**NIOSH:** 0.002 mg/m<sup>3</sup> Ceiling (15 min)

5 mg/m<sup>3</sup> IDLH

**OSHA (US):** 10 µg/m<sup>3</sup> TWA (Cancer hazard, See 29 CFR 1910.1018, except Arsine, as As); 5 µg/m<sup>3</sup> Action  
Level (as As)

10 µg/m<sup>3</sup> TWA (as As)

**Mexico:** 0.01 mg/m<sup>3</sup> TWA

### SILVER (7440-22-4)

**ACGIH:** 0.1 mg/m<sup>3</sup> TWA (dust and fume)

**NIOSH:** 0.01 mg/m<sup>3</sup> TWA (dust)

10 mg/m<sup>3</sup> IDLH (dust)

**Europe:** 0.1 mg/m<sup>3</sup> TWA

**OSHA (US):** 0.01 mg/m<sup>3</sup> TWA

**Mexico:** 0.1 mg/m<sup>3</sup> TWA

### QUARTZ (14808-60-7)

**ACGIH:** 0.025 mg/m<sup>3</sup> TWA (respirable fraction)

**NIOSH:** 0.05 mg/m<sup>3</sup> TWA (respirable dust)

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50 mg/m3 IDLH (respirable dust)

**OSHA (US):** 30)/(%SiO<sub>2</sub> + 2) mg/m3 TWA, total dust); ((250)/(%SiO<sub>2</sub> + 5) mppcf TWA, respirable fraction); ((10)/(%SiO<sub>2</sub> + 2) mg/m3 TWA, respirable fraction

**Mexico:** 0.1 mg/m3 TWA (respirable fraction)

## SILICON DIOXIDE (7631-86-9)

**NIOSH:** 6 mg/m3 TWA  
3000 mg/m3 IDLH

**OSHA (US):** 20 mppcf TWA; ((80)/(% SiO<sub>2</sub>) mg/m3 TWA)

## BERYLLIUM (7440-41-7)

**ACGIH:** 0.00005 mg/m3 TWA (inhalable fraction)  
Skin - potential significant contribution to overall exposure by the cutaneous route

**NIOSH:** 0.0005 mg/m3 Ceiling  
4 mg/m3 IDLH

**OSHA (US):** 2 µg/m3 TWA  
5 µg/m3 Ceiling

**Mexico:** 0.002 mg/m3 TWA

## Component Analysis

### LEAD (7439-92-1)

Lead in blood: 70 µg/100mL (binding biological limit value); 0.075 mg/m3 TWA (medical surveillance threshold in air measured as a time weighted average over 40 hours per week); Lead in blood: 40 µg/100mL (medical surveillance threshold measured in individual workers)

## Ventilation

Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

## PERSONAL PROTECTIVE EQUIPMENT

### Eyes/Face

Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

### Protective Clothing

Wear appropriate chemical resistant clothing.

### Glove Recommendations

Wear appropriate chemical resistant gloves.

## Respiratory Protection

Under conditions of frequent use or heavy exposure, respiratory protection may be needed.

Respiratory protection is ranked in order from minimum to maximum.

Consider warning properties before use.

Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100 or P100.

Any air-purifying full-facepiece respirator equipped with an N95, R95, or P95 filter. The following filters may also be used: N99, R99, P99, N100, R100 or P100.

Any powered, air-purifying respirator with a high-efficiency particulate filter.

Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.

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Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

## \*\*\* Section 9 - PHYSICAL AND CHEMICAL PROPERTIES \*\*\*

<b>Physical State:</b>	Solid	<b>Appearance:</b>	Not available
<b>Color:</b>	dark, green	<b>Physical Form:</b>	dust
<b>Odor:</b>	odorless	<b>Odor Threshold:</b>	Not available
<b>Melting Point:</b>	795 °C	<b>Boiling Point:</b>	Not applicable
<b>Vapor Pressure:</b>	Not applicable	<b>Vapor Density (air = 1):</b>	Not applicable
<b>Density:</b>	Not available	<b>Specific Gravity (water = 1):</b>	5.5 - 6.0
<b>Water Solubility:</b>	1.05 g/L	<b>Coeff. Water/Oil Dist:</b>	Not available

## \*\*\* Section 10 - STABILITY AND REACTIVITY \*\*\*

### Chemical Stability

Stable at normal temperatures and pressure.

### Conditions to Avoid

Avoid generating dust.

### Materials to Avoid

acids, oxidizing materials, halogens, bases, metals, metal oxides, combustible materials, metal salts, halo carbons, peroxides, reducing agents, metal carbide, alcohols

LEAD SULFIDE:

HYDROGEN PEROXIDE: May decompose violently.

IODINE MONOCHLORIDE: May react vigorously.

LEAD:

AMMONIUM NITRATE: Violent or explosive reaction.

CHLORINE TRIFLUORIDE: Violent reaction.

DISODIUM ACETYLIDE: Trituration in mortar may be violent and liberate carbon.

HYDROGEN PEROXIDE (52% OR GREATER): Violent decomposition.

HYDROGEN PEROXIDE (60% SOLUTION) + TRIOXANE: Spontaneously detonable.

METALS (ACTIVE): Incompatible.

NITRIC ACID: Lead-containing rubber may ignite.

OXIDIZERS (STRONG): Incompatible.

SODIUM AZIDE: Forms lead azide and copper azide in copper pipe.

SODIUM CARBIDE: Vigorous reaction.

SULFURIC ACID (HOT): Reacts.

ZIRCONIUM-LEAD ALLOYS: Ignition on impact.

CHALCOPYRITE:

No data available.

FERROUS SULFIDE:

ACIDS (STRONG): Evolves hydrogen sulfide.

BASES (STRONG): Incompatible.

LITHIUM: Reaction occurs around 260 C with consequent temperature rise to

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945 C.

METAL OXIDES: Incompatible.

STEEL: Incompatible.

MOLYBDENUM (POWDER):

BROMINE PENTAFLUORIDE: Violent reaction or possible ignition.

BROMINE TRIFLUORIDE: Incandesces on contact.

CHLORINE TRIFLUORIDE: Violent reaction and possible ignition.

FLUORINE (GAS): Ignites on contact.

IODINE PENTAFLUORIDE: Incandescent reaction on heating.

LEAD DIOXIDE: Incandescent reaction on heating.

NITRYL FLUORIDE: Incandescent reaction.

OXIDIZERS (STRONG): Possible ignition.

POTASSIUM PERCHLORATE: Ignites at 330 C.

SODIUM PEROXIDE: Explosive reaction.

ALUMINUM:

ACIDS: Reacts to form flammable hydrogen gas.

ALCOHOLS: Vigorous reaction, with increase in temperature and pressure.

AMMONIUM NITRATE: Explosive mixture.

AMMONIUM PEROXODISULFATE: Possible explosion.

ANTIMONY: Violent reaction when heated.

ANTIMONY TRICHLORIDE (VAPOR): Ignition.

ARSENIC: Violent reaction when heated.

BARIUM PEROXIDE: Ignition on contact.

BASES: Reacts to form flammable hydrogen gas.

BISMUTH (POWDERED): Pyrophoric mixture.

BISMUTH TRIOXIDE: Explodes on heating.

BROMINE: Vigorous reaction.

BROMINE PENTAFLUORIDE: Violent reaction and possible ignition.

CARBON DIOXIDE: Ignites when heated.

CARBON DIOXIDE + ALUMINUM HALIDES: Incandescent reaction.

CARBON DISULFIDE (VAPOR): Ignition.

CARBON TETRACHLORIDE + METHANOL: Possible hazardous reaction.

CHLORINE: Ignition.

CHLORINE TRIFLUORIDE + CHARCOAL: Possible violent reaction.

CHLOROFLUOROHYDROCARBONS: Forms shock-sensitive mixture.

CHLOROFORMAMIDIUM NITRATE: Explosive ignition.

CHROMIC ANHYDRIDE: Violent reaction or ignition.

DIBORANE: Forms spontaneously flammable hydrides.

DISULFUR DIBROMIDE: Violent reaction.

FLUORINE: Attacks.

FORMIC ACID: Incandescent reaction.

HALOCARBONS: Explodes on contact.

HYDROCHLORIC ACID: Violent reaction.

HYDROFLUORIC ACID: Violent reaction.

HYDROGEN CHLORIDE: Vigorous exothermic reaction.

INTERHALOGENS: Possible ignition or explosive reaction.

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IODINE + WATER: Violent reaction.  
IRON: Exothermic reaction with evolution of flammable hydrogen gas.  
MERCURY: Reacts violently.  
MERCURY(II) SALTS: Vigorous reaction.  
METAL BROMATES: Forms shock-sensitive mixture.  
METAL CHLORATES: Forms shock-sensitive mixture.  
METAL IODATES: Forms shock-sensitive mixture.  
METAL NITRATES: Forms explosive mixture.  
METAL OXIDES: Violent or explosive reaction if heated.  
METAL SULFATES: Violent explosive reaction.  
METHANOL: Forms a detonable mixture.  
NIOBIUM OXIDE + SULFUR: Dangerous fire hazard.  
NITRIC OXIDE (VAPOR): Ignition.  
NITROUS OXIDE (VAPOR): Ignition.  
NITRYL FLUORIDE: Incandescens when heated.  
NON-METALS: Violent reaction.  
NON-METAL HALIDES: Ignition.  
OXIDIZERS: Fire and explosion hazard.  
OXYGEN: Spontaneous ignition and possible explosion.  
PALLADIUM: Exothermic reaction at 600 C.  
PERFORMIC ACID: Violent reaction.  
PEROXIDES: Possible ignition or explosion.  
PHOSGENE: Spontaneous ignition.  
PICRIC ACID + WATER: Possible ignition.  
PLATINUM: Rapid exothermic reaction.  
SILICON + LEAD OXIDE: Explodes on heating.  
SILICON STEEL: Violent reaction.  
SILVER CHLORIDE: Possible explosive reaction.  
SODIUM CARBIDE: Violent reaction.  
SODIUM CARBONATE: Possible explosion on heating.  
SODIUM DIURANATE: Exothermic reaction.  
SODIUM HYDROXIDE: Reacts to form explosive hydrogen gas.  
SULFUR DIOXIDE: Spontaneous ignition.  
ZINC: Possible fire hazard.  
COPPER:  
ACETYLENE: Forms explosive copper acetylide.  
ACETYLENIC COMPOUNDS: Formation of explosive acetylides.  
ACIDS: May react.  
ALUMINUM + SULFUR: Possible explosion.  
AMMONIUM NITRATE: Violent or explosive reaction.  
BARIUM BROMATE: Explosive reaction by heat, impact or friction.  
BARIUM CHLORATE: Explosive reaction by heat, impact or friction.  
BARIUM IODATE: Explosive reaction by heat, impact or friction.  
BASES: May react.  
1-BROMO-2-PROPYLENE: Formation of explosive compound.  
CALCIUM BROMATE: Explosive reaction by heat, impact or friction.

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CALCIUM CHLORATE: Explosive reaction by heat, impact or friction.  
CALCIUM IODATE: Explosive reaction by heat, impact or friction.  
CHLORATES: Explosive reaction.  
CHLORINE: Ignition reaction.  
CHLORINE + OXYGEN DIFLUORIDE: Explosive reaction at -10 C.  
CHLORINE TRIFLUORIDE: Intense reaction with possible ignition.  
DIMETHYL SULFOXIDE + TRICHLOROACETIC ACID: Possible explosion.  
ETHYLENE OXIDE: Possible explosion.  
FLUORINE: Ignition reaction.  
HYDRAZINIUM NITRATE: Ignition reaction.  
HYDRAZOIC ACID: Possible explosion.  
HYDROGEN PEROXIDE: Violent decomposition.  
HYDROGEN SULFIDE: Intense exothermic reaction with possible ignition.  
LEAD AZIDE: Forms explosive copper azide.  
MAGNESIUM BROMATE: Explosive reaction by heat, impact or friction.  
MAGNESIUM CHLORATE: Explosive reaction by heat, impact or friction.  
MAGNESIUM IODATE: Explosive reaction by heat, impact or friction.  
OXIDIZERS: May react.  
PHOSPHORUS: Incandescent reaction.  
POTASSIUM BROMATE: Explosive reaction by heat, impact or friction.  
POTASSIUM CHLORATE: Explosive reaction by heat, impact or friction.  
POTASSIUM DIOXIDE: Incandescent reaction.  
POTASSIUM IODATE: Explosive reaction by heat, impact or friction.  
SODIUM AZIDE: Forms explosive compound.  
SODIUM BROMATE: Explosive reaction by heat, impact or friction.  
SODIUM CHLORATE: Explosive reaction by heat, impact or friction.  
SODIUM IODATE: Explosive reaction by heat, impact or friction.  
SODIUM PEROXIDE: Incandescent reaction.  
SULFUR + CHLORATES: Spontaneous explosion.  
SULFURIC ACID: Intense reaction.  
ZINC BROMATE: Explosive reaction by heat, impact or friction.  
ZINC CHLORATE: Explosive reaction by heat, impact or friction.  
ZINC IODATE: Explosive reaction by heat, impact or friction.

## Thermal Decomposition Products

**Combustion:** oxides of sulfur, oxides of metal

## Possibility of Hazardous Reactions

Will not polymerize.

## \* \* \* Section 11 - TOXICOLOGICAL INFORMATION \* \* \*

### Component Analysis - LD50/LC50

The components of this material have been reviewed in various sources and the following selected endpoints are published:

**BISMUTH (7440-69-9)**

Oral LD50 Rat: 5 g/kg

**ARSENIC (7440-38-2)**

Oral LD50 Rat: 763 mg/kg

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**SILVER (7440-22-4)**

Oral LD50 Rat: >2000 mg/kg

**QUARTZ (14808-60-7)**

Oral LD50 Rat: 500 mg/kg

**SILICON DIOXIDE (7631-86-9)**

Oral LD50 Rat: >5000 mg/kg; Inhalation LC50 Rat: >2.2 mg/L/1H; Dermal LD50 Rabbit: >2000 mg/kg

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## RTECS Acute Toxicity (selected)

The components of this material have been reviewed, and RTECS publishes the following endpoints:

### COPPER (7440-50-8)

Oral: 413 mg/kg oral mouse LD50; >5000 mg/kg oral mouse LD50

### BISMUTH (7440-69-9)

Oral: 5 gm/kg oral rat LD50

## Acute Toxicity Level

### COPPER (7440-50-8)

Toxic: ingestion.

### BISMUTH (7440-69-9)

Moderately Toxic: ingestion.

### ARSENIC (7440-38-2)

Moderately Toxic: ingestion.

### SILVER (7440-22-4)

Toxic: ingestion.

## Component Carcinogenicity

### ALUMINUM, METALLIC, POWDER (7429-90-5)

ACGIH: A4 - Not Classifiable as a Human Carcinogen

### LEAD SULFIDE (1314-87-0)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

IARC: Monograph 87 [2006]; Supplement 7 [1987]; Monograph 23 [1980] (Group 2A (probably carcinogenic to humans))

NTP: Reasonably Anticipated To Be A Human Carcinogen

DFG: Category 2 (considered to be carcinogenic for man, as Pb except lead arsenate and lead chromate)

OSHA: Present

### LEAD (7439-92-1)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

IARC: Monograph 87 [2006] (Group 2A (probably carcinogenic to humans))

NTP: Reasonably Anticipated To Be A Human Carcinogen

DFG: Category 2 (considered to be carcinogenic for man)

OSHA: Present

### ARSENIC (7440-38-2)

ACGIH: A1 - Confirmed Human Carcinogen

IARC: Monograph 84 [2004]; Supplement 7 [1987]; Monograph 23 [1980] (Group 1 (carcinogenic to humans))

NTP: Known Human Carcinogen

DFG: Category 1 (causes cancer in man)

OSHA: Present

Cancer hazard - see 29 CFR 1910.1018 (except Arsine)

### QUARTZ (14808-60-7)

ACGIH: A2 - Suspected Human Carcinogen

IARC: Monograph 68 [1997] (Group 1 (carcinogenic to humans))

NTP: Known Human Carcinogen

DFG: Category 1 (causes cancer in man, alveola fraction)

OSHA: Present (respirable size)

### SILICON DIOXIDE (7631-86-9)

IARC: Monograph 68 [1997]; Supplement 7 [1987] (Group 3 (not classifiable))

### BERYLLIUM (7440-41-7)

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**ACGIH:** A1 - Confirmed Human Carcinogen  
**IARC:** Monograph 58 [1993]; Supplement 7 [1987] (Group 1 (carcinogenic to humans))  
**NTP:** Known Human Carcinogen  
**DFG:** Category 1 (causes cancer in man)  
**OSHA:** Present

## RTECS Irritation

The components of this material have been reviewed, and RTECS publishes the following endpoints:

### **ZINC (7440-66-6)**

300 ug/3 day(s) intermittent skin human mild

## Local Effects

### **COPPER (7440-50-8)**

**Irritant:** inhalation, eye.

### **ZINC (7440-66-6)**

**Irritant:** inhalation, skin, eye.

### **ARSENIC (7440-38-2)**

**Irritant:** inhalation, skin, eye.

### **BERYLLIUM (7440-41-7)**

**Irritant:** inhalation, skin, eye.

## Target Organs

### **LEAD SULFIDE (1314-87-0)**

nervous system, kidneys, teratogen.

### **LEAD (7439-92-1)**

nervous system, kidneys, teratogen.

### **ARSENIC (7440-38-2)**

immune system (sensitizer), nervous system.

### **BERYLLIUM (7440-41-7)**

immune system (sensitizer).

Renal tumors were produced in animals by lead acetate, lead subacetate, and lead phosphate given orally, subcutaneously, or intraperitoneally. Two studies in rats exposed to lead powder orally or by intramuscular injection and one study on intrarenal injection did not produce tumors. Renal tumors were produced in animals by lead acetate, lead subacetate, and lead phosphate given orally, subcutaneously, or intraperitoneally. No evaluation could be made of the carcinogenicity of other lead compounds. Aluminum itself has not been evaluated by IARC. However, aluminum production has been evaluated as IARC Group 1 (Human Sufficient Evidence). There is sufficient evidence that certain exposures occurring during aluminum production cause cancer.

## Medical Conditions Aggravated by Exposure

blood system disorders, liver and/or kidney disorders, blood system disorders, Alzheimer's disease, gastrointestinal disorders, liver disorders, kidney disorders, kidney disorders, nervous system disorders, respiratory disorders, liver disorders, respiratory disorders, respiratory disorders, respiratory disorders, skin disorders and allergies

## RTECS Tumorigenic

The components of this material have been reviewed, and RTECS publishes the following endpoints:

### **COPPER (7440-50-8)**

10.080 mg/kg oral mouse TDLo (12 week(s)); 100 mg/kg intrapleural rat TDLo

### **ZINC (7440-66-6)**

12.600 mg/kg oral mouse TDLo (46 week(s))

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

SDS ID: 00230872

## RTECS Mutagenic

The components of this material have been reviewed, and RTECS publishes the following endpoints:

### **MOLYBDENUM (7439-98-7)**

cytogenetic analysis rat inhalation 19500 ug/m<sup>3</sup>

### **LEAD (7439-92-1)**

cytogenetic analysis human unreported 50 ug/m<sup>3</sup>; DNA damage human inhalation 4.2 ng/L/6 year(s) intermittent; cytogenetic analysis monkey oral 42 mg/kg/30 week(s); cytogenetic analysis rat inhalation 23 ug/m<sup>3</sup>/16 week(s)

## RTECS Reproductive Effects

The components of this material have been reviewed, and RTECS publishes the following endpoints:

### **MOLYBDENUM (7439-98-7)**

448 mg/kg oral mouse TDLo (multigenerations); 5800 ug/kg oral rat TDLo (pre pregnancy 30 week(s), pregnant female 1-20 day(s), continuous); 6050 ug/kg oral rat TDLo (pre pregnancy 35 week(s), continuous)

### **COPPER (7440-50-8)**

250 ug/kg intrauterine rat TDLo (pre pregnancy 1 day(s), continuous); 1210 ug/kg oral rat TDLo (pre pregnancy 35 week(s), continuous); 152 mg/kg oral rat TDLo (pre pregnancy 22 week(s), continuous); 1520 ug/kg oral rat TDLo (pre pregnancy 22 week(s), continuous)

### **ALUMINUM, METALLIC, POWDER (7429-90-5)**

1260 mg/kg oral mouse TDLo (multigenerations); 67.5 mg/kg unreported rabbit TDLo (pregnant female 2-27 day(s), continuous)

### **LEAD (7439-92-1)**

814 mg/kg oral domestic animal TDLo (pre pregnancy 5 week(s), pregnant female 1-21 week(s), continuous); 662 mg/kg oral domestic animal TDLo (pregnant female 1-21 week(s), continuous); 2118 mg/kg oral mammal TDLo (post pregnancy 15 day(s), continuous); 1120 mg/kg oral mouse TDLo (multigenerations); 0.2 ppb oral mouse TDLo (multigenerations); 24 ug/kg oral mouse TDLo (multigenerations); 4099.2 mg/kg oral mouse TDLo (male 56 day(s)); 4800 mg/kg oral mouse TDLo (pregnant female 1-16 day(s), continuous); 6300 mg/kg oral mouse TDLo (pregnant female 1-21 day(s), continuous); 300 mg/kg oral mouse TDLo (pregnant female 1-2 day(s), continuous); 10 mg/m<sup>3</sup> inhalation rat TCLo (24 hour(s), pregnant female 1-21 day(s), continuous); 3 mg/m<sup>3</sup> inhalation rat TCLo (24 hour(s), pregnant female 1-21 day(s), continuous); 1100 mg/kg oral rat TDLo (pregnant female 1-22 day(s), continuous); 1545 gm/kg oral rat TDLo (pre pregnancy 8 week(s), post pregnancy 21 day(s), continuous); 790 mg/kg oral rat TDLo (multigenerations); 1140 mg/kg oral rat TDLo (pre pregnancy 14 day(s), post pregnancy 21 day(s), continuous); 520 mg/kg oral rat TDLo (pregnant female 7-22 day(s), post pregnancy 10 day(s), continuous)

## Additional Data

May cross the placenta. Smoking may result in higher blood lead levels. May be excreted in breast milk.

Elevated aluminum levels have been associated with Alzheimer's disease, neurofibrillary degeneration, and anemia.

## HEALTH EFFECTS

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

SDS ID: 00230872

## Inhalation - Acute Exposure

LEAD SULFIDE: Absorption of large amounts of lead may cause a metallic taste, thirst, a burning sensation in the mouth and throat, salivation, abdominal pain with severe colic, vomiting, diarrhea of black or bloody stools, constipation, fatigue, sleep disturbances, dullness, restlessness, irritability, memory loss, loss of concentration, delirium, oliguria often with hematuria and albuminuria, encephalopathy with visual failure, paresthesias, muscle pain and weakness, convulsions, and paralysis. Death may result from cardiorespiratory arrest or shock. Survivors of acute exposure may experience the onset of chronic intoxication. Liver effects may include enlargement and tenderness, and jaundice. The fatal dose of absorbed lead is approximately 0.5 grams. Pathological findings include gastrointestinal inflammation and renal tubular degeneration. MOLYBDENUM: Inhalation of dust may cause irritation of the respiratory tract. Concentrations of 25,000-30,000 mg/m<sup>3</sup>/1 hour did not produce any deaths in rats. Exposure to fume concentrations of 53 mg/m<sup>3</sup> from arcing molybdenum metal resulted in minimal effects in guinea pigs; 190 mg/m<sup>3</sup> resulted in some deaths, with pathological findings revealing bronchial and alveolar irritation with moderate fatty changes in the liver and kidneys. METAL FUME FEVER: Metal fume fever, an influenza-like illness, may occur due to the inhalation of freshly formed metal oxide particles sized below 1.5 microns and usually between 0.02-0.05 microns. Symptoms may be delayed 4-12 hours and begin with a sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms may include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Fever, chills, muscular pain, mild to severe headache, nausea, occasional vomiting, exaggerated mental activity, profuse sweating, excessive urination, diarrhea and prostration may also occur. Tolerance to fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours. CHALCOPYRITE: No data available. COPPER: Powdered dust may cause irritation of the upper respiratory tract and ulceration and perforation of the nasal septum. A feeling of illness similar to the common cold has been reported with symptoms of chills and stuffiness of the head. Workers exposed to copper dust in concentrations of 0.075 to 0.120 mg/m<sup>3</sup> complained of mild nasal discomfort. Exposure to copper fume may cause irritation to the mucous membranes. Freshly formed copper fumes may cause metal fume fever. Symptoms may include a sweet, metallic, or foul taste in the mouth, dry throat, coughing, fever, chills, muscle aches, weakness, lassitude, nausea, rarely vomiting, mild to severe headaches, and sometimes exaggerated mental activity. Workers exposed to concentrations of 1 to 3 mg/m<sup>3</sup> experienced an altered taste response but no nausea. IRON SALTS: Inhalation of the dusts or mists of soluble iron salts may be irritating to the respiratory tract. LEAD COMPOUNDS: Absorption of large amounts of lead may cause a metallic taste, thirst, a burning sensation in the mouth and throat, salivation, abdominal pain with severe colic, vomiting, diarrhea of black or bloody stools, constipation, fatigue, sleep disturbances, dullness, restlessness, irritability, memory loss, loss of concentration, delirium, oliguria often with hematuria and albuminuria, encephalopathy with visual failure, paresthesias, muscle pain and weakness, convulsions, and paralysis. Death may result from cardiorespiratory arrest or shock. Survivors of acute exposure may experience the onset of chronic intoxication. Liver effects may include enlargement and tenderness, and jaundice. The fatal dose of absorbed lead is approximately 0.5 grams. Pathological findings include gastrointestinal inflammation and renal tubular degeneration.

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

SDS ID: 00230872

## Inhalation - Chronic Exposure

METAL FUME FEVER: There is no form of chronic metal fume fever, however, repeated bouts with symptoms as described above are quite common. Resistance to the condition develops after a few days of exposure, but is quickly lost in 1 or 2 days. CHALCOPYRITE: No data available. COPPER: Prolonged industrial exposure may cause a green discoloration of the skin, hair and teeth. Welders exposed to copper fume experienced atrophic rhinitis, metallic taste, runny nose, and mucosal irritation of the mouth and eyes. Exposure in animals has caused destruction of red blood cells and lung cell injury. It is inconclusive as to whether prolonged exposure has any affect on the nervous system. A small number of studies suggest an affinity of copper for the sympathetic system, however, there is no proof that chronic poisoning will affect either the central or peripheral nervous system. IRON SALTS: No data available. LEAD COMPOUNDS: Prolonged or repeated exposure to low levels of lead may result in an accumulation in body tissues and exert adverse effects on the blood, nervous systems, heart, endocrine and immune systems, kidneys, and reproduction. Early stages of lead poisoning, "plumbism", may be evidenced by anorexia, weight loss, constipation, apathy or irritability, occasional vomiting, fatigue, headache, weakness, metallic taste in the mouth, gingival lead line in persons with poor dental hygiene, and anemia. Loss of recently developed motor skills is generally observed only in children. More advanced stages of poisoning may be characterized by intermittent vomiting, irritability and nervousness, myalgia of the arms, legs, joints and abdomen, paralysis of the extensor muscles of the arms and legs with wrist and/or foot drop. Severe "plumbism" may result in persistent vomiting, ataxia, periods of stupor or lethargy, encephalopathy with visual disturbances which may progress to optic neuritis and atrophy, hypertension, papilledema, cranial nerve paralysis, delirium, convulsions, and coma. Neurologic sequelae may include mental retardation, seizures, cerebral palsy, and dystonia musculorum deformans. Irreversible kidney damage has been associated with industrial exposure. Reproductive effects have been exhibited in both males and females. Paternal effects may include decreased sex drive, impotence, sterility and adverse effects on the sperm which may increase the risk of birth defects. Maternal effects may include miscarriage and stillbirths in exposed women or women whose husbands were exposed, abortion, sterility or decreased fertility, and abnormal menstrual cycles. Lead crosses the placenta and may affect the fetus causing birth defects, mental retardation, behavioral disorders, and death during the first year of childhood. Animal studies indicate that reproductive effects may be additive if both parents are exposed to lead. LEAD SULFIDE: Prolonged or repeated exposure to low levels of lead may result in an accumulation in body tissues and exert adverse effects on the blood, nervous systems, heart, endocrine and immune systems, kidneys, and reproduction. Early stages of lead poisoning, "plumbism", may be evidenced by anorexia, weight loss, constipation, apathy or irritability, occasional vomiting, fatigue, headache, weakness, metallic taste in the mouth, gingival lead line in persons with poor dental hygiene, and anemia. Loss of recently developed motor skills is generally observed only in children. More advanced stages of poisoning may be characterized by intermittent vomiting, irritability and nervousness, myalgia of the arms, legs, joints and abdomen, paralysis of the extensor muscles of the arms and legs with wrist and/or foot drop. Disturbances of menstrual cycles and spontaneous abortions may occur in women. Severe "plumbism" may result in persistent vomiting, ataxia, periods of stupor or lethargy, encephalopathy with visual disturbances which may progress to optic neuritis and atrophy, hypertension, papilledema, cranial nerve paralysis, delirium, convulsions, and coma. Neurologic sequelae may include mental retardation, seizures, cerebral palsy, and dystonia musculorum deformans. Irreversible kidney damage has been associated with industrial exposure. Reproductive effects have been exhibited in both males and females. Paternal effects may include decreased sex drive, impotence, sterility and adverse effects on the sperm which may increase the risk of birth defects. Maternal effects may include miscarriage and stillbirths in exposed women or women whose husbands were exposed, abortion, sterility or decreased fertility, and abnormal menstrual cycles. Lead crosses the placenta and may affect the fetus causing birth defects, mental retardation, behavioral disorders, and death during the first year of childhood. Animal studies indicate that reproductive effects may be additive if both parents are exposed to lead. MOLYBDENUM: No data available.

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

SDS ID: 00230872

## Inhalation - Other Toxicity Information

ALUMINUM, METALLIC, POWDER: May cause irritation with coughing and shortness of breath. Exposure to freshly formed fumes of aluminum may result in metal fume fever. See information on metal fume fever. Prolonged or repeated exposure to large concentrations of fine dust may cause emphysema, bronchial asthma and pulmonary fibrosis characterized by coughing, sputum production, weakness, anorexia, basal crackles, dyspnea, pneumothorax, and cardiac failure. Radiographic and pathological changes in the lungs may occur. The lung disease may be rapidly progressive, irreversible, and fatal. Bacterial infection may cause progression of the lung disease. A few rare cases of encephalopathy have been reported from occupational exposure; symptoms included mental deterioration and seizures. In sensitive individuals, aluminum may exacerbate asthma. Epidemiological studies of aluminum production have reported increased incidences of lung, bladder, and other cancers among exposed workers. However, the causative agents for these cancers have not been determined. FERROUS SULFIDE: See information on iron salts. LEAD: See information on lead compounds and metal fume fever.

## Skin Contact - Acute Exposure

ALUMINUM, METALLIC, POWDER: May cause irritation by abrasion. CHALCOPYRITE: No data available. COPPER: May be irritating and cause keratinization. Allergic dermatitis although rare, has been reported. Dermal absorption is negligible through intact skin. IRON SALTS: Contact with soluble iron salts may cause irritation. LEAD COMPOUNDS: Contact with lead powders or dust may be irritating. LEAD SULFIDE: Contact with lead powders or dust may be irritating. Lead is not absorbed through the skin, but may be transferred to the mouth inadvertently by cigarettes, chewing tobacco, food, or make-up. MOLYBDENUM: No data available.

## Skin Contact - Chronic Exposure

ALUMINUM, METALLIC, POWDER: May cause dermatitis with itching. Rarely, sensitization reactions have been reported. Vascular changes in the skin and congestive numbness of the fingers have been reported from occupational exposure. CHALCOPYRITE: No data available. COPPER: Repeated or prolonged contact may cause irritation and discoloration of the skin. IRON SALTS: Repeated or prolonged contact with irritants may cause dermatitis. LEAD COMPOUNDS: Prolonged or repeated exposure to the powder or dust may result in dermatitis. LEAD SULFIDE: Prolonged or repeated exposure to the powder or dust may result in dermatitis. Systemic toxicity may develop if lead is transferred to the mouth by cigarettes, chewing tobacco, food, or make-up. MOLYBDENUM: No data available.

## Skin Contact - Other Toxicity Information

LEAD: See information on lead compounds. FERROUS SULFIDE: See information on iron salts.

## Eye Contact - Acute Exposure

ALUMINUM, METALLIC, POWDER: May cause irritation due to abrasion and corneal necrosis. Intraocular aluminum deposits in human eyes have been well tolerated for several years without injurious effect, except occasionally slight depigmentation of adjacent iris. A low-grade uveal inflammation with posterior synechias, partial atrophy of the iris, and small opacities in the lenses and pigmentation of the fundus was reported in rabbits from intraocular deposits. CHALCOPYRITE: No data available. COPPER: The dust may cause irritation with redness and pain, tearing, and blurred vision. Copper particles in the eye may result in a foreign body response with characteristic discoloration of ocular tissue, degeneration and/or detachment of the retina, and atrophy of the globe. IRON SALTS: Contact with the eyes by soluble iron salts may cause irritation; a local brown discoloration may also occur. LEAD COMPOUNDS: Lead dust or powders may be irritating. Metallic lead particles may cause an inflammatory foreign body reaction. Injury is generally thought to be mechanical and not toxic. LEAD SULFIDE: Lead dust or powders may be irritating. Metallic lead particles may cause an inflammatory foreign body reaction and injury is generally thought to be mechanical and not toxic. MOLYBDENUM: Exposure to dust or fumes may cause irritation.

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

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## Eye Contact - Chronic Exposure

ALUMINUM, METALLIC, POWDER: Capillary changes in the conjunctiva were observed in workers of one aluminum plant. CHALCOPYRITE: No data available. COPPER: Repeated or prolonged exposure to irritants may cause conjunctivitis. IRON SALTS: Repeated or prolonged exposure to irritants may cause conjunctivitis. LEAD COMPOUNDS: Prolonged exposure may cause conjunctivitis. LEAD SULFIDE: Prolonged exposure may cause conjunctivitis. MOLYBDENUM: May cause conjunctivitis.

## Eye - Other Toxicity Information

LEAD: See information on lead compounds. FERROUS SULFIDE: See information on iron salts.

## Ingestion - Acute Exposure

ALUMINUM, METALLIC, POWDER: Large doses may cause gastrointestinal irritation, vomiting and diarrhea. Aluminum is poorly absorbed and may decrease absorption of other substances. Neurotoxic effects may occur in persons with impaired kidney function or chronic renal failure. CHALCOPYRITE: Doses of 50 mg of dust into the abdominal cavity did not produce death. COPPER: May cause headache, weakness, diarrhea, or weight loss. 120 ug/kg ingested by a human caused gastrointestinal disorder with nausea and vomiting. IRON SALTS: Ten minutes to several hours after excessive ingestion of soluble iron salts, severe gastritis or gastroenteritis may develop with abdominal pain, nausea, vomiting, hematemesis, watery or tarry diarrhea from corrosion of the gastric mucosa, dehydration, leukocytosis, and fever. Metallic taste, restlessness, lethargy, hypotonia, coma, pallor, cyanosis, a fast or weak pulse, hypotension, hyperventilation due to acidosis, shock, vasomotor instability, and cardiovascular collapse may occur. Severe cases may lead to death in 4 to 6 hours. After an asymptomatic period of 12 to 72 hours, symptoms of the initial stage may recur. Pneumonitis, pulmonary edema and hemorrhage, and convulsions may also be present. Liver impairment with jaundice, hypoglycemia, multiple coagulation defects, kidney damage with anuria, pancreatic damage, vascular damage, hypovolemia, hemoconcentration, profound shock, and vascular collapse may develop. At this stage, death may occur in one to three days or up to a week after ingestion, due to shock, hepatic failure, or pneumonia. Survivors may display gastric scarring or obstruction, pyloric obstruction or stenosis, mild hepatic cirrhosis, and, in at least one reported instance, neurologic sequelae. LEAD COMPOUNDS: Absorption of large amounts of lead from the intestinal tract may cause effects as detailed in acute inhalation. The fatal dose of absorbed lead is approximately 0.5 grams. LEAD SULFIDE: Absorption of large amounts of lead from the intestinal tract may cause all the same effects as detailed in acute inhalation. The fatal dose of absorbed lead is approximately 0.5 grams. MOLYBDENUM: No data available.

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

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## Ingestion - Chronic Exposure

ALUMINUM, METALLIC, POWDER: Animals with a diet of 340 ppm showed decreased growth in 2nd and 3rd generations. CHALCOPYRITE: No data available. COPPER: Copper is an essential element and is found in most human diets in minute amounts. Prolonged ingestion through the diet is not known to cause toxic effects except in people with a recessive gene disorder termed Wilson's disease which causes an abnormally high absorption, retention, and storage of copper by the body. This disease may cause a dysfunction of and structural damage to the liver, central nervous system, kidney, bones and eyes. The disease is usually progressive and may be fatal if left untreated. Reproductive effects have been reported in animals. IRON SALTS: Repeated therapeutic use of iron preparations may cause gastrointestinal tract irritation with nausea, vomiting, heartburn, anorexia, constipation, and diarrhea. Chronic excessive iron intake can lead to hemosiderosis with possible damage to the liver and pancreas. LEAD COMPOUNDS: Prolonged or repeated exposure to low levels of lead may result in an accumulation in body tissues and adverse effects on the kidneys, heart and blood and on the nervous, reproductive, endocrine and immune systems as detailed in chronic inhalation. LEAD SULFIDE: Prolonged or repeated exposure to low levels of lead may result in an accumulation in body tissues and adverse effects on the kidneys, heart and blood and on the nervous, reproductive, endocrine and immune systems as detailed in chronic inhalation. MOLYBDENUM: Ingestion of excess molybdenum in animals resulted in a condition known as "teart", characterized by severe diarrhea, loss of appetite, loss of weight, listlessness, poor performance, reduced growth rate, fading hair color, deformities of joints, and impaired reproduction. Reproductive effects have been reported in animals.

## Ingestion - Other Toxicity Information

LEAD: See information on lead compounds. FERROUS SULFIDE: See information on iron salts.

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

SDS ID: 00230872

## \*\*\* Section 12 - ECOLOGICAL INFORMATION \*\*\*

### Component Analysis - Aquatic Toxicity

#### COPPER (7440-50-8)

**Fish:** 96 Hr LC50 Pimephales promelas: 0.0068 - 0.0156 mg/L; 96 Hr LC50 Pimephales promelas: <0.3 mg/L [static]; 96 Hr LC50 Pimephales promelas: 0.2 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 0.052 mg/L [flow-through]; 96 Hr LC50 Lepomis macrochirus: 1.25 mg/L [static]; 96 Hr LC50 Cyprinus carpio: 0.3 mg/L [semi-static]; 96 Hr LC50 Cyprinus carpio: 0.8 mg/L [static]; 96 Hr LC50 Poecilia reticulata: 0.112 mg/L [flow-through]

**Algae:** 72 Hr EC50 Pseudokirchneriella subcapitata: 0.0426 - 0.0535 mg/L [static]; 96 Hr EC50 Pseudokirchneriella subcapitata: 0.031 - 0.054 mg/L [static]

**Invertebrate:** 48 Hr EC50 Daphnia magna: 0.03 mg/L [Static]

#### LEAD (7439-92-1)

**Fish:** 96 Hr LC50 Cyprinus carpio: 0.44 mg/L [semi-static]; 96 Hr LC50 Oncorhynchus mykiss: 1.17 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 1.32 mg/L [static]

**Invertebrate:** 48 Hr EC50 water flea: 600 µg/L

#### ZINC (7440-66-6)

**Fish:** 96 Hr LC50 Pimephales promelas: 2.16-3.05 mg/L [flow-through]; 96 Hr LC50 Pimephales promelas: 0.211-0.269 mg/L [semi-static]; 96 Hr LC50 Pimephales promelas: 2.66 mg/L [static]; 96 Hr LC50 Cyprinus carpio: 30 mg/L; 96 Hr LC50 Cyprinus carpio: 0.45 mg/L [semi-static]; 96 Hr LC50 Cyprinus carpio: 7.8 mg/L [static]; 96 Hr LC50 Lepomis macrochirus: 3.5 mg/L [static]; 96 Hr LC50 Oncorhynchus mykiss: 0.24 mg/L [flow-through]; 96 Hr LC50 Oncorhynchus mykiss: 0.59 mg/L [semi-static]; 96 Hr LC50 Oncorhynchus mykiss: 0.41 mg/L [static]

**Algae:** 96 Hr EC50 Pseudokirchneriella subcapitata: 0.11 - 0.271 mg/L [static]; 72 Hr EC50 Pseudokirchneriella subcapitata: 0.09 - 0.125 mg/L [static]

**Invertebrate:** 48 Hr EC50 Daphnia magna: 0.139 - 0.908 mg/L [Static]

#### SILVER (7440-22-4)

**Fish:** 96 Hr LC50 Pimephales promelas: 0.00155-0.00293 mg/L [static]; 96 Hr LC50 Oncorhynchus mykiss: 0.0062 mg/L [flow-through]; 96 Hr LC50 Lepomis macrochirus: 0.064 mg/L [static]

**Invertebrate:** 48 Hr EC50 Daphnia magna: 0.00024 mg/L [Static]

#### SILICON DIOXIDE (7631-86-9)

**Fish:** 96 Hr LC50 Brachydanio rerio: 5000 mg/L [static]

**Algae:** 72 Hr EC50 Pseudokirchneriella subcapitata: 440 mg/L

**Invertebrate:** 48 Hr EC50 Ceriodaphnia dubia: 7600 mg/L

## \*\*\* Section 13 - DISPOSAL CONSIDERATIONS \*\*\*

### Disposal Methods

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001. Hazardous Waste Number(s): D008. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 5.0 mg/L. Hazardous Waste Number(s): D004. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 5.0 mg/L. Hazardous Waste Number(s): D011. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 5.0 mg/L.

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

SDS ID: 00230872

## Component Waste Numbers

### LEAD (7439-92-1)

RCRA: 5.0 mg/L regulatory level

### ARSENIC (7440-38-2)

RCRA: 5.0 mg/L regulatory level

### SILVER (7440-22-4)

RCRA: 5.0 mg/L regulatory level

### BERYLLIUM (7440-41-7)

RCRA: waste\_number P015 (powder)

## \* \* \* Section 14 - TRANSPORT INFORMATION \* \* \*

### US DOT Information

**Shipping Name:** Environmentally hazardous substances, solid, n.o.s. (Contains: METAL SULFATE)

**UN/NA #:** UN3077 **Hazard Class:** 9 **Packing Group:** III

**Required Label(s):** 9

### Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

Component	CAS	
COPPER	7440-50-8	DOT regulated severe marine pollutant

### TDG Information

**Shipping Name:** Environmentally hazardous substance, solid, n.o.s. (Contains: METAL SULFATE)

**UN #:** UN3077 **Hazard Class:** 9 **Packing Group:** III

**Required Label(s):** 9

### ADR Information

**Shipping Name:** Environmentally hazardous substance, solid, n.o.s. (Contains: METAL SULFATE)

**UN #:** UN3077 **Hazard Class:** 9 **Packing Group:** III

**Required Label(s):** 9

# Safety Data Sheet

**Material Name: MOLYBDENUM CONCENTRATE**

**SDS ID: 00230872**

## ADR Tunnel Code Restrictions

This list contains tunnel restriction codes for those substances and/or chemically related entries which are found in chapter 3.2 of the ADR regulations.

**ALUMINUM, METALLIC, POWDER (7429-90-5)**

**ZINC (7440-66-6)**

**ARSENIC (7440-38-2)**

**BERYLLIUM (7440-41-7)**

## RID Information

**Shipping Name:** Environmentally hazardous substance, solid, n.o.s. (Contains: METAL SULFATE)

**UN #:** UN3077 **Hazard Class:** 9 **Packing Group:** III

**Required Label(s):** 9

## IATA Information

**Shipping Name:** Environmentally hazardous substance, solid, n.o.s. (Contains: METAL SULFATE)

**UN #:** UN3077 **Hazard Class:** 9 **Packing Group:** III

**Required Label(s):** 9

## ICAO Information

**Shipping Name:** Environmentally hazardous substance, solid, n.o.s. (Contains: METAL SULFATE)

**UN #:** UN3077 **Hazard Class:** 9 **Packing Group:** III

**Required Label(s):** 9

## IMDG Information

**Shipping Name:** Environmentally hazardous substance, solid, n.o.s. (Contains: METAL SULFATE)

**UN #:** UN3077 **Hazard Class:** 9 **Packing Group:** III

## Component Marine Pollutants (IMDG)

This material contains one or more of the following chemicals required by IMDG to be identified as marine pollutants.

**COPPER (7440-50-8)**

IMDG regulated marine pollutant

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

SDS ID: 00230872

## \*\*\* Section 15 - REGULATORY INFORMATION \*\*\*

### U.S. Federal Regulations

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 311/312 (40 CFR 370.21), SARA Section 313 (40 CFR 372.65), CERCLA (40 CFR 302.4), TSCA 12(b), and/or require an OSHA process safety plan.

#### **COPPER (7440-50-8)**

**SARA 313:** 1.0 % de minimis concentration

**CERCLA:** 5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

#### **ALUMINUM, METALLIC, POWDER (7429-90-5)**

**SARA 313:** 1.0 % de minimis concentration (dust or fume only)

#### **LEAD SULFIDE (1314-87-0)**

**SARA 313:** 0.1 % Supplier notification limit (Chemical Category N420)

**CERCLA:** 10 lb final RQ; 4.54 kg final RQ

#### **LEAD (7439-92-1)**

**SARA 313:** 0.1 % Supplier notification limit; 0.1 % de minimis concentration (when contained in stainless steel, brass, or bronze)

**CERCLA:** 10 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 4.54 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

#### **ZINC (7440-66-6)**

**SARA 313:** 1.0 % de minimis concentration (dust or fume only)

**CERCLA:** 454 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 1000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

#### **ARSENIC (7440-38-2)**

**SARA 313:** 0.1 % de minimis concentration

**CERCLA:** 1 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 0.454 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

#### **SILVER (7440-22-4)**

**SARA 313:** 1.0 % de minimis concentration

**CERCLA:** 1000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 454 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

#### **BERYLLIUM (7440-41-7)**

**SARA 313:** 0.1 % de minimis concentration

**CERCLA:** 10 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers); 4.54 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers)

### **SARA Section 311/312 (40 CFR 370 Subparts B and C)**

**Acute Health:** Yes **Chronic Health:** Yes **Fire:** No **Pressure:** No **Reactive:** No

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

SDS ID: 00230872

## U.S. State Regulations

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
MOLYBDENUM	7439-98-7	Yes	Yes	Yes	Yes	Yes	Yes
COPPER	7440-50-8	Yes	Yes	Yes	Yes	Yes	Yes
ALUMINUM, METALLIC, POWDER	7429-90-5	Yes	Yes	Yes	Yes	Yes	Yes
LEAD SULFIDE	1314-87-0	Yes	Yes	No	Yes	Yes	No
LEAD	7439-92-1	Yes	Yes	Yes	Yes	Yes	Yes
ZINC	7440-66-6	Yes	Yes	No	Yes	Yes	Yes
ARSENIC	7440-38-2	Yes	Yes	Yes	Yes	Yes	Yes
SILVER	7440-22-4	Yes	Yes	Yes	Yes	Yes	Yes
QUARTZ	14808-60-7	No	Yes	Yes	Yes	Yes	Yes
SILICON DIOXIDE	7631-86-9	Yes	Yes	Yes	No	Yes	No
BERYLLIUM	7440-41-7	Yes	Yes	Yes	Yes	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

WARNING! This product contains a chemical known to the state of California to cause reproductive/developmental effects.

## Component Analysis

### LEAD SULFIDE (1314-87-0)

**Carc:** carcinogen, initial date 10/1/92

**Repro/Dev. Tox:** developmental toxicity, initial date 2/27/87

### LEAD (7439-92-1)

**Carc:** carcinogen, initial date 10/1/92

**Repro/Dev. Tox:** developmental toxicity, initial date 2/27/87  
male reproductive toxicity, initial date 2/27/87  
female reproductive toxicity initial\_date 2/27/87

### ARSENIC (7440-38-2)

**Carc:** carcinogen, initial date 2/27/87

### QUARTZ (14808-60-7)

**Carc:** carcinogen, initial date 10/1/88 (airborne particles of respirable size)

### BERYLLIUM (7440-41-7)

**Carc:** carcinogen, initial date 10/1/87

## Canada

### Canada WHMIS

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

#### MOLYBDENUM (7439-98-7)

1 %

#### COPPER (7440-50-8)

1 %

#### ALUMINUM, METALLIC, POWDER (7429-90-5)

1 %

#### LEAD (7439-92-1)

0.1 %

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

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## Germany Water Classification

### **MOLYBDENUM (7439-98-7)**

Number 1443, not considered hazardous to water

### **COPPER (7440-50-8)**

Number 1443, not considered hazardous to water

### **ALUMINUM, METALLIC, POWDER (7429-90-5)**

Number 1443, not considered hazardous to water

### **LEAD (7439-92-1)**

Number 1443, not considered hazardous to water

### **ZINC (7440-66-6)**

Number 1349, not considered hazardous to water (particle size >1mm)

### **ZINC (7440-66-6)**

Number 7325, hazard class 2 - hazard to waters (particle size <=1 mm)

### **BISMUTH (7440-69-9)**

Number 1443, not considered hazardous to water

### **SILVER (7440-22-4)**

Number 1443, not considered hazardous to water

### **SILVER (7440-22-4)**

Number 1031, hazard class 3 - severe hazard to waters

### **QUARTZ (14808-60-7)**

Number 849, not considered hazardous to water

### **QUARTZ (14808-60-7)**

Number 849, not considered hazardous to water

### **SILICON DIOXIDE (7631-86-9)**

Number 849, not considered hazardous to water

### **SILICON DIOXIDE (7631-86-9)**

Number 849, not considered hazardous to water

## EU Marking and Labelling

### Risk Phrases

**R33** Danger of cumulative effects.

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

SDS ID: 00230872

## Component Analysis - Inventory

Component	CAS	US	CA	EU	AU	PH	JP	KR	CN	NZ
MOLYBDENUM	7439-98-7	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes
FERROUS SULFIDE	1317-37-9	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes
CHALCOPYRITE	1308-56-1	No	No	No	No	No	No	No	No	No
COPPER	7440-50-8	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes
ALUMINUM, METALLIC, POWDER	7429-90-5	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes
LEAD SULFIDE	1314-87-0	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes
LEAD	7439-92-1	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes
ZINC	7440-66-6	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes
BISMUTH	7440-69-9	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes
ARSENIC	7440-38-2	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes
SILVER	7440-22-4	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes
QUARTZ	14808-60-7	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes
SILICON DIOXIDE	7631-86-9	Yes	DSL	EIN	Yes	Yes	Yes	Yes	Yes	Yes
BERYLLIUM	7440-41-7	Yes	DSL	EIN	Yes	Yes	No	Yes	Yes	Yes

## \*\*\* Section 16 - OTHER INFORMATION \*\*\*

### Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists; ADR - European Road Transport; AU - Australia; BOD - Biochemical Oxygen Demand; C - Celsius; CA - Canada; CAS - Chemical Abstracts Service; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CN - China; CPR - Controlled Products Regulations; DFG - Deutsche Forschungsgemeinschaft; DOT - Department of Transportation; DSL - Domestic Substances List; EEC - European Economic Community; EINECS - European Inventory of Existing Commercial Chemical Substances; EPA - Environmental Protection Agency; EU - European Union; F - Fahrenheit; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; ICAO - International Civil Aviation Organization; IDL - Ingredient Disclosure List; IDLH - Immediately Dangerous to Life and Health; IMDG - International Maritime Dangerous Goods; JP - Japan; Kow - Octanol/water partition coefficient; KR - Korea; LEL - Lower Explosive Limit; LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database; MAK - Maximum Concentration Value in the Workplace; MEL - Maximum Exposure Limits; NFPA - National Fire Protection Agency; NIOSH - National Institute for Occupational Safety and Health; NJTSR - New Jersey Trade Secret Registry; NTP - National Toxicology Program; NZ - New Zealand; OSHA - Occupational Safety and Health Administration; PH - Philippines; RCRA - Resource Conservation and Recovery Act; RID - European Rail Transport; RTECS - Registry of Toxic Effects of Chemical Substances®; SARA - Superfund Amendments and Reauthorization Act; STEL - Short-term Exposure Limit; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act; TWA - Time Weighted Average; UEL - Upper Explosive Limit; US - United States

### Full text of R phrases in Section 3

- R11 Highly flammable.
- R15 Contact with water liberates extremely flammable gases.
- R20/22 Harmful by inhalation and if swallowed.
- R22 Harmful if swallowed.
- R23/25 Toxic by inhalation and if swallowed.
- R25 Toxic if swallowed.
- R26 Very toxic by inhalation.

# Safety Data Sheet

Material Name: MOLYBDENUM CONCENTRATE

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- R33 Danger of cumulative effects.
- R36/37/38 Irritating to eyes, respiratory system and skin.
- R36 Irritating to eyes.
- R37 Irritating to respiratory system.
- R43 May cause sensitization by skin contact.
- R48/23 Toxic: danger of serious damage to health by prolonged exposure through inhalation.
- R49 May cause cancer by inhalation.
- R50 Very toxic to aquatic organisms.
- R53 May cause long-term adverse effects in the aquatic environment.
- R61 May cause harm to the unborn child.
- R62 Possible risk of impaired fertility.

## Other Information

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