

MATERIAL SAFETY DATA SHEET
MSDS

Copper Concentrate

Product Information

Vale Inco Copper Concentrate is an intermediate product; used in recovery of metal contents.

Vale Inco Limited
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 Suite 1600, South Tower, PO Box 70
 Toronto, Ontario, Canada, M5J 2K2

Chemtrec 24 hr Emergency No. 1-800-424-9300

WHMIS Classification: D2B

Product Composition and Toxicological Data

Components & Formulas	% Dry Wt.	CAS No.	Exposure Limit (mg/m ³)
Chalcopyrite	75-100	1308-56-1	1.0 (as Cu)
Pentlandite	7-13	53809-86-2	0.2 * (as Ni)
Pyrrhotite	5-10	1310-50-5	N/Av
Crystalline Silica	1-3	14808-60-7	0.1 **

* - Inhalable fraction

** - Respirable fraction

Exposure limits used throughout this MSDS are taken from the Ontario regulations for designated substances, or the control of exposure to biological or chemical agents e.g. ACGIH threshold limit values; OSHA permissible exposure limits; Manufacturer's recommended limit. Other sources will be specified as required.

Physical Data

Boiling Point	See section 13 additional information
Freezing Point	See section 13 additional information
Molecular Weight	See section 13 additional information
Density	Not Applicable
Specific Gravity (H ₂ O =1)	See section 13 additional information
Vapour Pressure (Mm Mercury)	Not Applicable
Vapour Density (Air=1)	Not Applicable
Solubility In Water	Insoluble
Percent Volatiles By Volume	Not Applicable
Evaporation Rate	Not Applicable
Appearance And Odour	Dourless, Grayish-Green, Moist Powder
Odour Threshold (Ppm)	Odourless
Corrosiveness (To Common Metals)	Non-Corrosive
pH	Not Applicable
Physical State	Paste

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Fire or Explosion Hazard

<i>Conditions of Flammability:</i>	Non-Flammable
<i>Flash Point:</i>	Not Applicable
Flammable Limits (%)	
<i>Lower:</i>	Not Applicable
<i>Upper:</i>	Not Applicable
<i>Extinguishing Media:</i>	Not Applicable
<i>Special Fire Fighting Procedures:</i>	Not Applicable
<i>Hazardous Combustion Products (Exposure Limit):</i>	Not Applicable
<i>Fire And Explosion Hazards:</i>	This material contains Sulphides which when exposed to flame may evolve Sulphur Dioxide.

Reactivity and Stability

<i>Stability:</i>	Stable. Hazardous polymerization will not occur
<i>Incompatibility – Avoid Contact With:</i>	Strong acids, strong oxidizers. Upon contact with acids, Hydrogen Sulphide an extremely toxic gas is evolved. Many Sulphides react violently and explosively with powerful oxidizers; then SO ² evolves.
<i>Volatile products given off at room temperature (exposure limit):</i>	None
<i>Conditions of reactivity:</i>	As noted under incompatibility, Hydrogen Sulphide is evolved and can form explosive mixtures with air.
<i>Hazardous decomposition products – Thermal and others (exposure limit):</i>	SO _x (2 PPM), H ₂ S (10 PPM)
<i>Conditions to avoid:</i>	Heat

First Aid Measures

<i>Skin contact:</i>	For skin irritation, flush with plenty of water. For skin rashes, seek medical attention.
<i>Eye contact:</i>	Immediately flush with water for 15 minutes hold eyelids open while flushing.

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Inhalation: For respiratory tract irritation, remove to fresh air. If symptoms persist, seek medical care.

Ingestion: Get immediate medical attention.

Toxicological Data**Pentlandite:**

Intratracheal instillation of Pentlandite (>98% pure) in hamsters did not produce a significant increase in lung tumors. The Pentlandite remained in the lung nine times longer than the positive control, Nickel Subsulphide, which also did not produce a significant increase in lung tumors.

Although no oral lethality was available, an LD50 of >40 mg has been reported for hamsters via intratracheal instillation.

Nickel sulphide:

Refer to the toxicology of nickel sulphide.

Inhalation:

The national toxicology program has listed Nickel Subsulphide as reasonably anticipated to be a carcinogen based on the production of injection-site tumors. The international agency for research on cancer (IARC) concluded there was sufficient evidence that nickel compounds are carcinogenic to humans and that crystalline nickel sulphides are carcinogenic to animals. Epidemiological studies of workers engaged in the oxidation of nickel Subsulphide (Ni₃S₂) by dusty processes indicated the presence of a significant respiratory cancer hazard.

Rats exposed by inhalation to approx. 1 mg Ni₃S₂/m³ experienced an increased incidence of malignant lung tumors. Repeated intratracheal instillation of nickel Subsulphide produced an increased incidence of malignant lung tumors in rats. Repeated intratracheal instillation of nickel Subsulphide did not produce an increased incidence of malignant lung tumors in hamsters when administered at the maximum tolerated dose. Wounds: nickel Subsulphide and crystalline nickel Monosulfide (NiS) are potent. Experimental carcinogens in rodents by parenteral routes of administration.

Ingestion:

The U.S. National institute for occupational safety and health (NIOSH) concluded there is no evidence that nickel and its inorganic compounds are carcinogenic when ingested.

Chalcopyrite:

Significant information specific to chalcopyrite was not found in the literature. Refer to the toxicology of copper.

Copper:

Copper metal dust mist and fume may be irritating to the respiratory tract. In user operations where copper fume is generated, inhalation can result in symptoms of metal fume fever such as chills, fever and sweating. A few instances of allergic skin rashes have been reported in workers exposed in metallic copper.

Copper metal as a foreign body in the eye can produce an inflammatory reaction resulting in pus formation in the conjunctiva, cornea or sclera. The lowest observed toxic oral dose of copper is 120 micrograms/kg in humans. This dose caused gastrointestinal effects.

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Wilson's disease can occur in certain individuals with a rare, inherited metabolic disorder characterized by retention of excessive amounts of copper in the liver, brain, kidneys and corneas. These deposits eventually lead to tissue necrosis and fibrosis causing a variety of clinical effects, especially liver (ie. Hepatic) disease and neurologic changes. Wilson's disease is progressive and, if untreated leads to fatal liver failure.

Silica:

The international agency for research on cancer (IARC) has concluded there is limited evidence that crystalline silica and inadequate evidence that amorphous silica causes carcinogenicity in humans. IARC has also concluded there is sufficient evidence that crystalline silica and inadequate evidence that amorphous silica causes carcinogenicity in animals. Silica is rated moderate as an acute irritating dust. Prolonged inhalation of dusts containing free silica may result in the development of a disabling pulmonary fibrosis know as silicosis, characterized by shortness of breath, decreased chest expansion, lessened capacity for work absence of fever, increased susceptibility to tuberculosis and characteristic x-ray findings.

Amorphous silica is considered much less toxic than crystalline forms. The amorphous form does not cause silicosis. In some animal studies, amorphous silica has been shown to be fibrogenic, resulting in reduced lung function. In human studies, amorphous silica (diatomaceous earth, fused, precipitated and gel) seems to have little adverse effect on lungs when exposures are reasonably controlled. There is not enough industrial experience to indicate the degree of hazard for amorphous silica.

IARC states that number of studies has shown that persons diagnosed as having silicosis after exposure to dust containing crystalline silica have an increased risk of dying from lung cancer. Silicosis (a pneumoconiosis of the lung) begins with symptoms of coughing, dyspnea, and wheezing and repeated non-specific chest illnesses. Impairment of pulmonary function may be progressive.

Pyrrhotite:

An extensive literature search revealed no toxicological or health hazard information specific to this material.

Preventative Measures Spill, Leak and Disposal Procedures

Steps to be taken if material is released or spilled:

Prevent spread of spill.
 Wet sweep or scoop up and reuse.
 Flush with water.
 Flush with water into recovery sumps for recycling and reclaiming.
 Collection of spill material when dry may also be made by vacuuming or by wetting prior to sweeping, scooping, etc.

Environmental effects:

May pollute waterways. Specific data is unavailable.

Waste disposal method:

Wastes and spills are collected and recycled to recover metal values. Disposal does not occur.

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Preventative Measures Special Protection Information

<i>Engineering controls:</i>	Use with adequate ventilation.
<i>Eye:</i>	Safety glasses
<i>Hand (glove type):</i>	Neoprene Butyl rubber Natural rubber Leather
<i>Respirator type:</i>	Under normal circumstances, respiratory protection is not required. Under other circumstances departmental standards may be consulted.
<i>Precautionary measures:</i>	Wash thoroughly after handling.
<i>Other storage conditions:</i>	Keep in a moist condition if possible to avoid drying and to minimize dust generation. Dry material may heat autogenously and eventually ignite.
<i>Other handling conditions:</i>	Wash before eating, smoking or drinking. Avoid skin, eye or clothing contact. Avoid inhalation.

Additional Information

Designated substances: Silica (crystalline) 0.1-1%

Physical data (continued)	Boiling Point		Melting Point		Molecular Wt.	Specific Gravity
	°C	°F	°C	°F		
FeS ₂	n/av	n/av	950	1742	183.51	4.2
(Ni, Fe)S ₈	n/av	n/av	n/av	n/av	771.25	4.8
Se _{N-1} S _n	n/av	n/av	n/av	n/av	646.60	4.6
SiO ₂	2230	4046	1610	2930	60.1	2.63 – 2.66

Physical state - this material is normally in slurry form or filter cake; therefore in paste state.

Preparation Information

Prepared by: Vale Inco Limited
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Note:
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