



**PRODUCT INFORMATION**

INCO Liberator Purification Cathodes CCCR (Class D)

INCO LIMITED  
Ontario Division  
Copper Cliff, Ontario  
P0M 1N0

(705) 682-6622

INCO Liberator Purification Cathodes are sold to recover copper values.

**HAZARDOUS INGREDIENTS**

Hazardous Ingredients	Calculated Composition	C.A.S. No.	Oral LD <sub>50</sub> -rat	TLV <sup>1,2</sup> -mg/m <sup>3</sup>
Copper (Cu)	86	7440-50-8	n.av.	1
Nickel Sulfate Hexahydrate (NiSO <sub>4</sub> · 6H <sub>2</sub> O)	3.6	10101-97-0	300 mg/kg	0.1* (as Ni)
Sodium Sulfate Hydrated (Na <sub>2</sub> SO <sub>4</sub> · 7H <sub>2</sub> O) <sup>3,4</sup>	2.9	n.av.	5989 mg/kg	n.av.
Arsenic (As)	2.2	7440-38-2	n.av.	0.2
Amorphous Silica (SiO <sub>2</sub> )	2.5	7631-86-9	3160 mg/kg	10 <sup>5</sup>
Calcium Sulfate, Hydrated (CaSO <sub>4</sub> · 2H <sub>2</sub> O) <sup>4</sup>	1.2	10101-41-4	n.av.	10 <sup>5</sup>
Bismuth (Bi)	0.6	7440-69-9	n.av.	n.av.

\* As inhalable fraction

**PHYSICAL DATA**

Reddish-brown, odorless brittle plates.

Ingredient	Mol. wt.	S.G.	mp °C	bp °C	Sol. in H <sub>2</sub> O g/100ml
Copper	63.54	8.9	1083	2595	0
Nickel Sulfate Hexahydrate	262.86	2.07	D	n.av.	above 60 cold above 340 hot
Sodium Sulfate Hydrated	268.15	n.av.	D	n.av.	19.5 cold 44 20°C
Arsenic	74.92	5.727	n.av.	S at 613	0
Amorphous Silica	60.08	2.2-2.6	~1600	~2300	0
Calcium Sulfate Hydrated	172.17	2.32	128	163	~ .2 cold
Bismuth	208.98	9.80	271.3	~1560	0

D - Decomposes

S - Sublimes

**FIRE OR EXPLOSION HAZARD**

Not applicable.

**REACTIVITY DATA**

Sulfates can react violently when melted with aluminum.

Metals can react with acids to liberate hydrogen gas which can form explosive mixtures in air. Arsenic can react with hydrogen to form arsine (AsH<sub>3</sub>).

Arsenic trioxide and sulfur dioxide can be released upon heating this product.

**TOXICOLOGICAL PROPERTIES<sup>6</sup>**

As a complex mixture, the toxicological properties of this product are unknown. The toxicology of the ingredients is reported.

**Copper**

Inhalation: Copper metal dust and fume may be irritating to the respiratory tract. In user operations where copper fume is generated, inhalation of the fume can result in symptoms of metal fume fever such as chills, fever and sweating.

Eye Contact: Copper metal as a foreign body in the eye can provoke an inflammatory reaction resulting in pus formation in the conjunctiva, cornea or sclera.

Skin Contact: A few instances of allergic skin rashes have been reported in workers exposed to metallic copper.

Ingestion: The lowest observed toxic oral dose of copper (TD<sub>Lo</sub>) is 120 µg/kg in humans. This dose caused gastrointestinal effects.

Preexisting Conditions: 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, (i.e. hepatic) disease and neurologic changes. Wilson's disease is progressive and, if untreated, leads to fatal liver (i.e. hepatic) failure.

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**Nickel Sulfate Hexahydrate**

Inhalation: The International Agency for Research on Cancer (IARC) concluded there was limited evidence that nickel compounds are carcinogenic to humans.

Epidemiological studies of Norwegian nickel refinery workers showed that an increased risk of respiratory cancer was present in electrolysis plant workers. These workers had

mixed exposure to aerosols of nickel sulfate and nickel chloride and to insoluble forms of nickel. Electrolysis plant workers in an Ontario refinery similarly exposed to nickel sulfate and nickel chloride aerosols, but not to dust from matte roasting operations, did not show any increased incidence of respiratory cancer.

Toxicology Excellence for Risk Assessment (TERA) finds that carcinogenic risk from soluble nickel compounds via inhalation cannot be determined (Class D) because the existing evidence is composed of conflicting data.

Exposure to aerosols of nickel sulfate can cause irritation of the upper respiratory tract and asthma.

Repeated intraperitoneal injections (50 x 1 mg Ni) of nickel sulfate in rats produced abdominal tumors.

**Skin Contact:** Exposure to solutions of nickel sulfate can cause skin irritation, nickel sensitivity and allergic skin rashes.

**Eye Contact:** May cause irritation.

**Wounds:** Neither single nor repeated intramuscular injections of nickel sulfate have resulted in the development of tumors in rodents.

**Ingestion:** Ingestion can result in nausea, abdominal cramps and discomfort, giddiness, headache, diarrhea, vomiting, shortness of breath, cough, sore throat, heartburn, general weakness and muscle pain.

**Preexisting Conditions:** Skin contact can cause an allergic skin rash in previously sensitized individuals.

### **Arsenic**

Acute arsenic poisonings can be fatal. Symptoms of fatal poisonings are abdominal pain and vomiting, usually within an hour of ingestion. In some cases, dermatitis and peripheral neuritis follow recovery from acute symptoms. Acute dermatitis starts with erythema, associated with burning and itching giving the skin a mottled appearance. If the dermatitis is on the face, swelling may occur followed by eruptions of the skin.

IARC concluded that there was sufficient evidence that arsenic and arsenic compounds, as a group but not necessarily as individual chemicals, were carcinogenic to humans. An association between environmental exposure to arsenic through drinking water and skin cancer has been observed and confirmed; two cases of bladder cancer were also confirmed. U.S. smelter worker populations exposed to inorganic arsenic have been shown to have significant and consistent increases in lung cancer.

**Inhalation:** Arsenic dust in contact with moist skin, eyes or nasal passages can form arsenious acid causing irritation, in some cases, corroding the septal mucosa.

**Skin Contact:** Chronic skin lesions caused by exposure to arsenic compounds is characterized by cracking skin, thickening and drying of the skin, and warts accompanied by excessive sweating. Dermatitis of the face and eyelids can be accompanied by conjunctivitis, with redness, swelling and pain.

### **Amorphous Silica**

**Inhalation:** IARC has concluded there was inadequate evidence that amorphous silica was carcinogenic to humans and animals.

In some animal studies, amorphous silica has been shown to be fibrogenic resulting in reduced lung function.

In human studies, amorphous silica (diatomaceous earth, 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 (fused).

### **Calcium Sulfate Hydrated**

Calcium sulfate causes no long disease in calcium sulfate miners and is considered to be of low order of toxicity.

## **PREVENTIVE MEASURES**

If user operations generate dust or fume, use ventilation to keep exposure to airborne contaminants below their exposure limits. If ventilation alone cannot so control exposures, use NIOSH-approved respirators selected according to the Selection, Care and Use of Respirators CSA Z94.4-M1993. Maintain airborne nickel and arsenic levels as low as possible.

Avoid repeated skin contact. Wear suitable gloves. Wash skin thoroughly after handling. Launder clothing and gloves as needed.

## **FIRST AID MEASURES**

For skin rashes, seek medical attention.

For skin irritation, flush thoroughly with plenty of water.

In case of contact with eyes, immediately flush eyeballs with plenty of water for at least 15 minutes. Seek medical attention immediately.

In case of accidental ingestion of nickel sulfate in an amount less than about 1 gram, drink large quantities of water. For larger amounts, seek medical attention immediately.

For accidental ingestion of any amounts of arsenic seek medical attention immediately.

## **PREPARATION INFORMATION**

Prepared by:

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### **Note:**

***Inco believes that the information in this Material Safety Data Sheet is accurate. However, Inco makes no express or implied warranty as to the accuracy of such information and expressly disclaims any liability resulting from reliance on such information.***

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### **Footnotes:**

- ® Trademark of the Inco family of companies.
- 1 Threshold Limit Value of the American Conference of Governmental Industrial Hygienists.
- 2 Exposure Limits for user operations will depend on the relevant governmental regulations.
- 3 Oral mouse LD<sub>50</sub> of 5989 mg/kg is for sodium sulfate
- 4 Assumed hydrated form.
- 5 The value is for total dust containing no asbestos and less than 1% crystalline silica.
- 6 Describes possible health hazards of the product supplied. If user operations change it to other chemical forms, whether as end products, intermediates or fugitive emissions, the possible health hazards of such forms must be determined by the user.