

CCCR – CRED E/W Bosh Pond Solids

1. Product Information

Vale Inco CCCR - CRED E/W Bosh Pond Solids is used for recovery of metal values.

Vale Inco
 Copper Cliff, Ontario
 P0M 1N0

Emergency phone no: 1-800-424-9300

Vale Inco reference no: 1996-0123

2. Hazardous Ingredients

| Components & Formulas | % wt | CAS No | Exposure Limit (TLV) ^{1 2} |
|---|----------------------|------------|-------------------------------------|
| Nickel Carbonate (NiCO ₃) | 10-30 | 3333-67-3 | 0.1 mg/m ³ as Ni * |
| Basic Nickel Carbonate (NiCO ₃ •2Ni(OH) ₂ •4H ₂ O) | as NiCO ₃ | 39430-27-8 | 0.1 mg/m ³ as Ni * |
| Copper Carbonate (CuCO ₃) | 3-7 | 1184-64-1 | 1 mg/m ³ as Cu |
| Basic Copper Carbonate (CuCO ₃ •Cu(OH) ₂) | As CuCO ₃ | 12069-69-1 | 1 mg/m ³ as Cu |
| Cobalt Carbonate (CoCO ₃) | 10-30 | 7542-09-8 | 0.02 mg/m ³ as Co |
| Basic cobalt Carbonate (2CoCO ₃ •3Co(OH) ₂) | As CoCO ₃ | 12602-23-2 | 0.02 mg/m ³ as Co |
| Iron Arsenate | 0.5-1.5 | 10102-50-8 | 01 mg/m ³ as As |
| Silica | 1-5 | 14808-60-7 | 0.1 mg/m ³ ** |
| Calcium Carbonate | 1-5 | 471-34-1 | 10 mg/m ³ |

* - Inhalable fraction

** - respirable fraction

3. Physical Data

Odourless, coarse slurry

| | |
|---|----------------|
| Boiling point | Not Available |
| Freezing point | Not Available |
| Molecular weight | Not Available |
| Density | Not Available |
| Specific gravity (H ₂ O =1) | Not Available |
| Vapour pressure (mm mercury) | Not Applicable |
| Vapour density (air=1) | Not Applicable |
| Percent volatiles by volume | Not Applicable |
| Evaporation rate | Not Applicable |
| Coefficient of water/oil distribution | Not Applicable |
| Corrosiveness (to common metals) | Not corrosive |
| pH: | 9.0 |

4. Fire or Explosion Hazard

Conditions of flammability: not flammable

5. Reactivity Data

Stability: stable

Hazardous polymerization will not occur

Incompatibility - avoid contact with: strong acids

Conditions of reactivity: n/ap

6. Toxicological Data

Nickel Carbonate - basic Ni Carbonate

The national toxicology program has listed nickel carbonate as reasonably anticipated to be a carcinogen based on the production of injection-site tumors. However, there is reason to believe that the compound actually tested was a basic nickel carbonate.

Sino nasal cancer has been reported in a worker employed in an operation where a nickel-copper carbonate (formula unspecified) was decomposed to nickel-copper oxide.

Inhalation of dust may be irritating to the respiratory tract. Prolonged contact may irritate the skin and mucous membranes. Eye contact may cause eye irritation. Chemical alleged to be nickel carbonate but which was probably a basic nickel carbonate and dried crystalline nickel hydroxide caused tumors at the site of injection in rodents.

Basic nickel carbonate ($\text{NiCO}_3\text{-Ni(OH)}_2$ to $2\text{NiCO}_3\text{-3Ni(OH)}_2$) has a relatively low oral toxicity; its oral rat LD50 is 1044 mg/kg.

The national institute for occupational safety and health (NIOSH) concluded that nickel and its inorganic compounds are not carcinogenic when ingested.

Refer to the toxicology of nickel.

Cobalt Carbonate

Specific information on cobalt carbonate was not found in the literature. Refer to the toxicology of cobalt.

Copper Carbonates

Little information specific to copper carbonate was to be found in the literature. Sources did disclose that verdigris, formed by atmospheric corrosion of the surface of metallic copper and presumably composed of copper carbonates and oxides, causes immediate irritation and conjunctival inflammation when accidentally dropped or dusted on the eyes of patients but the reaction subsides without permanent damage soon after the eye is cleansed by irrigation.

Calcium Carbonate

Calcium carbonate is considered nontoxic. Inhalation of particulates could cause mild irritation of the respiratory tract. Although it is used as an antacid, ingestion of large amounts could lead to intestinal blockage. Calcium carbonate is listed by the American conference of governmental industrial hygienists as a nuisance particulate.

Silica

It is not known whether the silica present is amorphous or crystalline. The International Agency for Research on Cancer (IARC) has concluded there is sufficient evidence that inhaled crystalline silica is carcinogenic to humans and inadequate evidence that amorphous silica cause's cancer in humans (vol 68). Therefore IARC has classed crystalline silica inhaled in the form of quartz or cristobalite as "carcinogenic to humans (Group 1)". Amorphous silica is not classifiable as to its carcinogenicity to humans (Group 3).

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 known 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 a number of studies have 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, wheezing and repeated non-specific chest illnesses. Impairment of pulmonary function may be progressive.

Iron III arsenate

Arsenic compounds can be absorbed by inhalation or ingestion. Acute arsenic poisonings can be fatal. Fatal poisonings begin with symptoms of 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.

The international agency for research on cancer (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 exposure to arsenic through contaminated drinking water and skin cancer has been observed and confirmed. Two cases of bladder cancer were also confirmed. U.S. smelter workers exposed to inorganic arsenic have been shown to have significant and consistent increases in lung cancer.

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

MATERIAL SAFETY DATA SHEET

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Nickel

Acute Toxicity:

a) *Oral*: Non toxic - LD₅₀ ORAL RAT >9000 mg/kg

b) *Inhalation*: No information available

c) *Dermal*: No information available.

Corrosivity/Irritation:

a) *Respiratory Tract*: None

b) *Skin*: See sensitization section.

c) *Eyes*: Mechanical irritation may be expected.

Sensitization:

a) *Respiratory tract*: Nickel metal induced asthma is very rare. 3 case reports are available; the data is not sufficient to conclude that nickel metal is classified as a respiratory sensitizer.

b) *Skin*: Nickel metal is a well-known skin sensitizer. Direct and prolonged skin contact with metallic nickel may induce nickel allergy and elicit nickel allergic skin reactions in those people already sensitized to nickel, so called nickel allergic contact dermatitis.

c) *Pre-existing conditions*: Individuals known to be allergic to nickel should avoid contact with nickel whenever possible to reduce the likelihood of nickel allergic contact dermatitis reactions (skin rashes). Repeated contact may result in persistent chronic palmar/hand dermatitis in a smaller number of individuals, despite efforts to reduce or avoid nickel exposure.

Chronic toxicity:

a) *Oral*: No information available

b) *Inhalation*: Animal studies (rats) show that repeated dose inhalation of nickel damages the lung. Chronic inflammation, lung fibrosis and accumulation of nickel particles were observed.

c) *Dermal*: Direct and prolonged skin contact with nickel metal may cause nickel sensitization resulting in nickel allergic contact dermatitis /skin rash.

Mutagenicity /

Reproductive toxicity: No data.

Carcinogenicity:

a) *Ingestion*: The U.S. National Institute for Occupational Safety and Health (NIOSH) concluded that there is no evidence that nickel metal is carcinogenic when ingested.

b) *Inhalation*: There is limited information available from inhalation and intratracheal studies in animals. The U.S. National Toxicology Program has listed metallic nickel as reasonably anticipated to be a human carcinogen. To date, there is no evidence that nickel metal causes cancer in humans

MATERIAL SAFETY DATA SHEET
MSDS

based on epidemiology data from workers in the nickel producing and nickel consuming industries.

The International Agency for Research on Cancer (IARC)(Vol 49) found there was inadequate evidence that metallic nickel is carcinogenic to humans but since there was sufficient evidence that it is carcinogenic to animals, IARC concluded that metallic nickel is possibly carcinogenic to humans (Group 2B). In 1997, the ACGIH categorized elemental nickel as: A5 "Not Suspected as a Human Carcinogen". Epidemiological studies of workers exposed to nickel powder and to dust and fume generated in the production of nickel alloys and of stainless steel have not indicated the presence of a significant respiratory cancer hazard

Cobalt

LD₅₀ oral rat: 6171 mg/kg

Inhalation: Asthmatic symptoms and pulmonary fibrosis occurring in the tungsten carbide industry may be related to the inhalation of metallic cobalt dust. Evidence of polycythemia (an increase on the total red cell mass of the blood in the body) and altered thyroid, kidney and liver function have also been found. Excessive doses of metallic cobalt have produced cardiac changes in miniature swine.

Skin Contact: Repeated contact with metallic cobalt can cause cobalt sensitivity and allergic skin rashes.

Wounds: Cobalt powders have caused tumors at the site of injection in rodents. However, studies of cobalt containing prostheses do not suggest a significant risk for humans.

Preexisting Conditions: Sensitized individuals may experience an allergic skin rash or asthma.

7. Preventative Measures

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

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

Do not store near acids. If spilled, pick up product and replace in original container.

Nickel-containing waste is normally collected to recover nickel values. Should waste disposal be deemed necessary, follow the relevant governmental regulations.

8. First Aid Measures

Skin contact: For skin irritation flush thoroughly with plenty of water. For skin rashes, seek medical attention. Launder clothing as required.

Eye contact: Immediately flush with water for 15 minutes. Use eyewash fountains provided to flush eyes. Hold eyelids open while flushing with water.

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

Ingestion: Do not induce vomiting. Get immediate medical attention.

9. Preparation Information

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Note:
Vale Inco believes that the information in this Material Safety Data Sheet is accurate. However, Vale 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.

Footnotes:

- 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 *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.*