WHMIS (Classification)
CLASS D-1A : Very toxic material causing immediate and serious effects
CLASS D-1B : Toxic material causing immediate and serious effects

SECTION 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name
Cadmium Sulfate Solution

Product Code
None

Supplier
Noranda Income Limited Partnership, 860 Gérard Cadieux Boulevard, Salaberry-de-Valleyfield (Quebec)
Canada J6T 6L4

Information Contact
Viviane DeQuoy, Industrial Hygienist
(450) 373-9144 extension 2394

Phone Number (Business hours)
1 (450) 373-9144 Extension 2911

Phone Number (Emergency)
Neutral Cadmium Solution

Synonyms
Solution de sulfate de cadmium (French)

DSL (Domestic Substance List)
Listed

Name / Chemical Formula
Cadmium sulfate / Not applicable

Chemical Family
Metal salt

Utilization
Chemical and textile industries reagent

SECTION 2. COMPOSITION AND INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name / CAS # / Type</th>
<th>Percentage (%)</th>
<th>TLV-TWA (mg/m³)</th>
<th>OSHA TWA (mg/m³)</th>
<th>PEL - TWA (mg/m³)</th>
<th>TWAEV (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc (Sulfate) 7733-02-0</td>
<td>25-35</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td>Magnesium (Sulfate) 7487-88-9</td>
<td>2-5</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td>‡Manganese (Sulfate) 7785-87-7</td>
<td>1-3</td>
<td>0.2 (Mn, Mn inorganic compds)</td>
<td>5 (Mn fumes)</td>
<td>1 (fumes)</td>
<td>5 (dust, compounds)</td>
</tr>
<tr>
<td>Disodium (Sulfate) 7757-82-6</td>
<td>1 – 2</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td>Cadmium (Sulfate) 10124-36-4</td>
<td>0.5-1.5</td>
<td>0.01 (Cd)</td>
<td>0.002 (respirable fraction)</td>
<td>0.005 (Cd)</td>
<td>0.025 (Cd, compds Cd)</td>
</tr>
<tr>
<td>Calcium (Sulfate) (Gypsum) 10101-41-4</td>
<td>0.2-0.5</td>
<td>10 (inhalable fraction)</td>
<td>15 (total dust)</td>
<td>5 (respirable fraction)</td>
<td>10 (total dust)</td>
</tr>
<tr>
<td>Water</td>
<td>65-70</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td>Impureties (solubles, insolubles) -</td>
<td>Cobalt, Nickel ≤500ppm</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>

ACGIH : American Conference of Governmental Industrial Hygienists. OSHA : Occupational Safety and Health Administration.

Note : Zinc (Sulfate) : ORAL acute (LD50) : 2 949 mg/kg (Rat) ; 245 mg/kg (Mouse). INTRAPERITONEAL acute (LD50) : 71.750 mg/kg (Mouse). (HSDB).
Magnesium (Sulfate) : INTRAPERITONEAL acute (LD50) : 150 mg/kg (Mouse). SUBCUTANEOUS acute (LD50) : 1 200 mg/m³ (Rat) ; 645 mg/m³ (Mouse). (RTECS).
‡Manganese (Sulfate) : ACGIH TLV-TWA : 0.2 mg/m³ (Inhalable fraction) ; 0.02 mg/m³ (Respirable fraction) (NOTICE OF INTENDED CHANGES). NIOSH REL-TWA (≤10 hours) : 1 mg/m³ (Mn compounds and fume) ; STEL : 3 mg/m³ ; IDLH : 500 mg Mn/m³ (Mn compounds and fume). ORAL acute (DL50) : 305 mg/kg (Mouse). INTRAPERITONEAL acute (DL50) : 64 mg/kg (Mouse). SUBCUTANEOUS acute (DL50) : 146 mg/kg (Mouse). (HSDB).
Disodium (Sulfate) : ORAL acute (LD50) : 5 989 mg/kg (Mouse). : INTRAVENOUS acute (LD50) : 1 220 mg/kg (Rabbit). (RTECS).
Calcium (Sulfate) : OSHA Ceiling : 0.3 mg/m³ (Cd fume). NIOSH REL-TWA (≤10 hours) (Air) : Lowest feasible concentration (Dust, fume) ; IDLH : 9 mg Cd/m³ (Metal dust and compounds). ORAL acute (LD50) : 280 mg/kg (Rat) ; 47 mg/kg (Mouse). ORAL acute (LDLo) : 105 mg/kg (Dog). INTRAPERITONEAL acute (LD50) : 6 879 µg/kg (Mouse). (RTECS).
Calcium (Sulfate dihydrate, gypsum) : ACGIH TLV-TWA : Total dust containing no asbestos and < 1% crystalline silica. NIOSH REL-TWA (≤10 hours) : 5 mg/m³ (Respirable fraction), 10 mg/m³ (Total). QUEBEC TLV-TWAEV : The standard corresponds to dust containing no asbestos and the percentage in crystalline silica is less than 1 %. INHALATION acute (LoTC) : 194 g/m³/10 year-intermittent (Human). (RTECS).

Consult local authorities for acceptable exposure limits.

SECTION 3. RISK IDENTIFICATION FOR HUMAN HEALTH

Routes of Entry
Ingestion. Inhalation. Eye and skin contacts.

Carcinogenicity
Cadmium (Sulfate) : PROVEN PROVEN (Group 1, IARC) ; SUSPECTED (Human, A2, ACGIH) ; LISTED (NTP, OSHA).
Calcium (Sulfate) ; Magnesium (Sulfate) ; Zinc (Sulfate) : NOT A CARCINOGEN (IARC) ; NOT LISTED (ACGIH).
Disodium (Sulfate) : NOT A CARCINOGEN (IARC, OSHA, NTP).

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**Cadmiun Sulfate Solution**

**Mutagenicity**
Not applicable.

**Teratogenicity**
Not applicable.

**Acute Effects**
- **Zinc (Sulfate)**: Inhalation (Aerosols): Possibility of irritation of superior respiratory tract. Ingestion: Possibility of irritation of digestive tract, nausea, vomiting, diarrhea, liver and kidney damages.
- **Magnesium (Sulfate)**: Ingestion: Abdominal cramps, diarrhea.
- **Manganese (Sulfate)**: Ingestion: Abdominal cramps, diarrhea. Inhalation: Cough, difficult breathing, shortness of breath, sore throat. Eye pain
- **Cadmum (Sulfate)**: Possibility of irritation (Eyes, nose, throat, lungs) with coughing, shortness of breath. **Metal fume fever** (Delayed, transient, generally benign, flu-like condition). Ingestion and inhalation: Nausea, salivation, vomiting, cramps, diarrhea. Higher exposures: Possibility of pulmonary oedema (Build-up of fluid).
- **Calcium (Sulfate)**: Cough, redness, pain.

**Section 4. First Aid Measures**
- **Eye Contact**: Remove contact lenses if present. Immediately rinse eyes with plenty of water, while holding eyelids open for at least 15 minutes. Consult a physician.
- **Skin Contact**: Remove contaminated clothing. Immediately flush skin with plenty of water for at least 15 minutes.
- **Inhalation**: Remove the person from exposure. Bring to fresh air. Difficult breathing: give oxygen. Get immediate medical attention.
- **Ingestion**: DO NOT induce vomiting. **Conscious and alert person**: Rinse mouth with water and give ½ to 1 cup of water or milk to dilute material. **Spontaneous vomiting**: Keep head below hips to prevent aspiration; rinse mouth and give ½ to 1 cup of water or milk. **UNCONSCIOUS person**: DO NOT induce vomiting or give any liquid. Immediately obtain medical attention.

**Section 5. Fire and Explosion Data**
- **Flash Point**: Not applicable
- **Flammable Limits**: Not applicable
- **Auto-Ignition Temperature**: Not applicable
- **Products of Combustion**: Metallic, sulfur oxides.
- **Fire Hazard**: Not applicable
- **Explosion Hazard**: Not explosive (Mechanical impact; Static discharge).
- **Fire Fighting (Instructions)**: NON-FLAMMABLE. Use fire fighting materials and procedures adapted to the immediate environment. Firefighters must wear full protective clothing and self-contained breathing apparatus (SCBA).

**Section 6. Accidental Release Measures**
- **Spill**
  - **Inside plant**: Recover by pumping and recycle to process.
  - **Outside plant**: Dilute with water and collect in a convenient recycling container. If necessary: Neutralize residue with a diluted sodium carbonate solution. Wash down contaminated area. Collect water for recycling according to regulations.

**Personal Protection**
Full protective clothing. Chemical goggles. Gloves and Boots. Suggested clothing may not sufficiently protected. Consult a specialist BEFORE handling this product.

**Section 7. Handling and Storage**
- **Handling**: DO NOT ingest or inhale dust or vapours. Wear adequate protective clothing. Wear approved respirators if adequate ventilation cannot be provided. Ingestion or inhalation: Seek medical advice immediately and show the the SDS.
- **Storage**: Keep in a tightly closed container. Cool, well-ventilated area.

**Section 8. Engineering Controls and Personal Protection**
- **Engineering Controls**: Use process enclosures, local exhaust ventilation or other engineering controls to keep airborne levels below recommended exposure limits. Ensure that eyewash station and safety shower is proximal to the workstation location.
- **Personal Protection**: Safety glasses. Gloves (Rubber) and boots. Be sure to use a NIOSH approved respirator or equivalent when concentrations exceed occupational exposure limits.

**Section 9. Physical and Chemical Properties**

- **Physical State and Appearance**: Viscous liquid
- **Molecular Weight**: Not applicable
- **pH (1% soln/water)**: 5
- **Odour**: Odourless
- **Taste**: Acrid
- **Colour**: Pink
**Section 10. Stability and Reactivity Data**

- **Stability**: Yes
- **Conditions of Instability**: Not available
- **Incompatibilities**:
  - Zinc (Sulfate): Lead, calcium, strontium salts, borax, alkali carbonates and hydroxides, silver protein and tannins.
  - Magnesium (Sulfate): Magnesium hydride formation if in contact with calcium hydroxide or hydroxide aqueous solutions. Incompatible with: Arseniates, phosphates, tartrates (Mg precipitation).
  - Cadmium: Combustants agents, acids, strong oxidants.
  - Calcium (Sulfate): Magnesium, aluminum powder, phosphorus, acids, strong oxidizing agents.

**NOTE**: This list of products is not exhaustive. Verify technical documents to determine any incompatibilities with your process.

- **Corrosivity**: No

**Section 11. Toxicological Information**

**Chronic Effects**: Work conditions and methods that generate dust and vapours should be avoid or controlled.

- **Zinc (Sulfate)**: Human systemic effects by ingestion: Acute pulmonary edema, agranulocytosis, blood pressure decrease, diarrhea and other gastrointestinal changes.
- **Magnesium (Sulfate)**: In large quantities it can be toxic but in small quantities it does not represent any danger. Used as a purgative (Epsom salt).
- **Manganese (Sulfate)**: Chronic exposure by inhalation and ingestion to manganese salt may cause impairment of the central nervous system. Other signs of exposure to manganese or manganese compounds: Sluggishness, sleepiness, weakness in the legs, headache and sexual excitement followed by impotency.
- **Disodium sulfate**: No toxic effects reported. Target organs for acute and chronic overexposure: Gastro-intestinal tract.
- **Cadmium (Sulfate)**: Sensitive organs to acute and chronic overexposure: Liver, respiratory system, bone structure, kidneys, blood. Possibility of symptoms after chronic overexposure: Shortness of breath, cough, osteoporosis, proteinuria.
- **Calcium (Sulfate)**: Irritating (Dust): Eyes, skin and mucous membranes. Possibility of: Conjunctivitis, rhinitis, epistaxis, coughing, sneezing, pneumonia, laboured breathing. Ingestion: May result in obstruction, particularly at the pylorus. Chronic overexposure: Possibility of dermatitis.

**Toxicity**: Persons with the following pre-existing conditions warrant particular attention:

- **Zinc (Sulfate)**: Skin problems or respiratory disorders.
- **Manganese (Sulfate)**: Lungs, nervous system, Parkinson's disease.
- **Cadmium (Sulfate)**: Osteoporosis, chronic renal diseases, emphysema. Preferred method for biological monitoring: Urinary (BEI 5 μg/g creatinine, background) and blood (BEI 5 μg/g, background) levels measurement; Sampling time: Not critical. Proteinuria detection: Beta-2 microglobulines or protein-retinol linked dosages.
- **Calcium (Sulfate)**: Respiratory disorder.

*Eating, drinking and smoking must be prohibited in areas where this material is handled and processed. Workers must wash hands and face before eating, drinking and smoking.*

**Section 12. Ecotoxicological Information**

**Ecotoxicity**: Zinc (Sulfate): Fathead minnow (LC50, 96h): 25.8 mg/l. Rainbow trout (LC50, 48h): 4.76 mg/l (inflow-through, hard water).

- **Cadmium (Sulfate)**: Dangerous to aquatic life in high concentrations. Fish (Time period not specified): 1 000 mg/l (critical concentration, toxic). Rainbow trout (LC50, 96 h): 0.007 mg/l (Flow through, hard).

**Toxicity to Animals**: Zinc (Sulfate): ORAL acute (LD50): 2 949 mg/kg (Rat); 245 mg/kg (Mouse). INTRAPERITONEAL acute (LD50): 71,750 mg/kg (Mouse), (HSDB).

- **Magnesium (Sulfate)**: INTRAPERITONEAL acute (LD50): 150 mg/kg (Mouse). SUBCUTANEOUS acute (LD50): 1 200 mg/m² (Rat); 645 mg/m² (Mouse). (RTECS).
- **Manganese (Sulfate)**: ORAL acute (DL50): 305 mg/kg (Mouse). INTRAPERITONEAL acute (DL50): 64 mg/kg (Mouse). SUBCUTANEOUS acute (DL50): 146 mg/kg (Mouse). (HSDB).
- **Cadmium (Sulfate)**: ORAL acute (LD50): 280 mg/kg (Rat); 47 mg/kg (Mouse). ORAL acute (LDLo): 105 mg/kg (Dog). INTRAPERITONAL acute (LD50): 6 879 μg/kg (Mouse). (RTECS).
Calcium (Sulfate dihydrate, gypsum): INHALATION acute (LoTC): 194 g/m³/10 year-intermittent (Human). (RTECS).

Biodegradation Products: Not applicable
Biodegradation Products (Toxicity): Not applicable

Remarks on Environment: Due to the product's composition, particular attention must be taken: substances potentially toxic to aquatic life include zinc, cadmium.

BOD₅ and COD: Not available

**SECTION 13. DISPOSAL ARRANGEMENTS**

Waste Disposal: Recycle to process, if possible. Consult local or regional authorities.

**SECTION 14. TRANSPORT INFORMATION**

TDG (Pictograms): Not regulated (Canada)
PIN: Not applicable
Special Provisions (Transport): Not applicable

**SECTION 15. OTHER REGULATIONS**

Zinc (Sulfate) (Anhydrous): Xn Harmful ; N Dangerous for the environment (Pictogram)
Annex I Index number: 030-013-00-7 ; EU Consolidated Inventories : EC Number 215-222-5
Classification: Xn: R22 ; R41 ; N: R50/53
R: 22, 41, 50/53 ; S: 22, 26, 39, 46, 60, 61.
Manganese (Sulfate): Xn Harmful ; N Dangerous for the environment (Pictograms)
Annex I Index number: 025-003-00-7 ; EU Consolidated Inventories : EC Number 232-089-9
Classification: Xn: R48/20/22 ; N: R51/53
Cadmium (Sulfate): T+ Very toxic ; N Dangerous for the environment (Pictogram)
Annex I Index number: 048-009-00-9 ; EU Consolidated Inventories : EC Number 233-331-6
Classification: Carc. Cat. 2, R45 ; Muta. Cat. 2, R46 ; Repr. Cat. 2, R60-61 ; T: R48/23/25 ; T+: R26 ; T: R25 ; N: R50, 53
R: 45, 46, 60, 61, 25, 26, 48/23/25, 50/53 ; S: 53, 45, 60, 61 ; Cancerogen C2

Specific Conc Limits: Classification
2.5% ≤ C < 7%: T, N ; R45-46-60-61-22-23-48/20/22-51/53
1% ≤ C < 2.5%: T ; R45-46-60-61-22-23-48/20/22-52/53


EU: Consolidated Inventories: Listed.
Magnesium (Sulfate): EU Consolidated Inventories : EC Number 231-298-2
Disodium (Sulfate): EU Consolidated Inventories : EC Number 231-820-9
Calcium (Sulfate): EU Consolidated Inventories : EC Number 231-900-3
Water: EU Consolidated Inventories : EC Number 231-791-2
Not listed in the Annex I of Council Regulation No (EC) 304/2003
Not listed in a priority list (as foreseen under Council Regulation (EEC) No 793/93

Risk Phrases (EEC): R22- Harmful in case of ingestion
R26- Very toxic by inhalation
R41- Risk of serious damage to eyes
R45- May cause cancer
R46 : May cause heritable genetic damage.
R48/20/22- Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed
R48/23/25- Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R60 : May impair fertility.
R61- May cause harm to the unborn child.

Safety Phrases (EEC): S22- Do not breathe dusts
S26- In case of contact with eyes, wash immediately with plenty of water and seek medical advice
S39- Wear eye/face protection
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S46- If swallowed, seek medical advice immediately and show container or label.
**Cadmium Sulfate Solution**

SS3- Avoid exposure -- obtain special instructions before use.
S60- This material and/or its container must be disposed of as hazardous waste.
S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

**CEPA DSL (Canada)**
CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) : On the Domestic Substances List (DSL) ; Acceptable for use under the provisions of CEPA.

**Regulation (U.S.A.)**
CERCLA Section 103 Hazardous substances (40 CFR 302.4) ; SARA Section 313, Toxic Chemicals (40 CFR 372.65) : Listed.

**Zinc (Sulfate)** (RQ) : 1 000 pounds (454 kg)

**Manganese (Compounds)** : no RQ is assigned to this generic or broad class, although the class is a CERCLA hazardous substance. See 50 Federal Register 13456 (April 4, 1985).

**Cadmium (Compounds)** : no RQ is assigned to this generic or broad class, although the class is a CERCLA hazardous substance. See 50 Federal Register 13456 (April 4, 1985).

**Classifications HCS (U.S.A.)**

- Highly toxic
- Dangerous may cause cancer
- Target organ effects

**NFPA (National Fire Protection Association) (U.S.A.)**

Fire Hazard 0 Reactivity 1 Health 1 Special Hazard

**DOT (U.S.A.) (Pictograms)**
**DSCL (Europe) (Pictograms)**
**ADR (Europe) (Pictograms)**

**SECTION 16. OTHER INFORMATION**

**References**
- ESIS : C&L (Classification and Labelling), substances or preparations in accordance with Directive 67/548/EEC (substances) and 1999/45/EC (preparations),
- ESIS : EINECS (European Inventory of Existing Commercial chemical Substances) O.J. C 146A, 15.6.1990
- Patty's Industrial Hygiene and Toxicology, 3rd Revised Edition
- Règlement sur les produits contrôlés (Canada)
- RTECS (2010), Registry of Toxic Effects of Chemical Substances, NIOSH, CDC
- Toxicologie industrielle & intoxication professionnelle, 3e édition, Lauwerys

**Glossaire**
- CSST : Commission de la Santé et de la Sécurité du Travail (Québec).
- HSDB : Hazardous Substances Data Bank.
- NTP : U.S. National Toxicology Program.
- RTECS : Registry of Toxic Effects of Chemical Substances

**Note**
No specific studies have been performed on this mixture. For your protection, we suggest that you test it before using in your process.

**Written by :** Groupe STEM Consultants / Noranda Income Limited Partnership

**Complete revision :** 2010-10-18 **Partial review :** None **Previous complete revision :** 2007-10-18

**Request to :** Viviane DeQuoy Tel. : 1 (450) 373-9144 poste 2394 Fax : 1 (450) 373-3929 Noranda Income Limited Partnership, 860 Gérard Cadieux Boulevard, Salaberry-de-Valleyfield (Quebec) Canada J6T 6L4 The MSDS are available at the Noranda Income Fund website : http://www.norandaincomefund.com/about/msds.html
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