Section 1 - Product and Company Information

Product Name                  COBALTOUS CHLORIDE ANHYDROUS
Product Number                60818
Brand                         FLUKA
Company                       Sigma-Aldrich Canada, Ltd
Address                       2149 Winston Park Drive
                                Oakville ON L6H 6J8 CA
Technical Phone:              9058299500
Fax:                          9058299292
Emergency Phone:             800-424-9300

Section 2 - Composition/Information on Ingredient

<table>
<thead>
<tr>
<th>Substance Name</th>
<th>CAS #</th>
<th>SARA 313</th>
</tr>
</thead>
<tbody>
<tr>
<td>COBALT CHLORIDE</td>
<td>7646-79-9</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Formula         CoCl2
Synonyms        Cobalt chloride * Cobalt dichloride * Cobalt muriate * Cobaltous chloride * Cobaltous dichloride * Dichlorocobalt * Kobalt chloride (German)
RTECS Number:   GF9800000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Toxic. Dangerous for the environment.
Toxic if swallowed. Causes burns. May cause sensitization by inhalation and skin contact. May cause cancer by inhalation. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Probable Carcinogen (US). Target organ(s): Thyroid. Heart.

HMIS RATING
HEALTH: 3*
FLAMMABILITY: 0
REACTIVITY: 1

NFPA RATING
HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 1

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is
conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

DERMAL EXPOSURE
In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Use extinguishing media appropriate to surrounding fire conditions. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves. Wear disposable coveralls and discard them after use.

METHODS FOR CLEANING UP
Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe dust. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.

SPECIAL REQUIREMENTS
Handle and store under inert gas. Hygroscopic.
Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Use only in a chemical fume hood. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.
Hand: compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Wash thoroughly after handling. Discard contaminated shoes.

Section 9 - Physical/Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>At Temperature or Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Physical State: Solid</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td>Form</td>
<td>Powder</td>
<td></td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>129.84 AMU</td>
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<tr>
<td>pH</td>
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</tr>
<tr>
<td>BP/BP Range</td>
<td>1,049 °C</td>
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</tr>
<tr>
<td>MP/MP Range</td>
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<tr>
<td>Freezing Point</td>
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<tr>
<td>Vapor Pressure</td>
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</tr>
<tr>
<td>Vapor Density</td>
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<tr>
<td>Saturated Vapor Conc.</td>
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</tr>
<tr>
<td>SG/Density</td>
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</tr>
<tr>
<td>Bulk Density</td>
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<td></td>
</tr>
<tr>
<td>Odor Threshold</td>
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<td></td>
</tr>
<tr>
<td>Volatile%</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>VOC Content</td>
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<td></td>
</tr>
<tr>
<td>Water Content</td>
<td>&lt; 2 %</td>
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</tr>
<tr>
<td>Solvent Content</td>
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<td></td>
</tr>
<tr>
<td>Evaporation Rate</td>
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<td></td>
</tr>
<tr>
<td>Viscosity</td>
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<tr>
<td>Surface Tension</td>
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<tr>
<td>Partition Coefficient</td>
<td>Log Kow: 0.85</td>
<td></td>
</tr>
<tr>
<td>Decomposition Temp.</td>
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<td></td>
</tr>
<tr>
<td>Flash Point</td>
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<td></td>
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<tr>
<td>Explosion Limits</td>
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<td></td>
</tr>
<tr>
<td>Flammability</td>
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<tr>
<td>Autoignition Temp</td>
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<td></td>
</tr>
<tr>
<td>Refractive Index</td>
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<td>Optical Rotation</td>
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<tr>
<td>Miscellaneous Data</td>
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</tr>
<tr>
<td>Solubility</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

N/A = not available

Section 10 - Stability and Reactivity
STABILITY
Stable: Stable.
Conditions of Instability: Absorbs ammonia from air.
Conditions to Avoid: Moisture.
Materials to Avoid: Oxidizing agents, Alkali metals.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: May cause eye irritation.
Inhalation: Material may be irritating to mucous membranes and upper respiratory tract. May be harmful if inhaled.
Ingestion: Harmful if swallowed.

SENSITIZATION
Respiratory: May cause allergic respiratory reaction.
Skin: May cause allergic skin reaction.

TARGET ORGAN(S) OR SYSTEM(S)

SIGNS AND SYMPTOMS OF EXPOSURE
Large amounts of cobalt(II) chloride depress erythrocyte production which may lead to death in children. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema.

TOXICITY DATA

Oral
Child
1500 mg/kg
LDLO

Oral
Rat
80 mg/kg
LD50

Intraperitoneal
Rat
17402 UG/KG
LD50

Intravenous
Rat
4300 UG/KG
LD50

Remarks: Behavioral: Convulsions or effect on seizure threshold.
Behavioral: Somnolence (general depressed activity).

Oral
Mouse
80 mg/kg
LD50

Intraperitoneal
Mouse
49 MG/KG
LD50

Intravenous
Mouse
23300 UG/KG
LD50

Remarks: Behavioral: Convulsions or effect on seizure threshold.
Behavioral: Somnolence (general depressed activity).

Oral
Guinea pig
55 mg/kg
LD50

Oral
Rat
418 mg/kg
LD50

CHRONIC EXPOSURE - CARCINOGEN
Result: This product is or contains a component that has been
reported to be probably carcinogenic based on its IARC, OSHA,
ACGIH, NTP, or EPA classification.

Species: Rat
Route of Application: Subcutaneous
Dose: 400 MG/KG
Exposure Time: 19D
Frequency: I
Result: Tumorigenic: Tumors at site or application.
Tumorigenic: Carcinogenic by RTECS criteria.

IARC CARCINOGEN LIST
Rating: Group 2B

CHRONIC EXPOSURE - TERATOGEN

Species: Mouse
Dose: 25 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (10D PREG)
Result: Specific Developmental Abnormalities: Craniofacial
(including nose and tongue).

CHRONIC EXPOSURE - MUTAGEN

Species: Human
Dose: 1 MMOL/L
Cell Type: HeLa cell
Mutation test: DNA inhibition
Species: Hamster  
Dose: 200 UMOL/L  
Cell Type: Embryo  
Mutation test: Unscheduled DNA synthesis

Species: Hamster  
Dose: 200 UMOL/L  
Cell Type: lung  
Mutation test: Mutation in mammalian somatic cells.

Species: Mammal  
Dose: 750 UMOL/L  
Cell Type: lymphocyte  
Mutation test: DNA damage

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat  
Dose: 11 MG/KG  
Route of Application: Oral  
Exposure Time: (1-22D PREG)  
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Species: Rat  
Dose: 30 GM/KG  
Route of Application: Intraperitoneal  
Exposure Time: (15-16D PREG)  
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Mouse  
Dose: 7280 MG/KG  
Route of Application: Oral  
Exposure Time: (13W MALE)  
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count). Paternal Effects: Testes, epididymis, sperm duct. Effects on Fertility: Male fertility index (e.g., # males impregnating females per # males exposed to fertile nonpregnant females).

Section 12 - Ecological Information

N/A

ACUTE ECOTOXICITY TESTS

Test Type: EC50 Algae  
Species: Chlorella vulgaris  
Time: 96 h  
Value: 0.52 mg/l

Test Type: EC50 Daphnia  
Species: Daphnia magna  
Time: 48 h  
Value: 1.1 - 1.6 mg/l

Test Type: LC50 Fish  
Species: Cyprinus carpio  
Time: 96 h
Value: 0.33 mg/l  
Test Type: LC50 Fish  
Species: Onchorhynchus mykiss (Rainbow trout)  
Time: 96 h  
Value: 1.4 mg/l

Test Type: LC50 Fish  
Species: Pimephales promelas (Fathead minnow)  
Time: 96 h  
Value: 22 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Observe all federal, state, and local environmental regulations. (DN) Requires special label: "Contains a substance which is regulated by Danish work environmental law due to the risk of carcinogenic properties."

Section 14 - Transport Information

DOT
Proper Shipping Name: Corrosive solids, toxic, n.o.s.  
UN#: 2923  
Class: 8  
Packing Group: Packing Group III  
Hazard Label: Corrosive  
Hazard Label: Toxic substances.  
PIH: Not PIH

IATA
Proper Shipping Name: Corrosive solid, toxic, n.o.s.  
IATA UN Number: 2923  
Hazard Class: 8  
Packing Group: III

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: T-N  
Indication of Danger: Toxic. Dangerous for the environment.  
R: 49-22-42/43-50/53  
Risk Statements: May cause cancer by inhalation. Harmful if swallowed. May cause sensitization by inhalation and skin contact. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.  
S: 53-22-45-60-61  
Safety Statements: Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. Do not breathe dust. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Toxic. Dangerous for the environment.  
Risk Statements: Toxic if swallowed. Causes burns. May cause sensitization by inhalation and skin contact. May cause cancer by inhalation. Very toxic to aquatic organisms, may cause
long-term adverse effects in the aquatic environment.
Safety Statements: Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. Do not breathe dust. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: Yes
DEMINIMIS: 0.1 %
NOTES: This product is subject to SARA section 313 reporting requirements - cobalt compounds.
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2008 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.