Cobalt

Section 1. Identification of the Substance and Company

1.1 Product Identification:

Product Name: Cobalt Metal
Synonyms: Cobalt Rounds, Electrolytic Cobalt Rounds
Chemical Family: Metal
Chemical Formula: Co

EC No: 231-158-0
CAS No: 7440-48-4

1.2 Uses

Identified Uses:
- Use of cobalt in the manufacture of inorganic cobalt substances.
- Use of cobalt in the manufacture of cobalt carboxylates and resinates.
- Manufacture of cobalt in the catalyst industry.
- Industrial use of cobalt as catalyst.
- Manufacture and industrial use of cobalt containing alloys, steels and tools.
- Industrial use of cobalt in surface treatment processes.
- Manufacture and industrial use of batteries using cobalt.
- Industrial use of cobalt in the manufacture of inorganic pigments & frits, glass, ceramic ware, varistors and magnets (calcination/sintering processes).
- Manufacture and industrial use of coatings and inks using cobalt as drier and/or pigment.
- Industrial use of cobalt in the production of diamond tools.
- Welding in industrial and/or professional settings.
- Professional use of dental alloys containing cobalt.
- Professional use of diamond tools and other cobalt-containing tools.
- Service life of articles containing cobalt encapsulated in the internal part of the product.
- Service life of dental alloys.
- Handling of heat and wear resistant vehicle parts.
- Consumer use of cutting tools other than hard metal.

Uses Advised Against: None known

1.3 Company Identification

Canada Contact Information
Vale Canada Limited
200 Bay Street, Royal Bank Plaza
Suite 1600, South Tower, P.O. Box 70
Toronto, Ontario, Canada M5J 2K2

US Contact Information
Vale Americas Inc.
250 Pehle Avenue
Suite 302
Saddle Brook, NJ 07663, U.S.A.

msds@vale.com
Section 2. Hazards Identification

2.1 Classification of substance
- Carcinogenicity – Category 1B
- Toxic to Reproduction – Category 2
- Acute Toxicity, oral – Category 4
- Respiratory Sensitization – Category 1
- Skin Sensitization – Category 1
- Aquatic Chronic – Category 4

Hazard Pictograms: GHS07 – Exclamation Mark; GHS08 - Health Hazard

Signal Word: Danger

Hazard Statements:
- H350i – May cause cancer via inhalation
- H302 – Harmful if swallowed
- H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- H317 – May cause an allergic skin reaction.
- H413 – May cause long lasting harmful effects to aquatic life


2.2: Label elements

Product identifier: Cobalt

CAS #: 7440-48-4

Symbols: GHS07 – Exclamation Mark, GHS08 - Health Hazard

Signal Word: Danger

Hazard Statements:
- H302, H317, H334, H350i, H361f, H413

Precautionary Statements:
- P261, P273, P280, P284, P302+P352, P501

(Note: P-statements have been reduced, the full list can be found in Section 15.)
Section 3. Composition

- **Substance**
- **Mixture**

<table>
<thead>
<tr>
<th>Hazardous ingredient(s)</th>
<th>Typical Composition (%)</th>
<th>CAS No.</th>
<th>EC No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>&gt;99</td>
<td>7440-48-4</td>
<td>231-158-0</td>
</tr>
</tbody>
</table>

Section 4. First Aid Measures

**Ingestion:** IF SWALLOWED: Rinse mouth. Call a POISON CENTRE/doctor if you feel unwell.

**Inhalation:** IF INHALED: Remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.

**Skin:** IF ON SKIN: Wash with plenty of water. Take off contaminated clothing and wash it before reuse. If skin irritation or rash occurs: Get medical advice/attention.

**Eyes:** Hold eyelids apart and flush eyes with plenty of water for at least 15 minutes. If eye irritation persists: Get medical advice/attention.

**Most important symptoms and affects, both acute and delayed**

- Inhalation: Cough, Sore throat, Wheezing, Increased difficulty in breathing.
- Ingestion: Abdominal pain, Vomiting.
- Eye Contact: Redness.

**Indication of immediate medical attention and special treatment needed**

IF exposed or concerned: Get medical advice/attention.

Section 5. Fire Fighting Measures

**Suitable extinguishing media:** As appropriate for surrounding fire. Extinguish with dry chemical, carbon dioxide or halons.

**Special risks:** Decomposes in a fire giving off toxic fumes: Cobalt oxide dust, Acrid smoke, Metal fumes.

**Special protective equipment for fire-fighting:** Fire fighters should wear complete protective clothing including self-contained breathing apparatus. Dike fire control water for later disposal. Do not allow to enter drains, sewers or watercourses.

Section 6. Accidental Release Measures

**Person related precautionary measures:** Ensure adequate ventilation. Avoid breathing dust. Wear appropriate personal protective equipment, avoid direct contact.
Environmental Protection measures: Spillages or uncontrolled discharges into watercourses must be alerted to the appropriate regulatory body.

Procedures for cleaning/absorption: Sweep spilled substances into containers if appropriate moisten first to prevent dusting. Use vacuum equipment for collecting spilt materials, where practicable. Transfer to a lidded container for disposal or recovery.

Reference to other sections See also Section 7, & 8.

Section 7. Handling and Storage

7.1 Precautions for Safe Handling: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Provide adequate ventilation. Avoid breathing dust. Contaminated work clothing should not be allowed out of the workplace. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. Wear protective gloves/protective clothing/eye protection/face protection. See Section: 8.

7.2 Conditions for Safe Storage Store locked up. Stable under normal storage conditions. Incompatible with acids, and strong oxidizing agents.

Section 8. Exposure Controls / Personal Protection

8.1.1 Exposure Limits:

<table>
<thead>
<tr>
<th>Cobalt Metal (Co) – CAS 7440-48-4</th>
<th>Exposure Limit (mg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH TLV-TWA ¹</td>
<td>0.02</td>
</tr>
<tr>
<td>OSHA PEL ²</td>
<td>0.1</td>
</tr>
</tbody>
</table>

8.2.1 Occupational exposure controls: Provide adequate ventilation.

8.2.2 Personal Protective Equipment:

Eye/face protection Wear eye protection with side protection.

Skin protection (Hand protection/ Other) Wear protective clothing and gloves: Butyl rubber, Neoprene, PVC.

Respiratory protection A suitable dust mask or dust respirator with filter type P may be appropriate.

Thermal hazards Not applicable.

8.2.3 Environmental Exposure Controls: Avoid release to the Environment.
Section 9. Physical and Chemical Properties

Silver-grey odourless metal.

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state at 20°C and 101.3 kPa</td>
<td>solid</td>
</tr>
<tr>
<td>pH (Value)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Melting Point (°C)</td>
<td>1494°C @1013hPa</td>
</tr>
<tr>
<td>Boiling point/boiling range (°C):</td>
<td>2927°C @1013hPa</td>
</tr>
<tr>
<td>Flash Point (°C)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Non-flammable</td>
</tr>
<tr>
<td>Explosive limit ranges.</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapour Pressure (mm Hg)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapour Density (Air=1)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Relative Density</td>
<td>8.89 @ 20°C</td>
</tr>
<tr>
<td>Solubility (Water)</td>
<td>2.94mg/l @ 20°C</td>
</tr>
<tr>
<td>Solubility (Other)</td>
<td>Not available</td>
</tr>
<tr>
<td>Partition Coefficient (n-Octanol/water)</td>
<td>Not available</td>
</tr>
<tr>
<td>Auto Ignition Temperature (°C)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition Temperature (°C)</td>
<td>Not available</td>
</tr>
<tr>
<td>Viscosity (mPa.s)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>Not oxidizing</td>
</tr>
<tr>
<td>Size</td>
<td>8-12 mm thick, 18-24 mm dia.</td>
</tr>
<tr>
<td>Magnetic properties</td>
<td>Ferromagnetic</td>
</tr>
</tbody>
</table>

Section 10. Stability and Reactivity

10.1 Reactivity Stable under normal conditions.
10.2 Chemical stability Stable under normal conditions.
10.3 Possibility of hazardous reactions Stable under normal conditions.
10.4 Conditions to avoid Heat.
10.5 Incompatible materials Acids, Strong oxidising agents.
10.6 Hazardous Decomposition Product(s) Cobalt oxide dust, acrid smoke, metal fumes.

Section 11. Toxicological Information

Cobalt

Acute Toxicity

a) Oral: LD_{50} ORAL RAT 550 mg/kg. Acute Tox. 4; Harmful if swallowed.

b) Inhalation: Low acute toxicity. Main Symptoms: Cough, Sore throat, Wheezing, Increased difficulty in breathing. See Section 15 for further information.
c) Dermal:  
LD₅₀(Dermal) >2000mg/kg. Low acute toxicity.

**Corrosivity/Irritation**

a) Respiratory Tract:
None.

b) Skin:
No data. Not classified. See sensitization section.

c) Eyes:
Low acute toxicity. Main Symptoms: Redness.

**Sensitization**

a) Respiratory tract:
Resp. Sens. 1; May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Skin Sens. 1; May cause an allergic skin reaction. Repeated contact with metallic cobalt can cause cobalt sensitivity and allergic skin rashes.

**Pre-existing conditions:**
Sensitized individuals may experience an allergic skin rash or asthma.

**Chronic toxicity**

a) Oral:
No information available.

b) Inhalation:
No information available.

c) Dermal:
No information available.

**Mutagenicity / Reproductive toxicity:**
There is no evidence of mutagenic potential. Reproductive toxicity category 2; suspected of damaging fertility. Specific effect: fertility impairment in males.

**Carcinogenicity**

a) Ingestion:
No data. Not classified.

b) Inhalation:
Carcinogenicity category 1B; may cause cancer by inhalation.

**Specific Target Organ Toxicity:**

a) Single Exposure:
None anticipated.

b) Repeated Exposure:
None anticipated.

**Aspiration Hazard:**
None.
Section 12. Ecological Information

| Toxicity | Aquatic Chronic 4; May cause long lasting harmful effects to aquatic life. By analogy with similar materials: Cobalt Dichloride. Fish: LC50 = 1.5mg/l (Fresh water) Aquatic invertebrates: LC50 = 0.61mg/l (Fresh water); 2.32mg/l (Sea water) Algae: LC50 = 144μg/l (Fresh water); 24.1μg/l (Sea water) NOEC Fish = 351.4mg/l NOEC Aquatic invertebrates: = 5.47μg/l (Fresh water); 206μg/l (Sea water) NOEC Algae = 4.9μg/l (Fresh water); 1.23μg/l (Sea water) |
| Persistence and degradability | The methods for determining the biological degradability are not applicable to inorganic substances. |
| Mobility in soil | The substance is essentially insoluble in water. |
| Results of PBT and vPvB assessment | Not applicable |
| Other adverse effects | None anticipated. |

Section 13. Disposal Considerations

Waste treatment methods
Recover or recycle if possible. Dispose of contents/container to a Licensed recycler. Dispose of contents in accordance with local, state or national legislation.

Additional Information
No information available.

Section 14. Transport Information

| U.S. Dept. of Transportation Regulations | Not regulated. |
| Canadian Transportation of Dangerous Goods Act | Not regulated. |
| European Agreement Concerning the International Carriage of Dangerous Goods by Road | Not regulated. |
Section 15. Regulatory Information

Additional toxicological information:
The Acute Toxicity inhalation information represents the product as it is placed on the market. Downstream users should be aware that cobalt metal powder is classified as Acute Toxicity inhalation category 1; LC₅₀ 4hr ≤ 0.05 mg/L. If the downstream use produces finely divided particles of cobalt metal, additional respiratory protection may be required.

United States of America Regulatory Information:
SARA Section 313 Supplier Notification
This product contains the following chemical(s) subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40 CFR 372: Cobalt

Refer to the Hazardous Ingredients section of this SDS for the appropriate CAS numbers and percent by weight.

Classification of the Substance under US Hazard Communication Standard (29 CFR) - HazCom 2012:
Carcinogenicity – Category 1B
Toxic to Reproduction – Category 2
Acute Toxicity, oral – Category 4
Respiratory Sensitization – Category 1
Skin Sensitization – Category 1
Aquatic Chronic – Category 4

Hazard Pictograms: GHS07 – Exclamation Mark; GHS08 - Health Hazard

Signal Word: Danger

Hazard Statements: H350i – May cause cancer via inhalation.
H361f – Suspected of damaging fertility. Specific effect: fertility impairment in males.
H302 – Harmful if swallowed.
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317 - May cause an allergic skin reaction.
H413 - May cause long lasting harmful effects to aquatic life.

Precautionary Statements

Prevention: P201: Obtain special instructions before use.
P202: Do not handle until all safety precautions have been read and understood.
P261: Avoid breathing dust.
P264: Wash hands thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P272: Contaminated work clothing should not be allowed out of the workplace.
P273: Avoid release to the environment.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P284: In case of inadequate ventilation wear respiratory protection.
Response:

P330: Rinse mouth.
P301+P312: IF SWALLOWED: Call a POISON CENTRE/doctor if you feel unwell.
P302+P352: IF ON SKIN: Wash with plenty of water.
P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P308+P313: IF exposed or concerned: Get medical advice/attention.
P333 + P313: If skin irritation or rash occurs: Get medical advice/attention.
P342+P311: If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
P362 + P364: Take off contaminated clothing and wash it before reuse.

Storage:

P405: Store locked up.

Disposal:

P501 - Dispose of contents/container in accordance to local, regional, national and international regulations.

Section 16. Other Information

Indications of Change:

1.0 – Original document

The following acronyms may be found in this document:

- ACGIH: American Conference of Governmental Industrial Hygienists
- Acute Tox. 4: Acute Toxicity Category 4
- Aquatic Chronic 4: Hazardous to the aquatic environment Category 4
- DNEL: Derived No Effect Level
- LTEL: Long Term Exposure Limit
- OEL: Occupational Exposure Limits
- OSHA: Occupational Safety and Health Administration
- PEL: Permissible Exposure Limit
- PBT: Persistent, Bioaccumulative and Toxic
- PNEC: Predicted No Effect Concentration
- Resp. Sens 1B: Respiratory Sensitization Category 1B
- Repr. 2: Reproductive toxicity Category 2
- Repr. Cat 3: Reproductive toxicity Category 3
- Skin Sens. 1: Skin Sensitization Category 1
- STEL: Short Term Exposure Limit
- STOT: Specific Target Organ Toxicity
- TLV-TWA: Threshold Limit Value – Time Weighted Average
- vPvB: very Persistent and very Bioaccumulative
Safety Data Sheet prepared by:
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200 Bay St., Royal Bank Plaza
Suite 1600, South Tower, PO Box 70
Toronto, ON, Canada, M5J 2K2
Product Stewardship (416) 361-7801
msds@vale.com

SDS available online at www.vale.com

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

1. Threshold Limit Values of the American Conference of Governmental Industrial Hygienists, 2013
2. Occupational Safety and Health Administration Permissible Exposure Limit.
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.