

Cobalt Metal

Section 1. Identification of the Substance and Company

1.1 Product Identification:

Product Name: Cobalt Metal

Synonyms: Cobalt rounds

EC No: 231-158-0

CAS No: 7440-48-4

REACH Registration number: see Section 15

1.2 Uses

Identified Uses:

Use at industrial sites; Use of cobalt in the manufacture of inorganic cobalt substances (intermediate use)

Use at industrial sites; Use of cobalt in the manufacture of cobalt carboxylates and resinates (intermediate use)

Use at industrial sites; Industrial use of cobalt containing catalysts

Use at industrial sites; Production and industrial use of cobalt containing alloys, steels and tools

Use at industrial sites; Industrial use of cobalt in the production of diamond tools

Use at industrial sites; Industrial use of cobalt metal in additive manufacturing (3D-printing)

Service life (worker at industrial site); Service life of cobalt containing alloys, steels and tools in industrial settings

Service life (worker at industrial site); Welding in industrial settings

Service life (professional worker); Welding in professional settings

Service life (professional worker); Service life of cobalt-containing tools in professional settings

Service life (professional worker); Service life of dental alloys containing cobalt in professional settings

Service life (consumers); dental alloys

Service life (consumers); diamond tools and other cobalt-containing tools other than hard metal

Use at industrial sites; Industrial use of cobalt in passivation processes in surface treatment

Use at industrial sites; Passivation processes in surface treatment at large industrial sites with continuous processes

Use at industrial sites; Industrial use of cobalt in plating processes in surface treatment

Use at industrial sites; Industrial use of cobalt in thermal spraying in surface treatment

Service life (worker at industrial site); Industrial handling of surface treated articles (passivated/plated/sprayed)

Service life (professional worker); Professional handling of surface treated articles (passivated/plated/sprayed)

Service life (consumers); heat and wear resistant vehicle parts

Use at industrial sites; Production of cobalt-containing batteries

Service life (worker at industrial site); Service life of cobalt-containing batteries in industrial settings

Service life (professional worker); Service life of cobalt-containing batteries in professional settings ES 27 -

Use at industrial sites; Industrial use of cobalt in the production of varistors and magnets
(calcination/sintering processes)

Use at industrial sites; Industrial use of cobalt in the manufacture of inorganic pigments, frits, ceramic ware,
glass

Service life (worker at industrial site); Service life of cobalt-containing varistors and magnets in industrial
settings

Service life (professional worker); Service life of cobalt-containing varistors and magnets in professional
settings

Service life (consumers); cobalt being encapsulated in the internal part of the product

Use at industrial sites; Production of hardmetal powder

Use at industrial sites; Production of sintered hardmetal articles

Use at industrial sites; Production of hardmetal powder for surface technology

Service life (worker at industrial site); Service life of hardmetal articles in industrial settings

Service life (professional worker); Service life of hardmetal articles in professional settings

Service life (consumers); hard metal articles

Use at industrial sites; Use of cobalt as an intermediate in the manufacture of catalysts

Uses Advised Against

None identified

1.3 Company Identification

Manufactured by

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For Europe call CHEMTREC: +(44) 870 8200418

Section 2. Hazards Identification

2.1 Classification of the 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 3

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.
H412 – Harmful to aquatic life with long lasting effects

Precautionary Statements: P201, P202, P261, P264, P270, P272, P273, P280, P284, P330, P301+P312, P302+P352, P304+P340, P308+P313, P333+P313, P342+P311, P362+P364, P405, P501

2.2: Label elements

Product identifier: Cobalt

CAS #: 7440-48-4

Symbols:

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.

H412 – Harmful to aquatic life with long lasting effects

Precautionary Statements:

P261 - Avoid breathing dust

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

P302+P352 - IF ON SKIN: Wash with plenty of water

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

(NOTE: P-statements have been reduced)

For full text of Precautionary, statements see section 15.

Section 3. Composition

Substance **Mixture**

Hazardous ingredient(s)	Typical Composition (%)	CAS No.	EC No.
Cobalt	>99	7440-48-4	231-158-0

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 halones.

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

<i>Person related precautionary measures:</i>	Ensure adequate ventilation. Avoid breathing dust. Wear appropriate personal protective equipment, avoid direct contact.
<i>Environmental Protection measures:</i>	Spillages or uncontrolled discharges into watercourses must be alerted to the appropriate regulatory body.
<i>Procedures for cleaning/absorption:</i>	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.
<i>Reference to other sections</i>	See also Section 7, & 8.

Section 7. Handling and Storage

<i>Precautions for Safe Handling:</i>	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, and face protection. See Section: 8.
<i>Conditions for Safe Storage</i>	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:

Cobalt Metal (Co) – CAS 7440-48-4	Exposure Limit (mg/m ³)
ACGIH TLV-TWA, USA ¹	0.02
UK WEL ²	0.1
NOHSC, Australia	0.05

DNEL's

DNEL	Oral	Inhalation	Dermal
Industry - Long Term – Local effects	-	40 µg/m ³	-
Industry - Long Term - Systemic effects	-	-	-
Industry - Short term - Local effects	-	-	-
Industry - Short term - Systemic effects	-	-	-

Consumer - Long Term - Local effects	-	6.3 µg/m ³	-
Consumer - Long Term - Systemic effects	29.8 µg/kg bw/day	-	-
Consumer - Short term - Local effects	-	-	-
Consumer - Short term - Systemic effects	-	-	-

8.1.2 Environmental Limits:

PNEC's

	PNEC
Aquatic - Freshwater Compartment	0.62µg Co/L
Aquatic - Marine Compartment	2.36 µg Co/L
Sediment - Freshwater Compartment	53.8 mg Co/kg sediment dry wt
Sediment - Marine Compartment	69.8 mg Co/kg sediment dry wt
Terrestrial Compartment (soil)	10.9 mg/kg Soil dw.
Sewage Treatment Plant	0.37 µg Co/L
Atmospheric Compartment	No hazard identified

8.2.1 Occupational exposure controls:

Provide adequate ventilation.

PPE:

Respiratory protection: A suitable dust mask or dust respirator with filter type P (EN143 or EN405) may be appropriate.

Eye/face protection: Wear eye protection with side protection (EN166).

Hand & Skin protection: Wear protective clothing and gloves: Butyl rubber, Neoprene, PVC.

Section 9. Physical And Chemical Properties

Silver-grey odourless metal.

Physical state at 20°C and 101.3 kPa	solid
pH (Value)	Not applicable
Melting Point (°C)	1494°C @1013hPa
Boiling point/boiling range (°C):	2927°C @1013hPa
Decomposition temperature	Not applicable
Relative Density	8.89 @ 20°C
Vapour Pressure	Not applicable

Vapour Density	Not applicable
Surface tension	Not applicable
Water solubility	2.94mg/l @ 20°C
pH	Not applicable
Evaporation rate	Not applicable
Partition Coefficient (n-Octanol/water)	Not applicable
Flash Point (°C)	Not applicable
Flammability (solid, gas)	Non-flammable
Explosive properties	Not applicable
Self-ignition temperature (°C)	Not applicable
Oxidising properties	Not oxidising
Granulometry	8-12 mm thick, 18-24 mm dia
Stability in organic solvents and identity of relevant degradation products	Not available
Dissociation constant	Not applicable
Viscosity	Not applicable
Packaged density	See relative density

Section 10. Stability and Reactivity

<i>Reactivity</i>	Stable under normal conditions.
<i>Chemical stability</i>	Stable under normal conditions.
<i>Possibility of hazardous reactions</i>	Stable under normal conditions.
<i>Conditions to avoid</i>	Heat
<i>Incompatible materials</i>	Acids, Strong oxidising agents.
<i>Hazardous Decomposition Product(s)</i>	Cobalt oxide dust, Acrid smoke, Metal fumes

Section 11. Toxicological Information³

Cobalt

Acute Toxicity

- a) *Oral:* LD₅₀ 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.

<i>c) Eyes:</i>	Low acute toxicity. Main Symptoms: Redness.
Sensitization	
<i>a) Respiratory tract:</i>	Resp. Sens. 1; May cause allergy or asthma symptoms or breathing difficulties if inhaled.
<i>b) Skin:</i>	Skin Sens. 1; May cause an allergic skin reaction. Repeated contact with metallic cobalt can cause cobalt sensitivity and allergic skin rashes.
<i>c) Pre-existing conditions:</i>	Sensitized individuals may experience an allergic skin rash or asthma.
Chronic Toxicity	
<i>a) Oral:</i>	No information available.
<i>b) Inhalation:</i>	No information available.
<i>c) Dermal:</i>	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	
<i>a) Ingestion:</i>	No data. Not classified.
<i>b) Inhalation:</i>	Carcinogenicity category 1B; May cause cancer by inhalation.
Specific Target Organ Toxicity:	
<i>a) Single Exposure:</i>	None anticipated.
<i>b) Repeated Exposure:</i>	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)
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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.

Bioaccumulative Potential: Aquatic plants: Bioconcentration factor (BCF) : > 100 – 5000.
 Aquatic invertebrates: BCF <300.
 Fresh water, Fish: BCF/ BAF <10.
 Marine, Fish: BCF/ BAF <10.
 The substance has low potential for bioaccumulation.

Mobility in soil: The substance is essentially insoluble in water.

Results of PBT and vPvB Not applicable

Assessment:

Other Adverse Effects: Not anticipated

Section 13. Disposal Considerations

Waste treatment methods: Recover or recycle if possible. Dispose of contents in accordance with local, state or national legislation.

Additional information: No information available

Section 14. Transport Information

International Maritime Dangerous Goods Code	Not regulated.
International Civil Aviation Organization Technical Instructions for the Carriage of Dangerous Goods by Air	Not regulated.
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.

MARPOL Annex V

Under the 7 Criteria contained within the MARPOL Annex V, This material is classified as:

	Harmful to the Marine Environment (HME)
X	Not Harmful to the Marine Environment (non-HME)

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.

Europe:

REACH Registration #:

01-2119517392-44-xxxx – Vale Europe Limited

01-2119517392-44-xxxx – Vale Canada Limited (H2 Compliance acting as Only Representative)

Exposure Scenarios: See Annex 1

Classification according to Part 3 of Annex VI of EU Regulation No. 1272/2008

- Carcinogenicity – Category 1B
- Toxic to Reproduction – Category 2
- Acute Toxicity, oral – Category 4
- Respiratory Sensitization – Category 1
- Skin Sensitization – Category 1
- Aquatic Chronic – Category 3

Symbols:

GHS07 – Exclamation Mark

GHS08 - Health Hazard



Signal Word:

Danger

Hazard Statements:

H350i – May cause cancer via inhalation.
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H302 – Harmful if swallowed.
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H412 - Harmful to aquatic life with long lasting effects.

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.

United States of America:

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 40 CFR 372: Cobalt

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

Canada:

WHMIS 2015 Classification:

Carcinogenicity – Category 1B

Toxic to Reproduction – Category 2

Acute Toxicity, oral – Category 4

Respiratory Sensitization – Category 1

Skin Sensitization – Category

All components are listed on the Canadian Domestic Substances List (DSL)

Section 16. Other Information

Indications of Change:

- 1.0 – Original document
- 1.1 – Added “Size” and “magnetic properties” in Section 9
- 1.2 – Added section 2.3 information
- 2.0 – Updated sections as a result of NTP study
- 2.2- Updated PNECS and compliance with EU CLP
- 3.0- Updated for WHMIS 2015
- 3.1 – Added manufacturer Vale Canada Newfoundland & Labrador
- 3.2 – Update to Aquatic Chronic Cat.3 classification, PNECS and update of Uses/Exposure Scenarios
- 3.3 – Updated Only Representative
- 3.4 – Updated Exposure Scenarios

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
LR	Lead Registrant

MMAD	Mass Median Aerodynamic Diameter
NIOSH	National Institute of Occupational Safety and Health
NOHSC	National Occupational Health & Safety Commission
OEL	Occupational Exposure Limits
OR	Only Representative
OSHA	Occupational Safety and Health Administration
PBT	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
WEL	Workplace Exposure Limit (UK HSE EH40)

Safety Data Sheet prepared by:

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SDS available online at <http://www.vale.com/canada/en/business/mining/nickel/pages/default.aspx>

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. 2016.
2. Maximum Exposure Limit of the Health and Safety Executive in the U.K. in EH40/00.
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.

ANNEX 1 – Exposure Scenarios

Exposure Scenarios can be obtained by clicking on the following link:

<http://www.vale.com/canada/EN/business/mining/product-safety-information/reach-scenarios-cobalt/Pages/default.aspx>

If you are unable to retrieve the document or have difficulties, please use the following email address for assistance: msds@vale.com

- ES 4 - Use at industrial sites; Use of cobalt in the manufacture of inorganic cobalt substances (intermediate use)
- ES 5 - Use at industrial sites; Use of cobalt in the manufacture of cobalt carboxylates and resinsates (intermediate use)
- ES 6 - Use at industrial sites; Industrial use of cobalt containing catalysts
- ES 7 - Use at industrial sites; Production and industrial use of cobalt containing alloys, steels and tools
- ES 8 - Use at industrial sites; Industrial use of cobalt in the production of diamond tools
- ES 9 - Use at industrial sites; Industrial use of cobalt metal in additive manufacturing (3D-printing)
- ES 10 Service life (worker at industrial site); Service life of cobalt containing alloys, steels and tools in industrial settings
- ES 11- Service life (worker at industrial site); Welding in industrial settings
- ES 12- Service life (professional worker); Welding in professional settings
- ES 13 - Service life (professional worker); Service life of cobalt-containing tools in professional settings
- ES 14 Service life (professional worker); Service life of dental alloys containing cobalt in professional settings
- ES 15 - Service life (consumers); dental alloys
- ES 16 - Service life (consumers); diamond tools and other cobalt-containing tools other than hard metal
- ES 17 – Use at industrial sites; Industrial use of cobalt in passivation processes in surface treatment
- ES 18 - Use at industrial sites; Passivation processes in surface treatment at large industrial sites with continuous processes
- ES 19 - Use at industrial sites; Industrial use of cobalt in plating processes in surface treatment
- ES 20- Use at industrial sites; Industrial use of cobalt in thermal spraying in surface treatment
- ES 21 Service life (worker at industrial site); Industrial handling of surface treated articles (passivated/plated/sprayed)
- ES 22 - Service life (professional worker); Professional handling of surface treated articles (passivated/plated/sprayed)
- ES 23 - Service life (consumers); heat and wear resistant vehicle parts
- ES 24 - Use at industrial sites; Production of cobalt-containing batteries
- ES 25 - Service life (worker at industrial site); Service life of cobalt-containing batteries in industrial settings

ES 26 - Service life (professional worker); Service life of cobalt-containing batteries in professional settings

ES 27 - Use at industrial sites; Industrial use of cobalt in the production of varistors and magnets (calcination/sintering processes)

ES 28 - Use at industrial sites; Industrial use of cobalt in the manufacture of inorganic pigments, frits, ceramic ware, glass

ES 29 - Service life (worker at industrial site); Service life of cobalt-containing varistors and magnets in industrial settings

ES 30 - Service life (professional worker); Service life of cobalt-containing varistors and magnets in professional settings

ES 31 - Service life (consumers); cobalt being encapsulated in the internal part of the product

ES 32 - Use at industrial sites; Production of hardmetal powder

ES 33 - Use at industrial sites; Production of sintered hardmetal articles

ES 34 - Use at industrial sites; Production of hardmetal powder for surface technology

ES 35 - Service life (worker at industrial site); Service life of hardmetal articles in industrial settings

ES 36 - Service life (professional worker); Service life of hardmetal articles in professional settings

ES 37 - Service life (consumers); hard metal articles

ES 38 - Use at industrial sites; Use of cobalt as an intermediate in the manufacture of catalysts