SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Name of the substance	Cobalt
Trade name of the substance	ELECTROLYTIC COBALT
Identification number	027-001-00-9
Registration number	01-2119517392-44-0014
Synonyms	Cut cathode (1”x1”), Lugs, Starting Sheets, Ribs
SDS number	Co-rev 0-2010
Issue date	01-April-2011
Version number	02
Revision date	26-October-2012
Supersedes date	01-April-2011

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Manufacture and industrial use of cobalt containing alloys, steels and tools. Registered uses, for this product, can be found in section 15 of this eSDS.
Uses advised against	-

1.3. Details of the supplier of the safety data sheet

Supplier	
Company name	Xstrata Nikkelverk AS
Adress	Vesterveien 31, N-4606 Kristiansand Norway
Telephone number:	+47 38 10 10
Contact person	Technology Director, Xstrata Nikkelverk AS
Emergency telephone number	+47 38 10 10 (during office hours 09:00 - 17:30 CET)
e-mail	post@xstratanickel.no

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Directive 67/548/EEC or 1999/45/EC as amended

Classification Repr. Cat. 3;R62, R42/43, R53

The full text for all R-phrases is displayed in section 16.

Classification according to Regulation (EC) No 1272/2008 as amended

Health hazards		
Respiratory sensitisation	Category 1	H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Skin sensitisation	Category 1	H317 - May cause an allergic skin reaction.
Reproductive toxicity	Category 2	H361f - Suspected of damaging fertility.
Environmental hazards		
Hazardous to the aquatic environment, long-term aquatic hazard	Category 4	H413 - May cause long lasting harmful effects to aquatic life.

Hazard summary

Physical hazards	Not classified for physical hazards.
Health hazards	May cause sensitisation by inhalation and skin contact. Possible risk of impaired fertility. Occupational exposure to the substance or mixture may cause adverse health effects.
Environmental hazards	May cause long-term adverse effects in the aquatic environment.

Specific hazards Elevated temperatures or mechanical action may form dust and fumes which may be irritating to the eye, mucous membranes and respiratory tract. Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain. Acute exposure to cobalt metal, dust, and fume may cause irritation of skin and eyes. In sensitized individuals, exposure causes an asthma-like attack, with wheezing, bronchospasm, and dyspnea. The effects might be delayed. Suspect cancer hazard. Mechanical processing may generate dust. High concentrations of dust may form explosive mixture with air. May cause long-term adverse effects in the aquatic environment.

Main symptoms Irritation of nose and throat. Irritation of eyes and mucous membranes. Cough. Shortness of breath. Wheezing. Sensitisation.

2.2. Label elements

Label according to Regulation (EC) No. 1272/2008 as amended

Contains: Cobalt

Identification number 027-001-00-9

Hazard pictograms

Signal word Danger

Hazard statements
H317 - May cause an allergic skin reaction.
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H361f - Suspected of damaging fertility.
H413 - May cause long lasting harmful effects to aquatic life.

Precautionary statements

Prevention
P261 - Avoid breathing dust/fume.
P285 - In case of inadequate ventilation wear respiratory protection.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.

Response
P304 + P340 - IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
P342 + P311 - If experiencing respiratory symptoms: Call a POISON CENTRE or doctor/physician.
P333 + P313 - If skin irritation or rash occurs: Get medical advice/attention.

Storage Store away from incompatible materials.

Disposal P501 - Dispose of contents/container in accordance with local/regional/national/international regulations.

Supplemental label information Not applicable.

2.3. Other hazards Not a PBT or vPvB substance or mixture.

SECTION 3: Composition/information on ingredients

3.1. Substances

General information

Chemical name	%	CAS-No. / EC No.	REACH Registration No.	INDEX No.	Notes
Cobalt	≥98,5 -≤100	7440-48-4 231-158-0	01-2119517392-44-0014	027-001-00-9	

Classification: **DSD:** Repr. Cat. 3;R62, R42/43, R53

CLP: Skin Sens. 1;H317, Resp. Sens. 1;H334, Repr. 2;H361, Aquatic Chronic 4;H413

#: This substance has workplace exposure limit(s).

Composition comments This product is registered under the REACH Regulation 1907/2006 as a mono-constituent substance. The full text for all R- and H-phrases is displayed in section 16. All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume. For more detailed chemical composition, refer to the certificate of analysis.

SECTION 4: First aid measures

General information Show this safety data sheet to the doctor in attendance. Get medical attention if any discomfort develops. Seek medical attention for all burns, regardless how minor they may seem.

4.1. Description of first aid measures

Inhalation If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if discomfort develops or persists.

Skin contact In case of contact with molten product, cool rapidly with water and seek immediate medical attention. Do not attempt to remove molten product from skin because skin will tear easily. Cuts or abrasions should be treated promptly with thorough cleansing of the affected area. Contact with dust: Wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions.

Eye contact Do not rub eyes. Remove any contact lenses. Flush eyes thoroughly with water, taking care to rinse under eyelids. If irritation persists, continue flushing for 15 minutes, rinsing from time to time under eyelids. If discomfort continues, consult a physician.

Ingestion Rinse mouth thoroughly if dust is ingested. Do not induce vomiting. Get medical attention if any discomfort continues.

4.2. Most important symptoms and effects, both acute and delayed Irritation of nose and throat. Irritation of eyes and mucous membranes. Cough. Shortness of breath. Wheezing. Sensitisation.

4.3. Indication of any immediate medical attention and special treatment needed Treat symptomatically. Symptoms may be delayed.

SECTION 5: Firefighting measures

General fire hazards Solid metal is not flammable; however, finely divided metallic dust or powder may form an explosive mixture with air. Do not use water on molten metal: Explosion hazard could result.

5.1. Extinguishing media

Suitable extinguishing media Special powder against metal fires. Dry sand. Halons. Carbon dioxide (CO2).

Unsuitable extinguishing media No restrictions known.

5.2. Special hazards arising from the substance or mixture Fire or high temperatures create: Metal oxides.

5.3. Advice for firefighters

Special protective equipment for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Special fire fighting procedures Move container from fire area if it can be done without risk.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel Ensure adequate ventilation. Avoid inhalation of dust and contact with skin and eyes. Use personal protection as recommended in section 8 of the SDS.

For emergency responders Use personal protection as recommended in section 8 of the SDS.

6.2. Environmental precautions Avoid release to the environment.

6.3. Methods and material for containment and cleaning up Collect dust using a vacuum cleaner equipped with HEPA filter. Allow spilled material to solidify and scrape up with shovels into a suitable container for recycle or disposal.

6.4. Reference to other sections For personal protection, see section 8. For waste disposal, see section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling Welding, burning, sawing, brazing, grinding or machining operations may generate fumes and dusts. Provide adequate ventilation. Use appropriate tools. Avoid contact with sharp edges and hot surfaces. Avoid generation and spreading of dust. Avoid inhalation of dust and contact with skin and eyes. Wear appropriate personal protective equipment. Contaminated work clothing should not be allowed out of the workplace. Avoid contact with molten material. Do not use water on molten metal. Observe good industrial hygiene practices.

7.2. Conditions for safe storage, including any incompatibilities Keep dry. Store away from incompatible materials.

7.3. Specific end use(s) For detailed information, see section 15. Recommendations given in the exposure scenario for the uses are distributed and annexed as separate documents to this eSDS.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

UK. EH40 Workplace Exposure Limits (WELs)

Components	Type	Value
Cobalt (CAS 7440-48-4)	TWA	0.1 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

Recommended monitoring procedures Follow standard monitoring procedures.

Derived no-effect level (DNEL)

Material	Type	Route	Value	Form
Cobalt (CAS 7440-48-4)	General Population	Inhalation	6.5 µg/m³	Long term Local effects
		Oral	9.5 µg/kg	Long term Systemic effects
	Workers	Inhalation	40 µg/m³	Long term Local effects

Predicted no effect concentrations (PNECs)

Material	Type	Route	Value	Form
Cobalt (CAS 7440-48-4)	Aqua (freshwater)	Not applicable	0.51 µg/l	
	Aqua (marine water)	Not applicable	2.36 µg/l	
	Sediment (freshwater)	Not applicable	9.5 mg/kg	
	Sediment (marine water)	Not applicable	9.5 mg/kg	
	Sewage Treatment Plant	Not applicable	0.37 µg/l	
	Soil	Not applicable	7.9 mg/kg	

8.2. Exposure controls

Appropriate engineering controls Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Use explosion-proof equipment if high dust/air concentrations are possible.

Individual protection measures, such as personal protective equipment

General information Use personal protective equipment as required. Personal protective equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.

Eye/face protection Wear dust-resistant safety goggles where there is danger of eye contact. In addition to safety glasses or goggles, a welding helmet with appropriate shaded shield is required during welding, burning, or brazing. A face shield is recommended, in addition to safety glasses or goggles, during sawing, grinding, or machining.

Skin protection

- Hand protection Wear suitable protective gloves to prevent cuts and abrasions. When material is heated, wear gloves to protect against thermal burns. Suitable gloves can be recommended by the glove supplier.

- Other Wear suitable protective clothing.

Respiratory protection In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter (type P2). Seek advice from local supervisor.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

Hygiene measures Routinely wash work clothing and protective equipment to remove contaminants. Follow up on any medical surveillance requirements.

Environmental exposure controls Contain spills and prevent releases and observe national regulations on emissions.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance Massive, solid metal.

Physical state Solid.

Form Solid forms such as: Cuts, Chips and Briquettes.

Colour Silver-gray.

Odour Odourless.

Odour threshold Not applicable.

pH Not applicable.

Melting point/freezing point 1494 °C (2721.2 °F) (1013 hPa)

Initial boiling point and boiling range 2927 °C (5300.6 °F) (1013 hPa)

Flash point Not applicable.

Evaporation rate Not applicable.

Flammability (solid, gas) Non flammable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)	Not applicable.
Flammability limit - upper (%)	Not applicable.
Vapour pressure	Not applicable.
Vapour density	Not applicable.
Relative density	8.89
Relative density temperature	20 °C (68 °F)
Solubility(ies)	2.94 mg/l (20°C)
Partition coefficient (n-octanol/water)	Not applicable.
Decomposition temperature	Not available.
Viscosity	Not applicable.
Viscosity temperature	Not applicable.
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.

9.2. Other information

Bulk density	Not applicable.
Percent volatile	Not applicable.
VOC (Weight %)	Not applicable.

SECTION 10: Stability and reactivity

10.1. Reactivity	Massive metal is non reactive under normal conditions of use, storage and transport.
10.2. Chemical stability	Massive metal is stable under normal conditions of use, storage and transport.
10.3. Possibility of hazardous reactions	Hazardous polymerisation does not occur. Hazardous reactions do not occur.
10.4. Conditions to avoid	Contact with incompatible materials. Contact with acids will release flammable hydrogen gas. Avoid conditions which create dust. Dust clouds may be explosive under certain conditions.
10.5. Incompatible materials	Acids. Strong oxidising agents. Ammonium nitrate.
10.6. Hazardous decomposition products	Welding, burning, sawing, brazing, grinding or machining operations may generate dusts and fumes of metal oxides.

SECTION 11: Toxicological information

General information Occupational exposure to the substance or mixture may cause adverse effects.

Information on likely routes of exposure

Ingestion	Ingestion may cause irritation and malaise.
Inhalation	May cause sensitisation by inhalation. Dust may irritate respiratory system.
Skin contact	May cause an allergic skin reaction. Dust may irritate skin.
Eye contact	Dust may irritate the eyes.
Symptoms	Irritation of nose and throat. Irritation of eyes and mucous membranes. Cough. Shortness of breath. Wheezing. Sensitisation.

11.1. Information on toxicological effects

Acute toxicity Acute exposure to cobalt metal, dust, and fume may cause irritation of skin and eyes. In sensitized individuals, exposure causes an asthma-like attack, with wheezing, bronchospasm, and dyspnea. Ingestion of cobalt may cause nausea, vomiting, diarrhea, and a sensation of hotness. High concentrations of freshly formed fumes/dusts of metal oxides can produce symptoms of metal fume fever.

Product	Species	Test results
Cobalt (CAS 7440-48-4)		
Acute		
Oral		
LD50	Rat	7510 mg/kg

Skin corrosion/irritation	May cause irritation through mechanical abrasion.
Serious eye damage/irritation	May cause irritation through mechanical abrasion.
Respiratory sensitisation	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Skin sensitisation	May cause allergic skin reaction.

Germ cell mutagenicity	Knowledge about mutagenicity is incomplete.
Carcinogenicity	Knowledge about carcinogenicity is incomplete.

IARC Monographs. Overall Evaluation of Carcinogenicity

Cobalt (CAS 7440-48-4)	2B Possibly carcinogenic to humans.

Reproductive toxicity	Suspected of damaging fertility.
Specific target organ toxicity - single exposure	Knowledge about health hazard is incomplete.
Specific target organ toxicity - repeated exposure	Test data conclusive but not sufficient for classification.
Aspiration hazard	Not classified.
Mixture versus substance information	Not available.
Other information	Chronic exposure to cobalt metal, dust, or fume may cause obstructive lung disease with wheezing, cough, and shortness of breath, dermatitis and respiratory hypersensitivity. Welding or plasma arc cutting of metal and alloys can generate ozone, nitric oxides and ultraviolet radiation. Ozone overexposure may result in mucous membrane irritation or pulmonary discomfort. UV radiation can cause skin erythema and welders flash.

SECTION 12: Ecological information

12.1. Toxicity May cause long lasting harmful effects to aquatic life.

Product		Species	Test results
Cobalt (CAS 7440-48-4)			
Aquatic			
Algae	EC50	Freshwater algae	144 µg/l, 72 Hours, (Cobalt dichloride)
		Marine water algae	24.1 µg/l, 72 Hours, (Cobalt dichloride)
Fish	LC50	Freshwater fish	1.5 mg/l, 96 Hours, (Cobalt dichloride)
Invertebrate	EC50	Freshwater invertebrate	0.61 mg/l, 48 Hours, (Cobalt dichloride)
		Marine water invertebrate	2.32 mg/l, 48 Hours, (Cobalt dichloride)

12.2. Persistence and degradability	The product is not biodegradable.
12.3. Bioaccumulative potential	Potential to bioaccumulate is low.
Partition coefficient n-octanol/water (log Kow)	Not applicable.
Bioconcentration factor (BCF)	Not available.
12.4. Mobility in soil	Cobalt in massive forms is not mobile in the environment.
Mobility in general	Cobalt in massive forms is not mobile in the environment.
12.5. Results of PBT and vPvB assessment	Not a PBT or vPvB substance or mixture.
12.6. Other adverse effects	Cobalt may react with other particles or adsorb on soil particles or water sediments.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste	Dispose of in accordance with local regulations. Recover and recycle, if practical. Solid metal and alloys in the form of particles may be reactive. Its hazardous characteristics, including fire and explosion, should be determined prior to disposal.
Contaminated packaging	Dispose of in accordance with local regulations.
EU waste code	06 04 99
Disposal methods/information	Dispose in accordance with all applicable regulations.

SECTION 14: Transport information

ADR

The product is not covered by international regulation on the transport of dangerous goods.

RID

The product is not covered by international regulation on the transport of dangerous goods.

ADN

The product is not covered by international regulation on the transport of dangerous goods.

IATA

The product is not covered by international regulation on the transport of dangerous goods.

IMDG

The product is not covered by international regulation on the transport of dangerous goods.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable. This product is a solid. Therefore, bulk transport is governed by IMSBC code. The material is not covered under the Appendix I.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I

Not listed.

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex II

Not listed.

Regulation (EC) No. 850/2004 On persistent organic pollutants, Annex I as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 1 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 2 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 3 as amended

Not listed.

Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex V as amended

Not listed.

Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry

Not listed.

Regulation (EC) No. 1907/2006, REACH Article 59(1) Candidate List as currently published by ECHA

Not listed.

Authorisations

Regulation (EC) No. 143/2011 Annex XIV Substances Subject to Authorisation

Not listed.

Restrictions on use

Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended

Not listed.

Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work

Not regulated.

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breastfeeding

Not regulated.

Other EU regulations

Directive 96/82/EC (Seveso II) on the control of major-accident hazards involving dangerous substances

Not regulated.

Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work

Cobalt (CAS 7440-48-4)

Directive 94/33/EC on the protection of young people at work

Cobalt (CAS 7440-48-4)

Other regulations

The product is classified and labelled in accordance with Regulation (EC) 1272/2008 (CLP Regulation) as amended and respective national laws implementing EC directives. This Safety Data Sheet complies with the requirements of Regulation (EC) No 1907/2006.

National regulations

Young people under 18 years old are not allowed to work with this product according to EU Directive 94/33/EC on the protection of young people at work. Follow national regulation for work with chemical agents.

15.2. Chemical safety assessment

For this substance a chemical safety assessment has been carried out.

Exposure scenarios relevant for this material are annexed and distributed as separate document to this eSDS.

Identified Uses:

Uses by workers in industrial settings
Use of cobalt in the manufacture of inorganic cobalt substances.
Use of cobalt in the manufacture of cobalt carboxylates and resinates.
Manufacture of cobalt as catalyst.
Industrial use of cobalt as catalyst.
Manufacture and industrial use of cobalt containing alloys and steels.
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.

Uses by professional workers
Professional uses of coatings and inks containing cobalt.
Professional use of dental alloys containing cobalt.

Uses by consumers.
None.

SECTION 16: Other information

List of abbreviations

DNEL: Derived No-Effect Level.
PNEC: Predicted No-Effect Concentration.
PBT: Persistent, bioaccumulative and toxic.
vPvB: Very Persistent and very Bioaccumulative.
DSD: Directive 67/548/EEC.
CLP: Regulation No. 1272/2008.
LD50: Lethal Dose, 50%.

References

IARC Monographs. Overall Evaluation of Carcinogenicity (Volumes 1-102)
IUCLID
Chemical safety report.

Information on evaluation method leading to the classification of mixture

The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available.

Full text of any statements or R-phrases and H-statements under Sections 2 to 15

R42/43 May cause sensitisation by inhalation and skin contact.
R53 May cause long-term adverse effects in the aquatic environment.
R62 Possible risk of impaired fertility.
H317 - May cause an allergic skin reaction.
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H361 - Suspected of damaging fertility or the unborn child.
H413 - May cause long lasting harmful effects to aquatic life.

Training information

Follow training instructions when handling this material.

Disclaimer

This Safety Data Sheet is specifically designed to comply with the requirements of the EU Regulation called REACH - Registration, Evaluation and Authorisation of Chemicals (EC No. 1907/2006 of the European Parliament and of the Council of 18 December 2006) and the corresponding country law, and may not comply with the requirements of any other regulations for safe product handling.