BASE METALS REFINERY

IMPALA
Member of the Implats Group

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SAFETY DATA SHEET – COBALT POWDER

DOCUMENT Nº.: **MAN-HDS-001**

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11	Alice Lourens	Manager Investor Relations (for inclusion on Implats' Web Page)

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Cobalt Powder

Synonyms: Cobalt Metal Powder, Impala Cobalt Powder, Cobalt ACGIH OSHA, Cobalt Metallic, Cobalt – 59, Kobalt (German), Super Cobalt.

Use(s): Process Reagent, Industrial Applications, Paint Additive, alloy manufacturer, flame spraying.

Supplier Details:
Impala Platinum Ltd – Refineries
Base Metals Refinery
P.O. Box 222
SPRINGS
1560
GAUTENG
Republic of South Africa
Tel.: +27 11 360 3478
Suzanne.finney@implats.co.za

Contact Persons: Laboratory Manager – Impala Base Metals Refinery

Emergency Contact Information:
For emergency information – see above for Impala Platinum contacts.
South Africa Poisons Information Centre: (24 hours): 0860 555 777 (South Africa only)

2. HAZARDS IDENTIFICATION

Classification according to GHS Classification (SANS 10234):

Health hazards:

Acute toxicity, oral	Category 4	H302 – Harmful if swallowed
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
Environmental hazards:	Category 4	H413 – May cause long lasting harmful effects in aquatic life

Hazard Summary:

Physical hazards: Not classified for physical hazards

Health hazards: Harmful if swallowed. May cause sensitisation by inhalation or skin contact.

Environmental hazards: May cause long lasting adverse effects in aquatic environment

Specific hazards: Chronic exposure may result in blood, liver, kidney, lung, heart and thyroid damage and skin disease. Cobalt and cobalt compounds are classified as possibly carcinogenic to humans (IARC Group 2B). Occupational exposure has been associated with lung cancer, and with repeated exposure, scarring of the lungs (pulmonary fibrosis. Eco-toxicity is highly unlikely in product form, e.g. during transportation in sealed containers, as eco-toxic only if reacted with oxidising agents, reactive metals or acids (see section 10), which may dissolve the cobalt powder into a solution form, and this will only occur under specially applied conditions.

Label Elements:

Hazard Pictograms:

Signal Word: DANGER

Health Statements:
H301 – Harmful if swallowed
H317 – May cause an allergic skin reaction
H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled
H413 – May cause long lasting harmful effects to aquatic life

Precautionary statements:

Prevention:
P201 – Obtain special instruction before use
P202 – Do not handle until all safety precautions have been read and understood
P261 – Avoid breathing dust/fume
P264 – Wash thoroughly after handling
P270 – Do not eat, drink or smoke when using this product
P272 – Contaminated work clothes must not be allowed out of the work place
P273 – Avoid release to the environment
P285 – In case of inadequate ventilation wear respiratory protection

Response:
P330 – Rinse mouth
P363 – Wash contaminated clothing before reuse
P101 + P312 – IF SWALLOWED: Call a poison centre/doctor
P302 + P352 – IF ON SKIN: Wash well with plenty of soap and water
P308 + P313 – If exposed or concerned get medical advice/attention
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
P305 + P351 + P338 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P337 + P313 – If eye irritation persists get medical advice/attention
P333 + PP313 – If skin irritation or rash occurs get medical advice/attention

Storage: P405 – Stored locked up

Disposal: P501 – Dispose of contents/container in accordance with local/ regional/national/international regulations

Supplemental label information: None

Other Hazards: Not a BPT or vPvB substance or mixture. No other acute or chronic health impact noted.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	:	Cobalt
Formula	:	Co
CAS Nº.	:	7440-48-4
Poison Sched.	**:**	None Allocated
Conc.	**:**	**≥**99.80%
RTECS#	**:**	GF 8750000
EC#	:	027-001-00-9
ICSC#	**:**	0782

4. FIRST AID MEASURES

Eye: Flush gently with running water for minimum 15 minutes. Seek medical attention if irritation develops.

Inhalation: If over exposure occurs leave exposure area immediately. If other than minor symptoms are displayed seek immediate medical attention.

Skin: Remove contaminated clothing and gently flush affected areas with soap and water. Seek medical attention if irritation develops. Launder clothing before reuse.

Ingestion: If poisoning occurs, contact a Doctor or Poisons Information Centre on +27 11 642 2417 South African Poisonous Information Centre (24 hours): 0860 555 777(South Africa only). Do not induce vomiting. Seek immediate medical attention.

First Aid Facilities: Eye wash facilities should be available.

5. FIRE FIGHTING MEASURES

Flash Point: Not detected

Flammable Limits: Not detected. Very fine dust (<3um) may burn when exposed to ignition sources or mixed with strong oxidising agent. May evolve toxic cobalt oxides when heated to decomposition. May evolve explosive hydrogen gas on contact with water / acid.

Auto-ignition Point: Not detected. Toxic cobalt oxides may be evolved when heated. Remain upwind and notify those downwind of hazard. Wear full protective equipment (see spillage section 6.1 below) including Self Contained Breathing Apparatus (SCBA) when combating fire. Use water fog to cool intact containers and nearby storage areas.

Fire Extinguishing Media: Non-flammable. Prevent contamination of drains or waterways; absorb runoff with sand or similar.

Special Fire Fighting Procedures: None

Hazardous Chemical Code: None allocated.

6. ACCIDENTAL RELEASE MEASURES

Spillage: If spilt (bulk), wear dust-proof goggles, PVC/rubber gloves, a Class P1 (Particulate) respirator and overalls. Collect spill and place in sealable container for disposal. Avoid generating dust. May cause long lasting harmful effects in aquatic life. Do not flush residues to sewer. Absorb all residues.

7. HANDLING AND STORAGE

Packaging Material: Packed in blue 250kg drums, loaded in 1000kg lots on a pallet, sealed with a numbered plastic seal and lead seal.

Handling: Before use, read the product label. Use of safe work procedures is recommended. Unsafe work practices to avoid eye or skin contact and inhalation. Observe good personal hygiene. Prohibit eating, drinking and smoking in contaminated areas. Wash hands before eating.

Storage: Store in cool, dry, well ventilated area, removed from oxidising agents, alkalis, acids and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use.

Transport: Not regulated for transport purposes.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits:

OHS Act South Africa	-	0.1mg/m^3
TLV / TWA:ACGIH	-	0.02mg/m^3
TWA ASCC (AUS)	-	0.05mg/m^3 metal dust and fume (as Co)
UK EH40 WELs TWA	-	0.1mg/m^3
PEL (USA)	-	0.01mg/m^3 metal dust and fume (as Co)
REL (USA)	-	0.05mg/m^3 metal dust and fume (as Co)
TLV (USA)	-	0.02mg/m^3 BEI (as Co)
EL (Canada)	-	0.02mg/m^3 IARC 2B
EV (Canada)	-	0.1mg/m^3

Biological Limits:

Reference	Determinant	Sampling Time	BEI
ACGIH BEI	Cobalt in urine	End of shift at end of work week	15 mg/L
ACGIH BEI	Cobalt in blood	End of shift at end of work week	1 mg/L

Exposure Controls: Do not inhale dust / powder. Use with adequate natural ventilation. Where a dust inhalation hazard exists, mechanical extraction ventilation is recommended. Maintain dust / fume levels below the recommended exposure standard.

PPE: Wear dust-proof goggles and PVC or rubber gloves. Where heavy skin contamination is likely wear overalls. Where an inhalation risk exists, wear a Class P2 (Particulate) respirator. At high dust levels, wear a Full-Face Class P3 (Particulate) or Powered Air Purifying Respirator (PAPR). Do **not** take working clothes home.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Grey metallic powder
Physical state	:	Solid
Odour	:	Odourless
Odour threshold	:	Not applicable
Flash Point	:	Not Applicable
Boiling Point	:	2927ºC (5300.6°F)
Melting Point	:	1495ºC (2719.4°F)
Exposure Standard (TWA)	:	0.02 mg/m^3 (cobalt)
Evaporation Rate	:	Not Available
pH	:	Not applicable
% Volatiles	:	Not Available
Specific Gravity	:	8.92
Vapour Pressure	:	Not applicable
Solubility (water)	:	Insoluble
Flammability	:	Non Flammable

Lower Explosion Limit	:	Not applicable
Upper Explosion Limit	:	Not applicable
Auto-ignition temperature	:	Not available
Decomposition temperature	:	Not available
Viscosity	:	Not applicable
Viscosity temperature	:	Not applicable
Molecular Weight	:	58.93g/mole
Co concentration	:	>=99.80%

10. STABILITY AND REACTIVITY

Flammability: Non-flammable – fine particles (<3um) can combust when exposed to ignition sources or mixed with strong oxidising agents. Potentially flammable/explosive mixtures in air may form at high concentrations. May evolve EXPLOSIVE hydrogen gas on contact with water/acids. May evolve toxic cobalt oxides when heated to decomposition.

Reactivity: Incompatible violently/explosively with strong oxidising agents (e.g. peroxides ammonium nitrate, bromine tetrafluoride and nitryl fluoride.) Attacked slowly by ammonia and sodium hydroxide. Incompatible with reactive metals (e.g. potassium and sodium) and with acids (e.g. hydrochloric acid). May spontaneously ignite on contact with air or acetylene in finely ground form.

Decomposition Products: May evolve toxic cobalt oxides when heated to decomposition.

11. TOXICOLOGICAL INFORMATION

Health Hazards – Eye: Irritant. Contact may result in irritation, lacrimation, pain, redness and conjunctivitis. Prolonged contact may cause corneal burns and possible permanent damage.

Health Hazards – Inhalation: Irritant. Over exposure to cobalt has been reported to cause respiratory sensitisation, with asthma like symptoms. Over exposure may result in upper respiratory and mucous membrane irritation, coughing and, at high levels, breathing difficulties with asthma like symptoms, with wheezing and shortness of breath. Potential respiratory sensitiser. Chronic exposure may result in lung fibrosis, hypersensitivity and asthma. DEAFNESS: Bilateral nerve deafness has been described following chronic occupational exposure to cobalt powder or during chronic treatment of anaemia with cobalt chloride. Deafness typically resolves completely after discontinuation of exposure (Gardner, 1953; Schirmacher, 1967; Meecham & Humphrey, 1991). RHINITIS: Rhinitis has been described in diamond polishers with exposure to fine cobalt dust and symptoms of bronchoconstriction (Gheysens et al, 1985).

Health Hazards – Skin: Irritant. Cobalt has been reported to cause dermatitis and skin sensitisation. Chronic over exposure may result in “Cobalt itch” or “carboloy-itch” (“measle like” red spotty rash). Prolonged and repeated contact may result in skin rash, dermatitis and hypersensitivity with allergic response.

Health Hazards – Ingestion: Low to moderate toxicity. Ingestion may result in nausea, vomiting, abdominal pain, diarrhoea, fatigue, dizziness and drowsiness, and with large doses unconsciousness. Ingestion of cobalt salts may cause reproductive effects. Thyroid damage, liver and kidney damage and heart failure may occur.

Acute Toxicity Data:

LDLo (Ingestion)	:	750mg/kg (rabbit)
LDLo (Intraperitoneal)	:	100mg/kg (mouse)
LDLo (Intravenous)	:	100mg/kg (mouse)
LD50 (Ingestion)	:	6170mg/kg (rat)
LD50 (Intaperitoneal)	:	100mg/kg (rat)

Other information: Cobalt salts (not metal) have been reported to cause chromosomal damage in experimental animals. Cobalt and cobalt compounds may cause cancer to humans (IARC Group 2B). Metallic cobalt is retained in and slowly absorbed from the lungs, with an estimated half-life of 5 to 15 years (HSDB).

12. ECOLOGICAL INFORMATION

Only if reacted with acids under specially applied conditions.
Limited ecotoxicity data was available form this product at the time this report was prepared. Ensure appropriate measures are taken to prevent this product from entering the environment and reacting with strong acids.

AQUATIC FATE: Cobalt is absorbed to a great extent by hydrolysis or oxidate sediments. Cobalt may be taken into solution in small amounts through bacteriological activity. TERRESTRIAL FATE: The availability of cobalt is primarily regulated by pH and is usually found in soils as divalent cobalt. At low pH it is oxidised to trivalent cobalt and often found associated with iron. Adsorption of divalent cobalt on soil colloids is high between pH 6 & 7, whereas leaching and plant uptake of cobalt are enhanced by a lower pH (HSDB).

13. DISPOSAL CONSIDERATION

Waste Disposal: Collect and reuse where possible. Minimise dust generation. Contact Impala Refineries on +27 11 360 3478 for additional specific information.

Legislation: Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

Hazchem.	None Allocated
U.N. #	None Allocated
D.G Class	None Allocated
PKG Group	None Allocated
EPG	None Allocated
Sub/Tert. Risk	None Allocated

15. REGULATORY INFORMATION

SA Hazardous Substances Act 15/1973
SANS 10228:2012 SA National Standard – The identification and classification of dangerous goods for transportation by road and rail modes

GHS of Classification and Labelling of Chemicals ST/SG/AC.10/3-/Rev.6

Regulation (EC) No. 1907/2006 of the European Parliament and the Council of December 2006

16. OTHER INFORMATION

Respirators: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

Exposure Standards – Time Weighted Averages: Exposure standards are established on the premise of an 8 hour work period of normal intensity, under normal climatic conditions and where a 16 hour break between shifts exists to enable the body to eliminate absorbed contaminants. In the following circumstances, exposure standards must be reduced; strenuous work conditions; hot, humid climates; high altitude conditions; extended shifts (which increase the exposure period and shorten the period of recuperation).

Colour Rating System: Amber. In accordance with Chem Alert reports are assigned a colour rating of Green, Amber or Red for the purpose of providing users with a quick and easy means of determining the hazardous nature of a product. Safe handling recommendations are provided in all Chem Alert reports so as to clearly identify how users can control the hazards and thereby reduce the risk (or likelihood) of adverse

effects. As a general guideline a Green colour rating indicates a low hazard, and Amber colour rating indicates a moderate hazard and a Red colour indicates rating indicates a high hazard.

Whist all due care has been taken in the preparation of the Colour Rating System, it is intended as a guide only and does not provide any warranty in relation to the accuracy of the Colour Rating System. As far as is lawfully possible, Impala accepts no liability or responsibility whatsoever for the actions or omissions of any person in reliance on the Colour Rating System.

Personal Protective Equipment Guidelines: The recommendation for protective equipment contained within this report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Health Effects from Exposure: It should be noted that the effects from exposure to this will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a report which encompasses all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

Abbreviations: AUS - Australia
mg/m^3 – Milligrams per cubic metre
CAS# - Chemical Abstract Service number – used to uniquely identify chemical compounds
CNS – Central Nervous System
EC – Enzyme commission
EU – European Union
GHS – Global Harmonized System of Classification and Labelling of Chemicals
IARC – International Agency for Research on Cancer
ICSC – International Chemical Safety Card
M – Moles per litre, a unit of concentration
pH – Relates to hydrogen ion concentration - this value will relate to a scale of 0 – 14, where 0 is highly acidic and 14 is highly alkaline.
ppm – Parts per million
RTECS – The Registry of Toxic Effects of Chemical Substances
TWA/ES – Time Weighted Average of Exposure Standard.

Report Status: Impala Platinum Ltd. have exercised reasonable care in the preparation of the information contained in this SDS, however, it assumes no responsibility or liability to the accuracy and suitability of such information, for application to the Buyer's intended purposes or consequences of its use. As regulatory standards and guideline recommendations are revised from time to time, Impala gives no assurance that the information contained in this SDS will be current at the time that the SDS is used. It is the responsibility of the Buyer/User to ensure that the most recent version of this document is available.

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