1 Identification

Product identifier
Product name: Cobalt powder

Stock number: 10610
CAS Number: 7440-48-4
EC number: 231-158-0
Index number: 027-001-00-9

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

Identified use: SU24 Scientific research and development

Details of the supplier of the safety data sheet
Manufacturer/Supplier: Alfa Aesar
Thermo Fisher Scientific Chemicals, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com

Information Department: Health, Safety and Environmental Department
Emergency telephone number: During normal business hours (Monday-Friday, 8am-7pm EST), call (800) 343-0660. After normal business hours, call Carechem 24 at (866) 928-0789.

2 Hazard(s) identification

Classification of the substance or mixture in accordance with 29 CFR 1910 (OSHA HCS)

GHS02 Flame
Flam. Sol. 1 H228 Flammable solid.

GHS08 Health hazard
Resp. Sens. 1 H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.

GHS07 Skin Sens. 1 H317 May cause an allergic skin reaction.

Label elements

GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)

Hazard pictograms

GHS02 GHS08

Signal word Danger

Hazard statements
H228 Flammable solid.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317 May cause an allergic skin reaction.

Precautionary statements
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P284 In case of inadequate ventilation wear respiratory protection.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P342+P311 If experiencing respiratory symptoms: Call a POISON CENTER/doctor/…
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

WHMIS classification

B4 - Flammable solid
D2A - Very toxic material causing other toxic effects

Classification system

HMIS ratings (scale 0-4) (Hazardous Materials Identification System)

Health (acute effects) = 1
Flammability = 2
Physical Hazard = 1

Other hazards

Results of PBT and vPvB assessment

PBT: Not applicable.
vPvB: Not applicable.

3 Composition/information on ingredients

Chemical characterization: Substances
CAS# Description:
7440-48-4 Cobalt

(Contd. on page 2)
4 First-aid measures

Description of first aid measures

After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.

After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.

After eye contact
Rinse opened eye for several minutes under running water. Then consult a doctor.

After swallowing
Seek medical treatment.

Information for doctor

Most important symptoms and effects, both acute and delayed
No further relevant information available.

Indication of any immediate medical attention and special treatment needed
No further relevant information available.

5 Fire-fighting measures

Extinguishing media

Suitable extinguishing agents
Special powder for metal fires. Do not use water.

For safety reasons unsuitable extinguishing agents
Water

Special hazards arising from the substance or mixture
If this product is involved in a fire, the following can be released:
Cobalt oxides

Advice for firefighters

Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation.

Environmental precautions:
Do not allow product to reach sewage system or any water course.

Methods and material for containment and cleaning up:
Dispose of contaminated material as waste according to section 13.
Ensure adequate ventilation.

Prevention of secondary hazards:
Keep away from ignition sources.

Reference to other sections
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

Handling

Precautions for safe handling
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Prevent formation of dust.

Information about protection against explosions and fires:
Protect against electrostatic charges.

Conditions for safe storage, including any incompatibilities

Storage

Requirements to be met by storerooms and receptacles:
Store in a cool location.

Information about storage in one common storage facility:
Do not store together with acids.

Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.

Specific end use(s)
No further relevant information available.

8 Exposure controls/personal protection

Additional information about design of technical systems:

Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Control parameters

Components with limit values that require monitoring at the workplace:

7440-48-4 Cobalt (100.0%)

PEL (USA)
Long-term value: 0.11 mg/m³ as Co; *for metal dust and fume

REL (USA)
Long-term value: 0.05 mg/m³ as Co, metal dust & fume

TLV (USA)
Long-term value: 0.02 mg/m³ as Co, BEI

EL (Canada)
Long-term value: 0.02 mg/m³ IARC ZB

EV (Canada)
Long-term value: 0.1 mg/m³
**Safety Data Sheet**

**Product name:** Cobalt powder

**Ingredients with biological limit values:**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Limit</th>
<th>Medium</th>
<th>Time</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>7440-48-4 Cobalt (100.0%)</td>
<td>15 µg/L</td>
<td>urine</td>
<td>end of shift at end of workweek</td>
<td>Cobalt (background)</td>
</tr>
<tr>
<td></td>
<td>1 µg/L</td>
<td>blood</td>
<td>end of shift at end of workweek</td>
<td>Cobalt (background, semi-quantitative)</td>
</tr>
</tbody>
</table>

**Additional information:** No data

**Exposure controls**

**Personal protective equipment**

**General protective and hygienic measures**

The usual precautionary measures for handling chemicals should be followed.

- Keep away from foodstuffs, beverages and feed.
- Remove all soiled and contaminated clothing immediately.
- Wash hands before breaks and at the end of work.
- Maintain an ergonomically appropriate working environment.

**Breathing equipment:** Use suitable respirator when high concentrations are present.

**Protection of hands:**

- Impervious gloves
- Check protective gloves prior to each use for their proper condition.

The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.

**Penetration time of glove material (in minutes):** Not determined

**Eye protection:** Safety glasses

**Body protection:** Protective work clothing.

**9 Physical and chemical properties**

**Information on basic physical and chemical properties**

**General Information**

- **Appearance:** Powder
- **Color:** Black
- **Odor:** Odorless
- **Odor threshold:** Not determined.
- **pH-value:** Not applicable.

**Change in condition**

- **Melting point/Melting range:** 1495 °C (2723 °F)
- **Boiling point/Boiling range:** 2927 °C (5301 °F)
- **Sublimation temperature/start:** Not determined
- **Flammability (solid, gaseous):** Highly flammable.
- **Ignition temperature:** Not determined
- **Decomposition temperature:** Not determined
- **Auto igniting:** Not determined.

**Danger of explosion:** Not determined.

**Explosion limits:**

- **Lower:** Not determined
- **Upper:** Not determined

**Vapor pressure at 994 °C (1821 °F):** 0.000001 hPa

**Density at 20 °C (68 °F):** 8.92 g/cm³ (74.437 lbs/gal)

**Bulk density at 20 °C (68 °F):** 850 kg/m³

**Relative density:** Not determined.

**Vapor density:** Not applicable.

**Evaporation rate:** Not applicable.

**Solubility in / Miscibility with water:** Insoluble

**Partition coefficient (n-octanol/water):** Not determined.

**Viscosity:**

- **Dynamic:** Not applicable.
- **Kinematic:** Not applicable.

**Other information**

No further relevant information available.

**10 Stability and reactivity**

**Reactivity:** No information known.

**Chemical stability:** Stable under recommended storage conditions.

**Thermal decomposition / conditions to be avoided:** Decomposition will not occur if used and stored according to specifications.

**Possibility of hazardous reactions:** Reacts with strong oxidizing agents

**Conditions to avoid:** No further relevant information available.

**Incompatible materials:**

- Acids
- Oxidizing agents

**Hazardous decomposition products:** Cobalt oxides

**11 Toxicological information**

**Information on toxicological effects**

**Acute toxicity:** The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for this substance.

**LD/LC50 values that are relevant for classification:**

<table>
<thead>
<tr>
<th>Route</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>LD50 6171 mg/kg (rat)</td>
</tr>
</tbody>
</table>

**Skin irritation or corrosion:** May cause irritation

**Eye irritation or corrosion:** May cause irritation

**Sensitization:**

- May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- May cause an allergic skin reaction.

**Germ cell mutagenicity:** The Registry of Toxic Effects of Chemical Substances (RTECS) contains mutation data for this substance.
Product name: Cobalt powder

Carcinogenicity:
IARC-2B: Possibly carcinogenic to humans: limited evidence in humans in the absence of sufficient evidence in experimental animals.
ACGIH A3: Animal carcinogen: Agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for this substance.
Reproductive toxicity: No effects known.
Specific target organ system toxicity - repeated exposure: No effects known.
Specific target organ system toxicity - single exposure: No effects known.
Aspiration hazard: No effects known.
Subacute to chronic toxicity: The Registry of Toxic Effects of Chemical Substances (RTECS) contains multiple dose toxicity data for this substance.
Additional toxicological information: To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

12 Ecological information

Toxicity
Aquatic toxicity: No further relevant information available.
Persistence and degradability: No further relevant information available.
Bioaccumulative potential: No further relevant information available.
Mobility in soil: No further relevant information available.
Additional ecological information:
General notes:
Do not allow undiluted product or large quantities to reach ground water, water course or sewage system.
May cause long lasting harmful effects to aquatic life.
Avoid transfer into the environment.
Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.
Other adverse effects: No further relevant information available.

13 Disposal considerations

Waste treatment methods
Recommendation: Consult state, local or national regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.

14 Transport information

UN-Number
DOT, IMDG, IATA UN3089

UN proper shipping name
DOT Metal powders, flammable, n.o.s. (Cobalt powder)
IMDG, IATA METAL POWDER, FLAMMABLE, N.O.S. (Cobalt powder)

Transport hazard class(es)

DOT

Class Label
4.1 Flammable solids, self-reactive substances and solid desensitised explosives.
4.1 (F3) Flammable solids, self-reactive substances and solid desensitised explosives
4.1

IMDG, IATA

Class Label
4.1 Flammable solids, self-reactive substances and solid desensitised explosives.
4.1

Packing group
DOT, IMDG, IATA III

Environmental hazards:
Not applicable.
Special precautions for user
Warning: Flammable solids, self-reactive substances and solid desensitised explosives
EMS Number:
F-G, S-G
Segregation groups
Heavy metals and their salts (including their organometallic compounds), powdered metals

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

Transport/Additional information:
DOT No
UN "Model Regulation": UN3089, Metal powders, flammable, n.o.s. (Cobalt powder), 4.1, III

15 Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture
GHS label elements The product is classified and labeled in accordance with 29 CFR 1910 (OSHA HCS)
Hazard pictograms

Signal word Danger

(Contd. on page 5)
Safety Data Sheet
per OSHA HazCom 2012

Product name: Cobalt powder

(Contd. of page 4)

38.0.2 Hazard statements
H228 Flammable solid.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317 May cause an allergic skin reaction.

Precautionary statements
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P342+P311 If exposing respiratory symptoms: Call a POISON CENTER/doctor/…
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory. All components of this product are listed on the Canadian Domestic Substances List (DSL).

SARA Section 313 (specific toxic chemical listings)
7440-48-4 Cobalt

California Proposition 65
Prop 65 - Chemicals known to cause cancer
7440-48-4 Cobalt

Prop 65 - Developmental toxicity Substance is not listed.
Prop 65 - Developmental toxicity, female Substance is not listed.
Prop 65 - Developmental toxicity, male Substance is not listed.

Information about limitation of use: For use only by technically qualified individuals.

Other regulations, limitations and prohibitive regulations
Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006. Substance is not listed.

The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.

Substance is not listed.

Annex XIV of the REACH Regulations (requiring Authorisation for use) Substance is not listed.

Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information
Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

Department issuing SDS: Global Marketing Department
Date of preparation / last revision 11/24/2015 / -

Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
WHMIS: Workplace Hazardous Materials Information System (Canada)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
vPvB: very Persistent and very Bioaccumulative
ACGIH: American Conference of Governmental Industrial Hygienists (USA)
OSHA: Occupational Safety and Health Administration (USA)
NTP: National Toxicology Program (USA)
IARC: International Agency for Research on Cancer
EPA: Environmental Protection Agency (USA)