1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers
Product name : Cobalt
Product Number : 266639
Brand : Aldrich
Index-No. : 027-001-00-9
CAS-No. : 7440-48-4

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO  63103
USA
Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number
Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Respiratory sensitisation (Category 1), H334
Skin sensitisation (Category 1), H317

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word : Danger
Hazard statement(s)
H317 May cause an allergic skin reaction.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P272 Contaminated work clothing should not be allowed out of the workplace.
P280 Wear protective gloves.
P285 In case of inadequate ventilation wear respiratory protection.
P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
P304 + P341 IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.

Wash contaminated clothing before reuse.

Dispose of contents/container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

<table>
<thead>
<tr>
<th>Formula</th>
<th>Molecular Weight</th>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co</td>
<td>58.93 g/mol</td>
<td>7440-48-4</td>
<td>231-158-0</td>
<td>027-001-00-9</td>
</tr>
</tbody>
</table>

**Hazardous components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Classification</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>Resp. Sens. 1; Skin Sens. 1; H317, H334</td>
<td>90 - 100 %</td>
</tr>
</tbody>
</table>

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

**General advice**
Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**
Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**
Flush eyes with water as a precaution.

**If swallowed**
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
no data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

**Suitable extinguishing media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Cobalt/cobalt oxides

5.3 Advice for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further information
no data available
6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 Methods and materials for containment and cleaning up
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Air sensitive. Handle and store under inert gas. Keep in a dry place.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>TWA</td>
<td>0.1 mg/m³</td>
<td>USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TWA</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
</tbody>
</table>

Remarks
- Pulmonary function
- Asthma
- Myocardial effects
- Substances for which there is a Biological Exposure Index or Indices (see BEI® section)
- Confirmed animal carcinogen with unknown relevance to humans

<table>
<thead>
<tr>
<th>Value</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02 mg/m³</td>
<td>USA. ACGIH Threshold Limit Values (TLV)</td>
</tr>
<tr>
<td>0.05 mg/m³</td>
<td>USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000</td>
</tr>
<tr>
<td>0.05 mg/m³</td>
<td>USA. NIOSH Recommended Exposure Limits</td>
</tr>
</tbody>
</table>

Biological occupational exposure limits

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Parameters</th>
<th>Value</th>
<th>Biological specimen</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>Cobalt</td>
<td>15 µg/l</td>
<td>In urine</td>
<td></td>
</tr>
</tbody>
</table>

Remarks
- End of shift at end of workweek
- Cobalt 1 µg/l In blood
- End of shift at end of workweek
8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

| a) Appearance | Form: powder |
| b) Odour      | no data available |
| c) Odour Threshold | no data available |
| d) pH         | no data available |
| e) Melting point/freezing point | Melting point/range: 1,493 - 1,495 °C (2,719 - 2,723 °F) |
| f) Initial boiling point and boiling range | 2,900 °C (5,252 °F) - lit. |
| g) Flash point | not applicable |
9.2 Other safety information

no data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
no data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
no data available

10.4 Conditions to avoid

Air

10.5 Incompatible materials
Oxidizing agents, Mineral acids, Acetylene, Hydrazinium nitrate, Strong oxidizing agents, Material readily reacts with acids generating flammable and/or explosive hydrogen gas.

10.6 Hazardous decomposition products
Other decomposition products - no data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - rat - 6,171 mg/kg

Inhalation: no data available

Dermal: no data available

no data available

Skin corrosion/irritation
no data available
Serious eye damage/eye irritation
no data available

Respiratory or skin sensitisation
Germ cell mutagenicity
no data available

Carcinogenicity
This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

IARC:
2B - Group 2B: Possibly carcinogenic to humans (Cobalt)
2A - Group 2A: Probably carcinogenic to humans (Cobalt)
2B - Group 2B: Possibly carcinogenic to humans (Cobalt)

IARC:
2B - Group 2B: Possibly carcinogenic to humans (Cobalt)
2A - Group 2A: Probably carcinogenic to humans (Cobalt)
2B - Group 2B: Possibly carcinogenic to humans (Cobalt)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
no data available

Specific target organ toxicity - single exposure
no data available

Specific target organ toxicity - repeated exposure
no data available

Aspiration hazard
no data available

Additional Information
RTECS: GF8750000
Kidney injury may occur., Damage to the eyes., Lung irritation, Throat., Rash, Vomiting, Diarrhoea

12. ECOLOGICAL INFORMATION

12.1 Toxicity
no data available

Toxicity to algae Remarks: no data available

12.2 Persistence and degradability

12.3 Bioaccumulative potential
Bioaccumulation Rudarius ercodes - 8 Weeks
- 990 µg/l

Bioconcentration factor (BCF): 2.16

12.4 Mobility in soil
no data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted
12.6 Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS
13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 3089  Class: 4.1  Packing group: II
Proper shipping name: Metal powders, flammable, n.o.s.
Reportable Quantity (RQ):
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 3089  Class: 4.1  Packing group: II  EMS-No: F-G, S-G
Proper shipping name: METAL POWDER, FLAMMABLE, N.O.S.
Marine pollutant: No

IATA
UN number: 3089  Class: 4.1  Packing group: II
Proper shipping name: Metal powder, flammable, n.o.s.

15. REGULATORY INFORMATION

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
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</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

Pennsylvania Right To Know Components

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

New Jersey Right To Know Components

<table>
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<tr>
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<th>Revision Date</th>
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<tbody>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>2007-07-01</td>
</tr>
</tbody>
</table>

California Prop. 65 Components
WARNING! This product contains a chemical known to the State of California to cause cancer.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No.</th>
<th>Revision Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>2007-09-28</td>
</tr>
</tbody>
</table>
16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

H317 May cause an allergic skin reaction.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Resp. Sens. Respiratory sensitisation
Skin Sens. Skin sensitisation

HMIS Rating
Health hazard: 0
Chronic Health Hazard: *
Flammability: 0
Physical Hazard 0

NFPA Rating
Health hazard: 0
Fire Hazard: 0
Reactivity Hazard: 0

Further information
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Preparation Information
Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.6 Revision Date: 06/30/2014 Print Date: 09/15/2014