

## Safety Data Sheet

**Material Name: Cobalt Based Alloys**

### \*\*\* Section 1 - Product and Company Identification \*\*\*

#### Manufacturer Information

Stanford Advanced Materials  
Address : 23661 Birtcher Dr.,  
Lake Forest, CA 92630 U.S.A.

Phone: (949) 407-8904

Emergency # (949) 407-8904

### \*\*\* Section 2 - Hazards Identification \*\*\*

#### GHS Classification:

Combustible Dust  
Skin Corrosion/Irritation - Category 2  
Eye Damage/Irritation - Category 2B  
Respiratory Sensitization - Category 1  
Skin Sensitization - Category 1  
Carcinogenicity - Category 1B  
Specific Target Organ Toxicity (Single Exposure) - Category 3  
Specific Target Organ Toxicity (Repeated Exposure) - Category 1  
Hazardous to the Aquatic Environment Chronic- Category 4

#### GHS LABEL ELEMENTS

##### Symbol(s)



##### Signal Word

Danger

##### Hazard Statements

May form combustible dust concentrations in air.  
Causes skin and eye irritation.  
May cause allergy or asthma symptoms or breathing difficulties if inhaled.  
May cause an allergic skin reaction.  
May cause cancer.  
May cause respiratory irritation.  
Causes damage to lungs through prolonged or repeated exposure.  
May cause long lasting harmful effects to aquatic life.

##### Precautionary Statements

###### Prevention

Wash thoroughly after handling.  
Do not eat, drink or smoke when using this product.  
Wear protective gloves/protective clothing/eye protection/face protection.  
Do not breathe dusts.  
Use only outdoors or in a well-ventilated area.  
In case of inadequate ventilation wear respiratory protection.

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Contaminated work clothing must not be allowed out of the workplace.  
Obtain special instructions before use.  
Do not handle until all safety precautions have been read and understood.  
Avoid release to the environment.

### Response

IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention.  
Take off contaminated clothing and wash it before reuse.  
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.  
Continue rinsing. If eye irritation persists get medical advice/attention.  
IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms call a doctor/physician.  
If exposed or concerned: Get medical advice/attention.  
Collect spillage.

### Storage

Store locked up.

### Disposal

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

## \*\*\* Section 3 - Composition / Information on Ingredients \*\*\*

CAS #	Component	Percent
7440-48-4	Cobalt	91-99
7439-89-6	Iron	0-6
7440-02-0	Nickel	0-4

## \*\*\* Section 4 - First Aid Measures \*\*\*

### First Aid: Eyes

First check the victim for contact lenses and remove if present. Lift eyelids and flush immediately with flooding amounts of water for at least 15 minutes. Do not allow the victim to rub his/her eyes or keep them shut. Consult a physician or ophthalmologist if all material cannot be removed or if there is continuing irritation.

### First Aid: Skin

Remove clothing around affected area. Rinse away loose material and wash affected area with soap and water. If there is a severe skin reaction or reddened or blistered skin, consult a physician and be prepared to transport the victim to a hospital for treatment.

### First Aid: Ingestion

Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center with information from this SDS and the Technical Data Sheet on the composition of the material ingested. Unless the poison control center advises otherwise, give the person one or two glasses of water, then induce vomiting. After first aid, have the person see a physician for follow up care.

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## First Aid: Inhalation

Move the person to fresh air and support breathing as required. If symptoms (wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital for treatment.

## \*\*\* Section 5 - Fire Fighting Measures \*\*\*

### General Fire Hazards

See Section 9 for Flammability Properties.

Powder may burn. Dust is an explosion hazard. When Cobalt contacts strong acids, flammable hydrogen gases may form. Also ignites on contact with bromine pentafluoride. Iron can have a violent or explosive reaction with ammonium nitrate + heat, ammonium peroxodisulfate, chloric acid, chlorine trifluoride, chloroformadanium nitrate. Iron may also react with water to produce explosive hydrogen gas.

### Hazardous Combustion Products

Toxic metal oxides, carbon and nitrogen oxides may be produced during a fire involving metal alloys. Alloys with nickel may also produce toxic nickel carbonyl.

### Extinguishing Media

Use dry sand, dry dolomite, or dry graphite powder or other dry chemical extinguishing agent formulated for metal fires.

### Unsuitable Extinguishing Media

Do not use water or halon.

### Fire Fighting Equipment/Instructions

Firefighters should wear full protective gear.

## \*\*\* Section 6 - Accidental Release Measures \*\*\*

### Recovery and Neutralization

Collect spilled material and place in sealed containers for reclamation or disposal.

### Materials and Methods for Clean-Up

Isolate spill area and provide ventilation. Vacuum up spill using a high efficiency particulate absolute (HEPA) air filter, or similar clean up measure that minimize dust, and place in a closed container for disposal. Avoid inhalation of dust. Remove sources of heat or ignition as dust clouds can burn or explode.

### Emergency Measures

Isolate area. Keep unnecessary personnel away.

### Personal Precautions and Protective Equipment

Wear appropriate protective clothing and respiratory protection for the situation.

### Environmental Precautions

None

### Prevention of Secondary Hazards

None

## \*\*\* Section 7 - Handling and Storage \*\*\*

### Handling Procedures

Use local exhaust ventilation to protect against dust and fume inhalation. If workers are exposed to dust provide appropriate respiratory, eye, and skin protection. An eye wash station should be readily available to areas of use.

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## Storage Procedures

Store in a closed container when possible to prevent accidental dust generation and to prevent possible product contamination (due to dampness, dust, etc.). Protect containers from physical damage. Keep dry and isolated from acids, caustics, halogenated compounds, and oxidizers. Do not store near combustible materials. Area should be well ventilated to guard against dust accumulation and dust becoming airborne. Avoid welding in storage area so as not to ignite flammable dusts.

## Incompatibilities

This chemical reacts with acids, but becomes passive in concentrated nitric acid.

## \* \* \* Section 8 - Exposure Controls / Personal Protection \* \* \*

### Component Exposure Limits

#### **Cobalt (7440-48-4)**

ACGIH: 0.02 mg/m3 TWA  
OSHA: 0.05 mg/m3 TWA (dust and fume)  
NIOSH: 0.05 mg/m3 TWA (dust and fume)

#### **Nickel (7440-02-0)**

ACGIH: 1.5 mg/m3 TWA (inhalable fraction)  
OSHA: 1 mg/m3 TWA  
NIOSH: 0.015 mg/m3 TWA

## Engineering Measures

Where feasible, enclose processes to prevent dust dispersion into the work area. Provide local exhaust when possible, and general ventilation as necessary, to keep airborne concentrations below exposure limits and as low as possible.

### Personal Protective Equipment: Respiratory

If airborne concentrations are above the applicable exposure limits, use NIOSH approved respiratory protection.

### Personal Protective Equipment: Hands

Use impervious gloves such as neoprene, nitrile, or rubber for hand protection.

### Personal Protective Equipment: Eyes

Wear safety glasses with side shields and/or goggles as necessary to prevent dust from entering eyes.

### Personal Protective Equipment: Skin and Body

Chemical resistant apron or coveralls is recommended. These should be worn one day only if exposed to particulates, and washed before reuse.

## \* \* \* Section 9 - Physical & Chemical Properties \* \* \*

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**Material Name: Cobalt Based Alloys**

**Appearance:** Gray powder  
**Physical State:** Solid  
**Vapor Pressure:** ND  
**Boiling Point:** ND  
**Solubility (H2O):** Insoluble  
**Evaporation Rate:** ND  
**Octanol/H2O Coeff.:** ND  
**Flash Point Method:** NA

**Lower Flammability Limit (LFL):** NA  
**Auto Ignition:** NA

**Odor:** None  
**pH:** NA  
**Vapor Density:** ND  
**Melting Point:** ND  
**Specific Gravity:** 8.9 (20°C)  
**VOC:** ND  
**Flash Point:** NA  
**Upper Flammability Limit (UFL):** NA  
**Burning Rate:** NA

## \*\*\* Section 10 - Chemical Stability & Reactivity Information \*\*\*

### Chemical Stability

This is a stable material.

### Hazardous Reaction Potential

Will not occur.

### Conditions to Avoid

Contamination from other materials.

### Incompatible Products

Cobalt readily resists oxidation. When finely divided it is pyrophoric in air. It will react with acetylene, hydrazinium nitrate, oxidizing agents in and 1,3,4,7-tetramethylisindole. This chemical reacts with acids, but becomes passive in concentrated nitric acid. Nickel reacts with strong acids to produce hydrogen gas. Iron is incompatible with the following: ammonium nitrate, heat, ammonium, peroxodisulfate, chloric acid, chlorine, trifluoride, chloroformadine, nitrate, sodium acetylide, chlorine, dinitrogen tetroxide, liquid fluorine, nitryl fluoride + heat, peroxy formic and potassium dichromate, sodium peroxide (at 240 °C).

### Hazardous Decomposition Products

Toxic metal oxides and carbon and nitrogen oxides may be produced during a fire involving metal alloys. Iron will create hydrogen gas. If Nickel contacts acids, it may release hydrogen gas that is flammable and explosive.

## \*\*\* Section 11 - Toxicological Information \*\*\*

### Acute Toxicity

#### Component Analysis - LD50/LC50

##### Cobalt (7440-48-4)

Inhalation LC50 Rat >10 mg/L 1 h; Oral LD50 Rat 6170 mg/kg

##### Iron (7439-89-6)

Oral LD50 Rat 984 mg/kg

##### Nickel (7440-02-0)

Oral LD50 Rat >9000 mg/kg

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## Potential Health Effects: Skin Corrosion Property/Stimulativeness

May cause skin irritation and dermatitis especially in creases of the skin where metal may accumulate and rub against skin.

## Potential Health Effects: Eye Critical Damage/ Stimulativeness

Causes eye irritation.

## Potential Health Effects: Ingestion

Ingestion of small amounts may occur through eating, smoking, or other hand to mouth contact. Ingestion of small amounts is unlikely to cause significant health effects, however cobalt poisoning may occur - see a physician if symptoms persist.

## Potential Health Effects: Inhalation

Inhalation of metal powder may cause chills, fever, sweating, nausea, and cough (symptoms of metal fume fever). Metal fume fever symptoms typically begin within 4 to 12 hours after the initial exposure and lasts from approximately 24 hours without causing permanent damage. Other effects may include nose and throat irritation, metallic taste, difficulty breathing, wheezing, coughing, weight loss, pulmonary damage and chest pain. Rare cases of asthma have been reported in individuals exposed to some forms of particulates containing nickel. Inhalation of iron dust and/or powder may attribute to iron poisoning.

## Respiratory Organs Sensitization/Skin Sensitization

Effects of long term or repeated exposure to metal powders may include respiratory disease, pneumoconiosis, bronchial asthma, lung fibrosis, and obstructive airway syndrome depending on the alloy components. Chronic inhalation of cobalt may cause diffuse nodular fibrosis and respiratory sensitivity.

## Generative Cell Mutagenicity

This product is not reported to produce mutagenic effects in humans.

## Carcinogenicity

### A: General Product Information

May cause cancer.

### B: Component Carcinogenicity

#### Cobalt (7440-48-4)

ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans

IARC: Monograph 86 [2006] (without tungsten carbide); Monograph 52 [1991] (Group 2B (possibly carcinogenic to humans))

#### Nickel (7440-02-0)

ACGIH: A5 - Not Suspected as a Human Carcinogen

NIOSH: potential occupational carcinogen

NTP: Reasonably Anticipated To Be A Human Carcinogen (Possible Select Carcinogen)

IARC: Monograph 49 [1990]; Supplement 7 [1987] (Group 2B (possibly carcinogenic to humans))

## Reproductive Toxicity

This product is not reported to cause reproductive effects in humans.

## Specified Target Organ General Toxicity: Single Exposure

May cause respiratory irritation.

## Specified Target Organ General Toxicity: Repeated Exposure

Causes damage to lungs through prolonged or repeated exposure.

## Aspiration Respiratory Organs Hazard

None

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## \*\*\* Section 12 - Ecological Information \*\*\*

### Ecotoxicity

#### A: General Product Information

May cause long lasting harmful effects to aquatic life.

#### B: Component Analysis - Ecotoxicity - Aquatic Toxicity

##### Cobalt (7440-48-4)

###### Test & Species

96 Hr LC50 Brachydanio rerio

>100 mg/L [static]

###### Conditions

##### Iron (7439-89-6)

###### Test & Species

96 Hr LC50 Morone saxatilis

13.6 mg/L [static]

96 Hr LC50 Cyprinus carpio

0.56 mg/L [semi-static]

###### Conditions

##### Nickel (7440-02-0)

###### Test & Species

96 Hr LC50 Brachydanio rerio

>100 mg/L

96 Hr LC50 Cyprinus carpio

1.3 mg/L [semi-static]

96 Hr LC50 Cyprinus carpio

10.4 mg/L [static]

72 Hr EC50 Pseudokirchneriella subcapitata

0.18 mg/L

96 Hr EC50 Pseudokirchneriella subcapitata

0.174 - 0.311 mg/L [static]

48 Hr EC50 Daphnia magna

>100 mg/L

48 Hr EC50 Daphnia magna

1 mg/L [Static]

###### Conditions

### Persistence/Degradability

Metal powders may cause ecological damage through silting or sedimentation effect in water depriving organisms of habitat and mobility, and/or fouling of gills, lungs and skin thus limiting oxygen uptake.

### Bioaccumulation

Metal powders in water or soil may form metal oxides or other metal compounds that could become bioavailable and harm aquatic or terrestrial organisms.

### Mobility in Soil

Metal powder would be relatively immobile in soils but some metal compounds may be transported with ground water.

## \*\*\* Section 13 - Disposal Considerations \*\*\*

### Waste Disposal Instructions

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations.

### Disposal of Contaminated Containers or Packaging

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

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Material Name: Cobalt Based Alloys

## \*\*\* Section 14 - Transportation Information \*\*\*

### DOT Information

Shipping Name: Environmentally Hazardous Substance Solid, n.o.s.

UN #: 3077 Hazard Class: 9 Packing Group: III

## \*\*\* Section 15 - Regulatory Information \*\*\*

### Regulatory Information

#### Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

##### Cobalt (7440-48-4)

SARA 313: 0.1 % de minimis concentration

##### Nickel (7440-02-0)

SARA 313: 0.1 % de minimis concentration

CERCLA: 100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm)

#### State Regulations

#### Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Cobalt	7440-48-4	Yes	Yes	Yes	Yes	Yes	No
Iron	7439-89-6	Yes	No	No	No	No	No
Nickel	7440-02-0	Yes	Yes	Yes	Yes	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.



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## Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Cobalt	7440-48-4	0.1 %
Nickel	7440-02-0	0.1 %

## Additional Regulatory Information

## Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC
Cobalt	7440-48-4	Yes	DSL	EINECS
Iron	7439-89-6	Yes	DSL	EINECS
Nickel	7440-02-0	Yes	DSL	EINECS

## \*\*\* Section 16 - Other Information \*\*\*

### Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; ADG = Australian Code for the Transport of Dangerous Goods by Road and Rail; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; AS = Standards Australia; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; MAK = Maximum Concentration Value in the Workplace; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average

### Literature References

Available on request.

End of Sheet