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**SAFETY DATA SHEET**

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<b>Section 1- IDENTIFICATION</b>		
COMPOSITION <b>Co</b>		PRODUCT NAME <b>Cobalt</b>
SUPPLIER: <b>Plasmaterials, Inc.</b> <b>2268 Research Drive</b> <b>Livermore, CA 94550</b> <b>Ph: 925-447-4030</b>	RECOMMENDED USE: <b>Laboratory Chemicals</b> <b>Scientific Research</b>	EMERGENCY TELEPHONE NUMBERS <b>US: 001-800-424-9300</b> <b>Europe: 001-703-527-3887</b>

<b>Section 2- HAZARD(S) IDENTIFICATION</b>	
<b>Skin Sensitization:</b> Category 1 (H317)	<b>Chronic Aquatic Toxicity:</b> Category 4 (H413)
<b>Respiratory Sensitization:</b> Category 1 (H334)	
<b>LABEL ELEMENTS:</b>	
<b>Signal Word:</b> Danger	
<b>Hazard Symbol:</b>	
	
<b>HAZARD STATEMENTS</b>	
-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	
<b>PRECAUTIONARY STATEMENTS</b>	
-P261: Avoid breathing dust, fume, gas, mist, vapors, spray	
-P264: Wash face, hands and any exposed skin thoroughly after handling	
-P272: Contaminated work clothing should not be allowed out of the workplace	
-P273: Avoid release to the environment	
-P280: Wear protective gloves, protective clothing, eye protection, face protection	
-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	
-P333+P313: If skin irritation or rash occurs: Get medical advice/attention	
-P342+P311: If experiencing respiratory symptoms: Call a poison center/doctor	
-P363: Wash contaminated clothing before reuse	
-P501: Dispose of contents/container to an approved waste disposal plant	
<b>Hazards not otherwise classified (HNOC):</b>	
None known	

### Section 3- COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT	CAS-No	Molecular Weight
Cobalt	7440-48-4	58.93 g/mol

### Section 4- FIRST AID MEASURES

**General Advice:** Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

**Inhalation:** Remove victim from exposure to fresh air. Give oxygen if breathing is difficult. If not breathing, give artificial respiration. Consult a physician if symptoms develop or persist.

**Skin Contact:** Wash off with soap and plenty of water. Consult a physician if irritation develops and/or persists.

**Eye Contact:** Flush eyes with plenty of water, lifting upper and lower lids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops or persists.

**Ingestion:** Rinse mouth with water. Never give anything by mouth to an unconscious person. Get medical attention if symptoms occur. If ingestion of a large amount does occur, call a poison control center immediately.

**Most Important Symptoms/Effects:** The most important known symptoms and effects are described in the labeling (see section 2) and/or in section 11.

**Indication of any Immediate Medical Attention and Special Treatment Needed:** No data available

### Section 5- FIREFIGHTING MEASURES

**Suitable Extinguishing Media:**

Water Fog, Alcohol-Resistant Foam, Dry Chemical Powder, Carbon Dioxide (CO<sub>2</sub>)

**Unsuitable Extinguishing Media:**

No Data Available

**Specific Hazards Arising from the Chemical:**

No data available

**General Fire Hazards:**

No unusual fire or explosion hazards noted.

**Protective Equipment & Precautions for Firefighters:**

As in any fire, Firefighters must wear full face, self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective clothing to prevent contact with skin and eyes.

**Specific Methods:**

Use water spray to cool unopened containers. Use standard firefighting procedures and consider the hazards of other involved materials.

### Section 6- ACCIDENTAL RELEASE MEASURES

**Personal Precautions:**

Keep unnecessary personnel away. Evacuate personnel to safe areas. Wear appropriate protective equipment and clothing during clean-up. Avoid dust formation. Avoid breathing dust, vapors, mist or gas. Ensure adequate ventilation. For personnel protection see Section 8.

**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.

**Methods for Containment & Clean Up:**

Pick up and arrange disposal without creating dust. Sweep up and shovel spillage. Collect in suitable closed container for disposal according to local regulations.

The product is immiscible with water and will spread on the water surface. Dike far ahead of spill for later disposal. Following product recovery, flush area with water.

For waste disposal see Section 13.

## Section 7- HANDLING AND STORAGE

### Handling:

Avoid contact with eyes, skin and clothing. Avoid formation of dust and aerosols. Avoid prolonged exposure. Provide appropriate exhaust ventilation at places where dust is formed. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices. Use care in handling and storage.

### Storage:

Store in original tightly closed container. Store in a dry and well-ventilated place. Store away from incompatible materials.

## Section 8- EXPOSURE CONTROLS/PERSONAL PROTECTION

### Exposure Guidelines:

#### Occupational Exposure Limits/Components with Workplace Control Parameters:

Component	CAS-No.	Value	Control Parameters	Basis
Cobalt	7440-48-4	PEL	0.1 mg/m <sup>3</sup> (Form: Dust and Fume)	USA. Occupational Exposure Limits (OSHA) Table Z-1 Limits for Air Contaminants
		TWA	0.100000 mg/m <sup>3</sup>	USA. Occupational Exposure Limits (OSHA) Table Z-1 Limits for Air Contaminants
		TWA	0.020000 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Pulmonary function Asthma Myocardial effects Substances for which there is a Biological Exposure Index or Indices Confirmed animal carcinogen with unknown relevance to humans		
		TWA	0.05 mg/m <sup>3</sup> (Form: Dust and Fume)	USA. NIOSH Pocket Guide to Chemical Hazards Materials
		TWA	0.050000 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits
		PEL	0.02 mg/m <sup>3</sup> (Form: Dust and Fume)	USA. California Code of Regulations, Title 8, Section 5155, Airborne Contaminants
		PEL	0.02 mg/m <sup>3</sup>	California permissible exposure limits for chemical contaminants (Title 8, Article 107)

#### Biological Occupational Exposure Limits:

Component	CAS-No.	Determinant	Value	Biological Specimen	Basis
Cobalt	7440-48-4	Cobalt	15 µg/l	Urine	ACGIH-Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			
		Cobalt	15 µg/l	In Blood	ACGIH-Biological Exposure Indices (BEI)
	Remarks	End of shift at end of workweek			

**Engineering Controls:** Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable: use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

**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.

**Personal Protective Equipment:**

**Eye/Face Protection:** Wear safety glasses with side shields or goggles. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

**Skin and Body 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.

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

**Thermal Hazards:** Wear appropriate thermal protective clothing when necessary.

**Hygiene Measures:** Handle in accordance with good industrial hygiene and safety practice. When using do not smoke. Keep away from food and drink. Wash thoroughly after handling and before eating, drinking and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

**Section 9- PHYSICAL AND CHEMICAL PROPERTIES**

**Physical State:** Solid

**Color:** No information available

**Odor:** No information available

**Odor Threshold:** No information available

**pH:** No information available

**Melting Point/Range:** 1,493-1,495°C / 2,719-2,723°F

**Boiling Point/Range:** 2,900-2,927°C / 5,252-5,300.6°F – lit.

**Flash Point:** No information available

**Evaporation Rate:** No information available

**Flammability (solid,gas):** No information available

**Flammability or Explosive Limits:**

**Upper:** No data available

**Lower:** No data available

**Vapor Pressure:** No information available

**Vapor Density:** No information available

**Relative Density:** 8.9 g/mL at 25°C / 77°F

**Solubility (Water):** Insoluble

**Partition coefficient; n-octanol/water:** No information available

**Auto Ignition Temperature:** No information available

**Decomposition Temperature:** No information available

**Viscosity:** No information available

**Explosive Properties:** No information available

**Oxidizing Properties:** No information available

**Section 10- STABILITY AND REACTIVITY**

**Reactive Hazard:** No data available

**Stability:** Stable under recommended storage conditions.

**Conditions to Avoid:** Air, Contact with incompatible materials

**Incompatible Materials:** Strong oxidizing agents, mineral acids/acetylene, hydrazinium nitrate, material readily reacts with acids generating flammable and/or explosive hydrogen gas.

**Hazardous Decomposition Products:**

Hazardous decomposition products formed under fire conditions – Cobalt/Cobalt Oxide

Other decomposition products - No data available

**Hazardous Polymerization:** No data available

**Hazardous Reactions:** No data available

## Section 11- TOXICOLOGICAL INFORMATION

### **Information on Toxicological Effects:**

**Acute Toxicity:**

LD50 Oral – Rat – Male and Female – 7,510 mg/kg (OECD Test Guideline 401)

**Inhalation:** No data available

**Dermal:** No data available

**Skin Corrosion/Irritation:** No data available

**Serious eye damage/irritation:** No data available

**Ingestion:** Due to lack of data the classification is not possible

**Respiratory or Skin Sensitization:**

**ACGIH Sensitization:**

HARD METALS CONTAINING COBALT AND TUNGSTEN CARBIDE, THORACIC FRACTION, AS CO (CAS 7440-48-4) – Respiratory Sensitization

**Respiratory Sensitization:** No data available

**Skin Sensitization:** 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, OSHA or EPA classification.

**-IARC:**

2B – Group 2B: Possibly carcinogenic to humans (Cobalt)

2A – Group 2A: Probably carcinogenic to humans (Cobalt)

**-NTP:** Reasonably anticipated to be a human carcinogen (Cobalt)

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

**Germ Cell Mutagenicity:** No data available

**Reproductive Effects:** No data available

**Development Effects:** 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

**Chronic Effects:** Prolonged inhalation may be harmful.

**Additional Information:**

Repeated dose:

Rat – Male and Female – Inhalation (dust/mist/fume) – LOAEL: 0.61 mg/m<sup>3</sup> toxicity

RTECS: GF8750000

-Kidney injury may occur. Damage to the eyes. Lung irritation, Throat, Rash, Vomiting, Diarrhea,

**-To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.**

## Section 12- ECOLOGICAL INFORMATION

**Toxicity:** Toxicity to Fish: LC50 – Danio rerio (zebra fish) - >100 mg/l – 96.0 h

**Persistence and Degradability:** No information available

**Bioaccumulation/Accumulation:** No information available

**Mobility in Soil:** No information available

**Results of PBT & vPvB assessment:** PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

**Other Adverse Effects:** An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life.

## Section 13- DISPOSAL CONSIDERATIONS

**Waste Disposal Methods:** Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Dispose of contaminated packaging as unused product. Dispose in accordance with all applicable regulations.

## Section 14- TRANSPORT INFORMATION

**DOT:** Not regulated as dangerous goods

### IATA:

**UN-No:** 3077

**Proper Shipping Name:** Environmentally hazardous substance, solid, n.o.s. (Cobalt)

**Hazard Class:** 9

**Packing Group:** III

**Special Precautions for User:** Read safety instructions, SDS and emergency procedures before handling

### IMDG/IMO:

**UN-No:** 3077

**Proper Shipping Name:** Environmentally hazardous substance, solid, n.o.s. (Cobalt)

**Hazard Class:** 9

**Packing Group:** III

**EMS-No:** F-A, S-F

**Marine Pollutant:** Yes

**Special Precautions for User:** Read safety instructions, SDS and emergency procedures before handling

### Further Information:

EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or >5kg for solids

## Section 15- REGULATORY INFORMATION

### US Federal Regulations:

**TSCA Section 12(b) Export Notification (40 CFR 707, Subpt.D):** Not regulated

**U.S. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):** Not regulated

**CERCLA Hazardous Substance List (40 CFR 302.4):** Cobalt (CAS No. 7440-48-4) - Listed

**SARA 302 Extremely Hazardous Substance:** No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302

**SARA 304 Emergency Release Notification:** Not regulated

### SARA 313 (TRI Reporting):

Component	CAS No.	Revision Date	% by Weight
Cobalt	7440-48-4	2007-07-01	99.9 – 100

**SARA 311/312 Hazardous Chemical:** Acute Health Hazard; Chronic Health Hazard

### HMIS (USA):

**Health Hazard:** 2

**Chronic Health Hazard:** \*

**Flammability:** 0

**Physical Hazard:** 0

### National Fire Protection Association (USA):

**Health Hazard:** 2

**Fire Hazard:** 0

**Reactivity Hazard:** 0

**Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List:** Cobalt (CAS No. 7440-48-4)

**Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):** Not regulated

**Safe Drinking Water Act (SDWA):** Not regulated

### US Massachusetts Right-to-Know Components:

Component	CAS No.	Revision Date
Cobalt	7440-48-4	2007-07-01

### US New Jersey Right-to-Know Components:

Component	CAS No.	Revision Date
Cobalt	7440-48-4	2007-07-01

### US Pennsylvania Right-to-Know Components:

Component	CAS No.	Revision Date
Cobalt	7440-48-4	2007-07-01

**US California Proposition 65 – CRT:** Warning! This product contains a chemical known to the State of California to cause cancer. Listed date/Carcinogenic Substance

Component	CAS No.	Listed Date
Cobalt	7440-48-4	July 1, 1992

**US California Candidate Chemicals List Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3 subd. (a)):** Cobalt (CAS No. 7440-48-4)

## Section 16- OTHER INFORMATION

The above information is accurate to the best of our knowledge. However, since data, safety standards and government regulations are subject to change, the conditions of handling and use, or misuse are beyond our control, Plasmaterials, Inc. makes no warranty, either expressed or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Users should satisfy themselves that they have all current data relevant to their particular use.

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The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.

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