## SECTION 1 - PRODUCT IDENTIFICATION

**PRODUCT and SYNONYMS:** Cobalt-Chromium-Molybdenum

**MOLECULAR FORMULA AND WEIGHT:** Co -Cr-Mo

**CHEMICAL FAMILY:** Metals, Cobalt Base Alloy

**HMIS HAZARD RATING:**

<table>
<thead>
<tr>
<th>HEALTH</th>
<th>FIRE</th>
<th>REACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

**KEY:** 0=Minimum; 1-Slight; 2-Moderate; 3-Serious; 4-Severe; *-Chronic Hazard

## SECTION 2 - INGREDIENTS/HAZARDS INFORMATION

### Chemical Components

<table>
<thead>
<tr>
<th>C.A.S. NO.</th>
<th>%</th>
<th>C.A.S. NO.</th>
<th>%</th>
<th>C.A.S. NO.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>7440-48-4</td>
<td>60~70</td>
<td>7440-47-3</td>
<td>27~30</td>
<td>7439-98-7</td>
<td>5~6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OSHA PEL</th>
<th>ACGIH TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05mg/m³</td>
<td>TWA 0.02mg(Co)/m³</td>
</tr>
<tr>
<td>1mg/m³</td>
<td>TWA 0.5mg/m³</td>
</tr>
<tr>
<td>10mg/m³</td>
<td>10mg/m³</td>
</tr>
</tbody>
</table>

#### Animal Carcinogen

#### Animal Carcinogen

#### 0.05mg/m³ TWA 0.5mg/m³ 10 hours

#### 20mg Co/m³ (metal,dust and fume)

#### Animal Carcinogen

#### 0.5mg/m³ Suspected Human Carcinogen

**NOISH REL**

<table>
<thead>
<tr>
<th>NIOSH REL</th>
<th>IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05mg/m³</td>
<td>20mg Co/m³</td>
</tr>
</tbody>
</table>

#### (metal,dust and fume)

#### 0.5mg/m³

**DFG TRK**

<table>
<thead>
<tr>
<th>DFG TRK</th>
<th>SEC.302 (EHS)</th>
<th>SEC.304 RQ</th>
<th>SEC.313</th>
<th>EPA TSCA LISTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Carcinogen</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Suspected Human Carcinogen</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**SEC.302 (EHS)**

<table>
<thead>
<tr>
<th>SEC.304 RQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

**SEC.313**

<table>
<thead>
<tr>
<th>SEC.313</th>
<th>EPA TSCA LISTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**EPA TSCA LISTED:**

<table>
<thead>
<tr>
<th>EPA TSCA LISTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

## SECTION 3 - PHYSICAL DATA

<table>
<thead>
<tr>
<th>PHENOMENON</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOILING POINT</td>
<td>N.Av.</td>
</tr>
<tr>
<td>VAPOR DENSITY</td>
<td>N.Av.</td>
</tr>
<tr>
<td>DENSITY</td>
<td>N.Av.</td>
</tr>
<tr>
<td>MELTING POINT</td>
<td>1650ºC</td>
</tr>
<tr>
<td>SOLUBILITY (WT. % IN WATER)</td>
<td>Insoluble in water</td>
</tr>
<tr>
<td>% VOLATILE BY VOLUME</td>
<td>None</td>
</tr>
<tr>
<td>VAPOR PRESSURE</td>
<td>N.Av.</td>
</tr>
<tr>
<td>EVAPORATION RATE</td>
<td>N.Av.</td>
</tr>
<tr>
<td>APPEARANCE AND ODOR</td>
<td>silvery gray hard metal granules, powders, no odor</td>
</tr>
</tbody>
</table>
SECTION 4 - REACTIVITY DATA

STABILITY:  ( ) Unstable  ( x ) Stable
HAZARDOUS POLYMERIZATION:  ( ) May occur  ( x ) Will not occur
CONDITIONS TO AVOID:  keep away from sources of ignition, heat, flames, oxidizing Agents and mineral acids,

INCOMPATIBILITY - MATERIALS TO AVOID:  V:Oxidizing Agents, mineral acids,
HAZARDOUS DECOMPOSITION PRODUCTS:  None recorded

SECTION 5 - FIRE AND EXPLOSION HAZARD DATA

MINIMUM EXPLOSIBLE CONCENTRATION (g/m^3):  N/Av.
FLAMMABILITY:  Not considered flammable. However, powdered cobalt alloy may ignite
EXTINGUISHING MEDIA:  Use dry chemicals such as sand, dolomite, and graphite powder for extinguishing a powdered metal fire. DO NOT USE WATER
FIRE FIGHTING PROCEDURES:  Wear NIOSH/MSHA authorized self-contained breathing apparatus with full protective clothing to provide contact with skin and eyes. Fumes from fire are hazardous & Isolate runoff to ensure ventilation. For large spills & fires immediately call your local fire dept
UNUSUAL FIRE & EXPLOSION HAZARDS:  Not considered flammable; however, finely divided powder in the form of dust can ignite if contacted by an ignition source

SECTION 6 - HEALTH HAZARD DATA

ROUTES OF ENTRY:  INHALATION:  (x)  INGESTION:  (x )
SKIN/ABSORPTION:  (x)  SKIN/EYE CONTACT:  ( x )

ACUTE EFFECTS OF OVEREXPOSURE:
Inhalation-  May irritate nose, throat, respiratory system, and lungs causing cough and/or shortness of breath. Higher exposure can cause a build-up of fluid in the lungs(Pulmonary edema)
Ingestion-  May be toxic by ingestion. The powder may cause dermatitis
Skin-  May cause irritation, redness, watering and skin granulomas or, occasionally blistering.
Eye-  May cause irritation, redness, watering and itching.

CHRONIC EFFECTS OF OVEREXPOSURE:
The following chronic health effects can occur at some time after exposure to Cobalt and can last for months or years. The powder may cause dermatitis.
Cobalt dust can cause skin allergy. If an allergy develops, very low future exposure can cause itching and a skin rash. Cobalt may cause an asthma-like allergy. Future exposure can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.
Repeated exposure to the metal dust can cause scarring of the lungs (fibrosis) even if no symptoms are noticed. This can be disabling or fatal. Cobalt may affect the heart, thyroid and kidneys.

OTHER CHRONIC HEALTH HAZARD : COBALT MAY DECREASE FERTILITY IN MALES.
EXPOSURE TO IONIZING RADIATION IS ASSOCIATE WITH AN INCREASED OF DEVELOPING CANCER. SOME ISOTOPES OF COBALT DO Emit IONIZING RADIATION. COBALT COMPOUNDS MAY CAUSE GENERIC CHANGES. WHETHER OR NOT THEY POSE A CANCER HAZARD NEEDS FURTHER STUDY.
SECTION 6 - HEALTH HAZARD DATA

Laboratory tests indicate chromium may be Carcinogenic. Causes respiratory tract, eye, and skin irritation. May be harmful if inhaled, absorbed through skin or swallowed. Contains material which causes damage to the following organs: respiratory tract, skin, eyes, lens or cornea. Warning: this product contains a chemical known to the State of California to cause cancer.

OTHER COMMENTS: To the best of our knowledge, the chemical, physical and toxicological properties of Cobalt base alloy has not been thoroughly studied and recorded.

TARGET ORGANS: Eyes, skin, respiratory system

TOXICITY DATA: No data available

CARCINOGENCITY: NTP: Yes; IARC Monographs: Yes; OSHA Regulated: No

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: Respiratory system or allergic conditions

RECOMMENDED EXPOSURE LIMITS: Refer to "Section II" LD50/LC50: Non recorded.

SIGNS AND SYMPTOMS OF EXPOSURE:

Inhalation - May cause sneezing, coughing, red and dry throat, shortness of breath
Ingestion - May cause discomfort, nausea and vomiting by local irritation
Skin - May cause redness, burning, itching and inflammation
Eye - May cause redness, watering, itching, burning and inflammation.

SECTION 7 - EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Remove victim to fresh air, administer oxygen (give artificial respiration)
Send to medical attention immediately.

INGESTION: Induce vomiting by giving water or milk, seek medical attention. Do not induce vomiting or give anything by mouth to unconscious person.

SKIN ABSORPTION: Take off contaminated clothing; brush material off skin; wash affected area with soap and water, seek medical attention.

SKIN/EYE CONTACT: flush eyes with water for 15 minutes. Seek medical attention.

SECTION 8 - EMPLOYEE PROTECTION

All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work. Workplace controls are better than personal protective equipment.

RESPIRATORY PROTECTION: Wear appropriate NIOSH/MSHA approved self contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode while conducting operations such as surface grinding which will generate respirable dust.

PROTECTIVE CLOTHING: Suitable protective gear, Do not take contaminated work closes home.

PROTECTIVE GLOVES: Impervious gloves

EYE PROTECTION: Use safety glasses with side shields and full length facechild during mechanic operations such as crushing, blending, compacting or spraying.

VENTILATION: Local exhaust: maintain below PELs or TLVs exposure during working environment to control air contamination.

WORK ENVIRONMENT: keep a dry, clean controlled condition. Do not eat, drink and smoke in work place. Do not blow dust off clothing or skin with compressed air.
SECTION 9 - HANDLING AND ENVIRONMENTAL PROTECTION

PRECAUTIONS TO BE TAKEN DURING HANDLING AND STORAGE:
Store in sealed cans or bottles and stay in cool, dry area away from heat, flames, sparks and dirt.
MACHINING OF COBALT ALLOY MAY RESULT IN FINE TURNINGS, CHIPS/DUST. DO NOT ACCUMULATE LARGE QUANTITIES OF FINES OR MACHINING RESIDUES. DISPOSE OF THESE MATERIALS DAILY.

SPILL OR LEAK PROCEDURES:
Evacuate persons not wearing protective equipments from areas of spill until clean-up is complete
Wear appropriate protective tools specified in Section 8. Isolate the area and insure proper ventilation.
Do not sweep for clean-up. Vacuum up spill using a high efficiency particulate absolute (HEPA) air filter & place in a closed container for safe disposal in an approved facility. Take care not to raise dust.
Ventilate the area of spill or leak after clean-up is complete. If employees are required to clean up spills, they must be properly trained and equipped. For large spills and fires immediately call your local fire dept.

WASTE DISPOSAL: Dispose of in accordance with local, state and federal regulations.

SECTION 10 - TRANSPORTATION REQUIREMENTS

TRANSPORTATION REQUIREMENTS: NO Specific DOT regulations


SECTION 11 - ADDITIONAL COMMENTS

CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATION
EH40 OCCUPATIONS EXPOSURE LIMITS

MAXIMUM EXPOSURE LIMIT: N.Av.

OCCUPATIONAL EXPOSURE STANDARD: N.Av.

THE ABOVE INFORMATION PROVIDED REPRESENTS THE BEST OF OUR KNOWLEDGE. EMPLOYERS SHOULD USE THIS INFORMATION AS A SUPPLEMENT TO OTHER INFORMATION, SUCH AS NEW SAFETY STANDARDS AND GOVERNMENT REGULATION, ETC., GATHERED BY THEM TO ENSURE PROPER USE AND PROTECT THE HEALTH AND SAFETY OF EMPLOYEES. PHELLY MATERIALS MAKES NO WARRANTY, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THE CONTINUING ACCURACY OF THE INFORMATION FURNISHED HEREIN, AND DISCLAIMS ALL LIABILITY FOR RELIANCE THEREON.