

Issuing Date 2015-07-09

Revision Date 2015-04-01

Revision Number 1

## 1. Identification of the substance/preparation and of the Company/undertaking

### Product Identifier

**Product Type** Welding rods, Coated rod (electrode), Welding wire  
**Product name** **Stellite 21 Rod/Wire/Electrode**  
**Product code** KSYC1004-1  
**Type** Base metals and alloys, > 1x1x1 mm

### Other means of identification

**Synonyms** No information available

### Recommended use of the chemical and restrictions on use

**Recommended Use** Service life, cobalt and/or nickel containing alloys, steels, prefabricated parts and tools, Metallurgical Products, Wear and Corrosion Resistant Welding Consumable, Wear and Corrosion Resistant Components, For use in industrial installations only

**Uses advised against** Consumer use.

### Details of the Supplier of the Safety Data Sheet

#### Emergency Telephone Number

**Emergency Telephone Number** CHEMTREC: +1-703-527-3887 (INTERNATIONAL)  
1-800-424-9300 (NORTH AMERICA)

**NRC (National Response Center)** USA, Poison Centres +1 800 222 1222  
Canada, IWK Regional Poison Center +1 902 470 8161 or 1 800 565 8161

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## 2. Hazards Identification

### Classification

This product does not require a hazard communication label as it does not pose a hazard in the form delivered. Hazards can occur while using this product. Please read and follow the instructions of this SDS.

Acute toxicity - Oral	Category 4
Respiratory sensitization	Category 1B
Skin sensitization	Category 1
Carcinogenicity	Category 1B
Reproductive Toxicity	Category 2

### Label Elements

## Emergency Overview

**DANGER**

### Hazard Statements

Harmful if swallowed. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause cancer by inhalation.

May cause an allergic skin reaction. May damage fertility. Causes damage to organs through prolonged or repeated exposure.  
 May cause long lasting harmful effects to aquatic life.  
 Heating may cause a fire.

### Precautionary Statements - Prevention

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wash face, hands and any exposed skin thoroughly after handling. Do not eat, drink or smoke when using this product. Do not breathe dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Wear respiratory protection. In case of inadequate ventilation wear respiratory protection. Contaminated work clothing should not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection.

### Precautionary Statements - Response

IF exposed or concerned: Get medical advice/attention Specific treatment is urgent (see supplemental first aid instructions on this label) **Eyes** 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. **Skin** IF ON SKIN: Wash with plenty of soap and water. If skin irritation or rash occurs: Get medical advice/attention. Wash contaminated clothing before reuse. **Inhalation** IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician. **Ingestion** IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. Rinse mouth.

### Precautionary Statements - Storage

Store locked up. Store in a well-ventilated place. Keep container tightly closed.

### Precautionary Statements - Disposal

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

**Appearance** solid metallic

**Physical State @20°C** solid

**Odor** odorless

### Hazards not otherwise classified (HNOC)

#### Welding Hazards

CAUTION. Welding will create fumes which may be toxic. If welding is performed on plated or coated materials such as galvanised or painted steel, excessive fume may be produced which contains additional hazardous components, and may result in metal fume fever or other health effects. The product and work surface will be hot during and after welding. Electric shock can kill. Arc Rays can injure eyes and burn skin.

#### Other Hazards

May be harmful if swallowed. Causes mild skin irritation. Very toxic to aquatic life with long lasting effects. Very toxic to aquatic life.

#### Unknown Aquatic Toxicity

37.65% of the mixture consists of ingredient(s) of unknown toxicity

## 3. Composition/Information on Ingredients

Chemical name	Formula	CAS-No	weight-%	GHS Classification
Cobalt	Co	7440-48-4	> 50	Acute Oral 4 (H302) Acute dust/mist 1 (H330) Eye damage 2 (H319) Resp. Sens. 1B (H334) Skin Sens. 1 (H317) Carc. 1B (H350i) Repr. tox 2 (H361f) Aquatic Acute 1 M=10(H400) Aquatic Chronic 1 M=1(H410)
Chromium	Cr	7440-47-3	25 - 50	Not classified
Molybdenum	Mo	7439-98-7	5 - 10	Not classified
Nickel	Ni	7440-02-0	2.5 - 3	STOT RE 1 (H372) S,7

				Carc. 2 (H351) S,7 Skin Sens. 1 (H317) S,7 Aquatic Chronic 3 (H412)
Silicon Metal	Si	7440-21-3	1 - 2.5	Not classified
Iron	Fe	7439-89-6	1 - 2.5	Not classified
Manganese	Mn	7439-96-5	0.1 - 1	Not classified
Carbon	C	7440-44-0	0.1 - 1	Not classified
Tungsten	W	7440-33-7	0.1 - 1	Not classified

\* The exact percentage (concentration) of composition has been withheld as a trade secret.

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

- H302 - Harmful if swallowed
- H317 - May cause an allergic skin reaction
- H319 - Causes serious eye irritation
- H330 - Fatal if inhaled
- H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
- H350i - May cause cancer by inhalation
- H351 - Suspected of causing cancer if inhaled
- H361f - Suspected of damaging fertility
- H372 - Causes damage to the following organs through prolonged or repeated exposure if inhaled:  
Lungs
- H400 - Very toxic to aquatic life
- H410 - Very toxic to aquatic life with long lasting effects
- H412 - Harmful to aquatic life with long lasting effects

## 4. First aid measures

### FIRST AID MEASURES

**General advice**

If symptoms persist, call a physician. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get in eyes, on skin, or on clothing. In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

**Eye Contact**

Keep eye wide open while rinsing. If symptoms persist, call a physician. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

**Skin contact**

Consult a physician if necessary. Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Wash off immediately with soap and plenty of water.

**Inhalation**

Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. Oxygen or artificial respiration if needed. Get medical attention. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation.

**Ingestion**

Do NOT induce vomiting. Drink plenty of water. If symptoms persist, call a physician. Rinse mouth.

**Self-protection of the first aider**

Self-protection of the first aider. Wear suitable gloves.

**Most important symptoms and effects, both acute and delayed**

**4.2. Most important symptoms and effects, both acute and delayed**

May cause allergy or asthma symptoms or breathing difficulties if inhaled. CNS and psychiatric effects, Parkinson-like symptoms. Languor, sleepiness and weakness in legs. A stolid masklike appearance of face, emotional disturbances such as uncontrollable laughter and spastic gait with tendency to fall in walking and findings in more advanced cases. Persons with a history of asthma, allergies, chronic or recurrent respiratory disease should not be exposed to any process in which this product is used.

**Indication of any immediate medical attention and special treatment needed**

**Notes to Physician** Treat symptomatically. May cause sensitization by inhalation and skin contact. May cause sensitization of susceptible persons.

## 5. Fire-fighting measures

**Suitable extinguishing media** Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

**Extinguishing media which must not be used for safety reasons** none.

**Specific hazards arising from the chemical** Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes Thermal decomposition can lead to release of irritating and toxic gases and vapors May cause sensitization by inhalation and skin contact Carbon oxides

**Protective equipment and precautions for firefighters** Use personal protective equipment as required In the event of fire, wear self-contained breathing apparatus

### Component Information

Chemical name	Extuinguishing Media for Fires (Suitable)	Extinguishing Media for Fires (Unsuitable)
Chromium	Use extinguishing media appropriate for surrounding fire.	Do not use carbon dioxide, which may form an explosive mixture with powdered chromium.
Silicon Metal	SMALL FIRES: Dry chemical, sand, water spray, foam.; LARGE FIRES: Water spray, fog, foam	-

## 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

**Personal precautions** See Section 12 for additional Ecological Information.

**Environmental precautions** Avoid release to the environment.

**Methods and material for containment and cleaning up** Pick up and transfer to properly labeled containers. Avoid generation of dust. Do not dry sweep dust. Wet dust with water before sweeping or use a vacuum to collect dust.

## 7. Handling and Storage

**Precautions for safe handling** Do not eat, drink or smoke when using this product. Use personal protective equipment as required. Avoid contact with eyes, skin and clothing. Wash contaminated clothing before reuse. Do not breathe dust/fume/gas/mist/vapors/spray.

**Conditions for safe storage, including any incompatibilities**

**Storage** Keep out of the reach of children. Keep container tightly closed in a dry and well-ventilated place. Keep containers tightly closed in a cool, well-ventilated place.

**Incompatible products** None known based on information supplied.

**Specific use(s)** Welding. .

## 8. Exposure Controls/Personal Protection

### Control parameters

Chemical name	Exposure Guidelines				
	USA - ACGIH TLV	USA - OSHA PEL	USA - NIOSH IDLH	Argentina	Brazil
Cobalt	0.02 mg/m <sup>3</sup> TWA 0.005 mg/m <sup>3</sup> TWA	0.1 mg/m <sup>3</sup> TWA (dust and fume)	20 mg/m <sup>3</sup> IDLH (dust and fume)	TWA: 0.02 mg/m <sup>3</sup>	-

	(thoracic fraction, as Co); respiratory sensitizer; A2 - suspected human carcinogen; TLV basis: pneumonitis				
Chromium	0.5 mg/m <sup>3</sup> TWA	1 mg/m <sup>3</sup> TWA	250 mg/m <sup>3</sup> IDLH	TWA: 0.5 mg/m <sup>3</sup>	-
Molybdenum	10 mg/m <sup>3</sup> TWA (inhalable fraction); 3 mg/m <sup>3</sup> TWA (respirable fraction)	Not Listed	5000 mg/m <sup>3</sup> IDLH	TWA: 10 mg/m <sup>3</sup> TWA: 3 mg/m <sup>3</sup>	-
Nickel	1.5 mg/m <sup>3</sup> TWA (inhalable fraction)	1 mg/m <sup>3</sup> TWA	10 mg/m <sup>3</sup> IDLH	TWA: 1.5 mg/m <sup>3</sup>	-
Silicon Metal	-	15 mg/m <sup>3</sup> TWA (total dust); 5 mg/m <sup>3</sup> TWA (respirable fraction)	Not Listed	TWA: 10 mg/m <sup>3</sup>	-
Manganese	0.02 mg/m <sup>3</sup> TWA (respirable fraction); 0.1 mg/m <sup>3</sup> TWA (inhalable fraction)	-	500 mg/m <sup>3</sup> IDLH	TWA: 0.2 mg/m <sup>3</sup>	5 mg/m <sup>3</sup> TWA LT (dust); 1 mg/m <sup>3</sup> TWA LT (fume)
Tungsten	10 mg/m <sup>3</sup> STEL 5 mg/m <sup>3</sup> TWA	-	-	TWA: 5 mg/m <sup>3</sup> STEL: 10 mg/m <sup>3</sup>	-
<b>Chemical name</b>	<b>Canada - Alberta</b>	<b>Canada - British Columbia</b>	<b>Canada - Ontario</b>	<b>Canada - Quebec</b>	<b>Canada - Manitoba</b>
Cobalt	0.02 mg/m <sup>3</sup> TWA	0.02 mg/m <sup>3</sup> TWA	0.02 mg/m <sup>3</sup> TWA	0.02 mg/m <sup>3</sup> TWAEV	0.02 mg/m <sup>3</sup> TWA 0.02 mg/m <sup>3</sup> TWA (as Co)
Chromium	0.5 mg/m <sup>3</sup> TWA	0.5 mg/m <sup>3</sup> TWA	0.5 mg/m <sup>3</sup> TWA	0.5 mg/m <sup>3</sup> TWAEV	0.5 mg/m <sup>3</sup> TWA
Molybdenum	10 mg/m <sup>3</sup> TWA (total); 3 mg/m <sup>3</sup> TWA (respirable)	3 mg/m <sup>3</sup> TWA (respirable); 10 mg/m <sup>3</sup> TWA (inhalable)	10 mg/m <sup>3</sup> TWA (metal, inhalable); 3 mg/m <sup>3</sup> TWA (metal, respirable)	-	10 mg/m <sup>3</sup> TWA (inhalable fraction); 3 mg/m <sup>3</sup> TWA (respirable fraction)
Nickel	1.5 mg/m <sup>3</sup> TWA	0.05 mg/m <sup>3</sup> TWA	1 mg/m <sup>3</sup> TWA (inhalable)	1 mg/m <sup>3</sup> TWAEV	1.5 mg/m <sup>3</sup> TWA (inhalable fraction)
Silicon Metal	-	10 mg/m <sup>3</sup> TWA (total dust); 3 mg/m <sup>3</sup> TWA (respirable fraction)	10 mg/m <sup>3</sup> TWA (total dust)	10 mg/m <sup>3</sup> TWAEV (containing no Asbestos and <1% Crystalline silica, total dust)	-
Manganese	0.2 mg/m <sup>3</sup> TWA	0.2 mg/m <sup>3</sup> TWA	0.2 mg/m <sup>3</sup> TWA	5 mg/m <sup>3</sup> TWAEV (dust); 1 mg/m <sup>3</sup> TWAEV (fume) 3 mg/m <sup>3</sup> STEV (fume)	0.02 mg/m <sup>3</sup> TWA (respirable fraction); 0.1 mg/m <sup>3</sup> TWA (inhalable fraction) 0.02 mg/m <sup>3</sup> TWA (as Mn, listed under respirable fraction); 0.1 mg/m <sup>3</sup> TWA (as Mn)
Tungsten	5 mg/m <sup>3</sup> TWA 10 mg/m <sup>3</sup> STEL	5 mg/m <sup>3</sup> TWA 10 mg/m <sup>3</sup> STEL	5 mg/m <sup>3</sup> TWA 10 mg/m <sup>3</sup> STEL	-	5 mg/m <sup>3</sup> TWA 5 mg/m <sup>3</sup> TWA (as W) 10 mg/m <sup>3</sup> STEL
<b>Chemical name</b>	<b>Chile</b>	<b>Colombia - OEL</b>	<b>Mexico OEL (TWA)</b>	<b>Nicaragua</b>	<b>Peru</b>
Cobalt	TWA: 0.016 mg/m <sup>3</sup>	0.02 mg/m <sup>3</sup> TWA 0.02 mg/m <sup>3</sup> TWA (as Co)	0.1 mg/m <sup>3</sup> TWA LMPE-PPT (dust and fume, as Co)	0.02 mg/m <sup>3</sup> TWA 0.02 mg/m <sup>3</sup> TWA (as Co)	0.02 mg/m <sup>3</sup> TWA
Chromium	TWA: 0.4 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup> TWA	0.5 mg/m <sup>3</sup> TWA LMPE-PPT	0.5 mg/m <sup>3</sup> TWA	-
Molybdenum	-	10 mg/m <sup>3</sup> TWA (inhalable fraction); 3 mg/m <sup>3</sup> TWA (respirable fraction)	-	10 mg/m <sup>3</sup> TWA (inhalable fraction); 3 mg/m <sup>3</sup> TWA (respirable fraction) 10 mg/m <sup>3</sup> TWA (inhalable fraction, as Mo); 3 mg/m <sup>3</sup> TWA (respirable fraction, as	-

				Mo)	
Nickel	TWA: 0.8 mg/m <sup>3</sup>	1.5 mg/m <sup>3</sup> TWA (inhalable fraction)	1 mg/m <sup>3</sup> TWA LMPE-PPT	1.5 mg/m <sup>3</sup> TWA (inhalable fraction)	1.5 mg/m <sup>3</sup> TWA
Silicon Metal	-	-	10 mg/m <sup>3</sup> TWA LMPE-PPT (inhalable fraction)	-	10 mg/m <sup>3</sup> TWA (inhalable fraction); 4 mg/m <sup>3</sup> TWA (respirable fraction); 5 mg/m <sup>3</sup> TWA (welding fumes)
Manganese	TWA: 0.8 mg/m <sup>3</sup> TWA: 4 mg/m <sup>3</sup>	0.02 mg/m <sup>3</sup> TWA (respirable fraction); 0.1 mg/m <sup>3</sup> TWA (inhalable fraction) 0.02 mg/m <sup>3</sup> TWA (as Mn, listed under respirable fraction); 0.1 mg/m <sup>3</sup> TWA (as Mn)	0.2 mg/m <sup>3</sup> TWA LMPE-PPT; 1 mg/m <sup>3</sup> TWA LMPE-PPT (fume, as Mn)	0.1 mg/m <sup>3</sup> TWA (inhalable fraction); 0.02 mg/m <sup>3</sup> TWA (respirable fraction) 0.02 mg/m <sup>3</sup> TWA (respirable fraction, as Mn); 0.1 mg/m <sup>3</sup> TWA (as Mn)	0.2 ppm TWA
Carbon	-	-	2 mg/m <sup>3</sup> TWA LMPE-PPT (dust)	-	-
Tungsten	-	5 mg/m <sup>3</sup> TWA 5 mg/m <sup>3</sup> TWA (as W) 10 mg/m <sup>3</sup> STEL 10 mg/m <sup>3</sup> STEL (as W)	-	5 mg/m <sup>3</sup> TWA 5 mg/m <sup>3</sup> TWA (as W) 10 mg/m <sup>3</sup> STEL	5 mg/m <sup>3</sup> TWA
<b>Chemical name</b>	<b>Uruguay</b>	<b>Venezuela</b>	...	...	...
Cobalt	0.02 mg/m <sup>3</sup> TWA	TWA: 0.02 mg/m <sup>3</sup>	-	-	-
Chromium	0.5 mg/m <sup>3</sup> TWA	TWA: 0.5 mg/m <sup>3</sup>	-	-	-
Molybdenum	10 mg/m <sup>3</sup> TWA (inhalable fraction); 3 mg/m <sup>3</sup> TWA (respirable fraction)	TWA: 10 mg/m <sup>3</sup> TWA: 3 mg/m <sup>3</sup>	-	-	-
Nickel	1.5 mg/m <sup>3</sup> TWA (inhalable fraction)	TWA: 1.5 mg/m <sup>3</sup>	-	-	-
Silicon Metal	-	TWA: 10 mg/m <sup>3</sup>	-	-	-
Manganese	0.02 mg/m <sup>3</sup> TWA (respirable fraction); 0.1 mg/m <sup>3</sup> TWA (inhalable fraction)	TWA: 0.2 mg/m <sup>3</sup>	-	-	-
Tungsten	10 mg/m <sup>3</sup> STEL 5 mg/m <sup>3</sup> TWA	STEL: 10 mg/m <sup>3</sup> TWA: 5 mg/m <sup>3</sup>	-	-	-

**Other Exposure Guidelines** Hexavalent Chrome may be formed during welding.

Chemical name	Derived No Effect Level (DNEL)	Predicted No Effect Concentration (PNEC)
Cobalt	0.04 mg/m <sup>3</sup> long term local inhalation	2.36 µg Co/l (AF 3) marine water; 0.74 µg/l (AF 3) fresh water
Chromium	0.5 mg/m <sup>3</sup> local inhalation	-
Molybdenum	11.17 mg/m <sup>3</sup> longterm local inhalation	-
Nickel	0.05 mg/m <sup>3</sup> local inhalation; 0.05 mg/m <sup>3</sup> systemic inhalation	0.0035-0.0218 mg/l freshwater; 0.0023 mg/l marine water
Iron	3 mg/m <sup>3</sup> local inhalation	-
Manganese	0.2 mg/m <sup>3</sup> systemic inhalation	-
Carbon	10 mg/m <sup>3</sup> systemic inhalation	-
Tungsten	5.8 mg/m <sup>3</sup> systemic inhalation	Tungsten 0.338 mg/l freshwater; 0.0338 mg/l marine water; 2.17 mg/kg soil; 11 mg/kg food

### Appropriate engineering controls

**Engineering controls** Showers  
Eyewash stations  
Ventilation systems.

### Individual protection measures, such as personal protective equipment

**Eye Protection** Use suitable eye protection to guard against the effects of welding. Wear safety glasses

with side shields (or goggles). Eye-irrigation bottle with pure water.

- Skin Protection** Long sleeved clothing. Wear fire/flammable resistant/retardant clothing. Wear impervious gloves and/or clothing if needed to prevent contact with the material. Gloves should be replaced regularly and if there is any sign of damage to the glove material.
- Hand Protection** Protective gloves. The product and work surface will be hot during and after welding. Ensure adequate protection is in place to stop individuals from burning themselves.
- Respiratory protection** Use only with adequate ventilation. If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.
- Hygiene Measures** Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Regular cleaning of equipment, work area and clothing is recommended. Keep away from food, drink and animal feeding stuffs. Avoid contact with skin, eyes and clothing. Wash hands before breaks and at the end of workday.

### Biological standards

Chemical name	USA ACGIH -BEI	Argentina - Occupational Exposure Limits - Biological Exposure Indices (BEIs)	Chile - Occupational Exposure Limits - Biological Exposure Indices (BEIs)
Cobalt	15 µg/L Medium: urine Time: end of shift at end of workweek Parameter: Cobalt (nonspecific)	15 µg/L urine end of shift on the last day of workweek Co (Background); 1 µg/L blood end of shift on the last day of workweek Co (Background, semi-quantitative)	-
Chemical name	Mexico - Occupational Exposure Limits - BEIs (IBE)	Venezuela - Biological Exposure Indices (BEIs)	...
Cobalt	15 µg/L Medium: urine Time: end of shift at end of work week Parameter: Cobalt (background); 1 µg/L Medium: blood Time: end of shift at end of work week Parameter: Cobalt (background, semi-quantitative)	15 µg/L urine end of shift at end of workweek Cobalt (F); 1 µg/L urine end of shift at end of workweek Cobalt (F,Sc)	-

### 9.1 Information on basic physical and chemical properties

<b>Physical State @20°C</b>	solid	<b>Appearance</b>	solid, metallic
<b>Odor</b>	odorless	<b>Melting point / melting range</b>	1285-1395 °C / 2340-2540 °F
<b>flash point</b>	not applicable	<b>Vapor Pressure</b>	not applicable
<b>Vapor Density</b>	not applicable	<b>Water solubility</b>	Insoluble in water
<b>Dynamic viscosity</b>	solid	<b>Density VALUE</b>	8.44 g/cm <sup>3</sup>

### 9.2. Other information

VOC Content (%) Not Applicable

### Component Information

Chemical name	Mol. Weight	Water Solub.	Vap. Press.	Vap. Dens.	pH Val.	Autoign. Temp.	Evap. Rate	Boil. Temp.
Cobalt	58.93 g/mol	-	0.00007 hPa at 1050 °C	-	-	-	-	2870 °C
Chromium	51.99 g/mol	-	-	-	-	-	-	2642 °C
Molybdenum	95.95 g/mol	0 mg/L at 20 °C	-	-	-	-	-	4612 °C at 101.3 hPa
Nickel	58.69 g/mol	-	1 mmHg at	-	-	-	-	-



Chemical name	Density VALUE	Melt. Temp.	Flash Point	Water Sol.	Bulk Dens.	Odor	State	color
Silicon Metal	28.08 g/mol	<1 mg/L	1810 °C	-	-	-	-	-
Iron	55.84 g/mol	-	0.000001 hPa at 25 °C	-	-	>100 °C	-	-
Manganese	54.93 g/mol	-	1 mmHg at 1292 °C	-	-	-	-	-
Carbon	12.01 g/mol	-	-	-	-	300 - 500 °C	-	-
Tungsten	183.84 g/mol	-	0.00000001 hPa at 1700 °C	-	-	-	-	-
Cobalt	8.85 - 8.9 g/cm3 at 20 °C	<1495 °C	-	soluble	-	-	-	-
Chromium	7.19 g/cm3 at 20 °C	1900 °C	-	insoluble	-	-	-	grey
Molybdenum	10.2 g/cm3 at 20 °C	2617 °C (sublimes)	-	insoluble	-	-	-	-
Nickel	8.9 g/cm3 at 25 °C	-	-	insoluble	-	-	-	-
Silicon Metal	2.33 g/cm3 at 25 °C	1410 °C	-	-	-	-	-	dark grey; dark brown
Iron	7.87 g/cm3 at 25 °C	1539 °C	-	insoluble	3000 - 4000 kg/m³	-	-	-
Carbon	-	>=3500 °C	-	insoluble	0.25 - 0.75 kg/m³ at 20 °C	-	-	-
Tungsten	19.3 g/cm3 at 20 °C	3422 °C	-	slightly soluble	2100 - 9000 kg/m³	-	-	-

## 10. Stability and Reactivity

<b>Reactivity</b>	Stable under normal conditions
<b>Chemical stability</b>	Stable under normal conditions.
<b>Possibility of Hazardous Reactions</b>	None under normal processing.
<b>Conditions to avoid</b>	Keep away from sources of heat (e.g. hot surfaces), sparks and open flames.
<b>incompatible materials</b>	Acids. Strong oxidizing agents.
<b>Hazardous decomposition products</b>	Thermal decomposition can lead to release of toxic/corrosive gases and vapors.

## 11. Toxicological Information

### Information on likely routes of exposure

#### Product Information

<b>Inhalation</b>	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
<b>Eye Contact</b>	May cause eye irritation with susceptible persons.
<b>Skin contact</b>	Repeated or prolonged skin contact may cause allergic reactions with susceptible persons. Prolonged contact may cause redness and irritation. Prolonged skin contact may defat the skin and produce dermatitis. May cause sensitization by skin contact.
<b>Ingestion</b>	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Ingestion may cause irritation to mucous membranes.

Chemical name	Oral LD50	dermal LD50	Inhalation LC50
Cobalt	550 mg/kg bw	>2000 mg/kg bw	0.05 mg/L



Chromium	LD50 >5000 mg/kg bw	Data waiving - Study Scientifically Unjustified	LC50 >5.41 mg/L air (analytical)
Molybdenum	LD50 >2000 mg/kg bw	Not Classified	LC50 >3.92 mg/L air
Nickel	>9000 mg/kg bw	Data waiving - Other Justification	NOAEC >=10.2 mg/L air
Silicon Metal	LD50 >3160 mg/kg bw	LD50 >5000 mg/kg bw	Acutely Non Toxic
Iron	= 984 mg/kg ( Rat )	-	-
Manganese	LD50 >2000 mg/kg bw	Data waiving - Study Scientifically Unjustified	LC50 >5.14 mg/L air (analytical)
Carbon	> 10000 mg/kg ( Rat )	-	-
Tungsten	LD50 >2000 mg/kg bw	LD50 >2000 mg/kg bw	LC50 >5.4 mg/L air

### Information on toxicological effects

Chemical name	US ACGIH - Critical effects
Cobalt	asthma; myocardial effects; pulmonary function
Chromium	skin and upper respiratory tract irritation
Nickel	dermatitis; pneumoconiosis
Manganese	CNS impairment
Tungsten	lower respiratory tract irritation

### Delayed and immediate effects as well as chronic effects from short and long-term exposure

**Irritation** Repeated exposure may cause skin dryness or cracking.

**Sensitization** May cause sensitization of susceptible persons.

**MUTAGENIC EFFECTS** None known.

**Carcinogenicity** This product contains one or more substances which are classified by IARC as carcinogenic to humans (Group I), probably carcinogenic to humans (Group 2A) or possibly carcinogenic to humans (Group 2B).

Chemical name	ACGIH	IARC	NTP: (National Toxicity Program)	OSHA
Cobalt	A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans	Group 2B - Possible Human Carcinogen	Printed Long-Term and Short-Term Study Reports: Long-Term Studies 16 Male Rat - Clear Evidence; Female Rat - Clear Evidence; Male Mice - Clear Evidence; Female Mice - Clear Evidence (TR-581) Present (includes nanoparticles, listed under Cobalt and certain cobalt compounds) Present (see RoC monograph for specific cobalt compounds, listed under Cobalt and certain cobalt compounds)	Not Listed
Chromium	A4 - Not Classifiable as a Human Carcinogen	Group 3 - Not Classified as a Human Carcinogen	Long-Term Exposure Studies for Which Technical Reports Were Not Prepared 17	Not Listed
Nickel	A5 - Not Suspected as a Human Carcinogen	Nickel Compounds: Group 1 - Known Human Carcinogen - Nickel, Metallic & Alloy: Group 2B - Possible Human Carcinogen	Known Human Carcinogen (listed under Nickel compounds and metallic nickel) Reasonably Anticipated To Be A Human Carcinogen Present (nanoparticles)	Not Listed
Iron	-	-	Present (excess or overload)	-
Manganese	A4 - Not Classifiable as a	-	-	-

	Human Carcinogen			
Tungsten	-	-	Short-Term Exposure Studies in Progress 5 (including suboxide fibers)	-
Chemical name	Chile	Argentina	Venezuela	Peru
Cobalt	A3 - Animal Carcinogen	A3 - Confirmed animal carcinogen with unknown relevance to humans	Present	-
Chromium	A4 - Not Classifiable as a Human Carcinogen	A4 - Not classifiable as a human carcinogen	A4 - Not Classified as a Carcinogen in Humans	-
Nickel	A1 - Confirmed Human Carcinogen	A5 - Not Suspected as a human carcinogen	A5 - Not an Alleged Carcinogen in Humans	A1 - Confirmed Human Carcinogen
Chemical name	Canada Alberta	Canada British Coloumbia	Canada Manitoba	Canada Quebec
Cobalt		IARC Category 2B - Possible Human Carcinogen	A3 Confirmed Animal Carcinogen with Unknown Relevance to Humans	C3 carcinogen - effect detected in animals
Chromium		-	A4 Not Classifiable as a Human Carcinogen	-
Nickel		IARC Category 2B - Possible Human Carcinogen	A5 Not Suspected as a Human Carcinogen	-
Manganese		-	A4 Not Classifiable as a Human Carcinogen	-

**Reproductive toxicity**  
**Chronic toxicity**

Contains a known or suspected reproductive toxin.  
Prolonged exposure may cause chronic effects. CNS and psychiatric effects, Parkinson-like symptoms. Languor, sleepiness and weakness in legs. A stolid masklike appearance of face, emotional disturbances such as uncontrollable laughter and spastic gait with tendency to fall in walking and findings in more advanced cases. Repeated contact may cause allergic reactions in very susceptible persons. Avoid repeated exposure. Repeated or prolonged skin contact may cause skin irritation and/or dermatitis and sensitization of susceptible persons. Repeated or prolonged exposure may cause central nervous system damage. Contains a known or suspected reproductive toxin. This product contains one or more substances which are classified by IARC as carcinogenic to humans (Group I), probably carcinogenic to humans (Group 2A) or possibly carcinogenic to humans (Group 2B).

**Target organ effects**

blood, central nervous system (CNS), Central Vascular System (CVS), Eyes, kidney, liver, Lungs, Nasal Cavities, respiratory system, Skin.

**Neurological effects**

Repeated or prolonged exposure may cause central nervous system damage. Prolonged or excessive exposure to manganese in dust or fume may cause irreversible central nervous system damage (Manganism). Symptoms resemble Parkinson's disease and include tremors, impaired speech, mask like face and impaired movement.

**Numerical measures of toxicity**

No data available

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral)	508 mg/kg
ATEmix (dermal)	5 mg/kg
ATEmix (inhalation-gas)	10 mg/l

## 12. Ecological Information

**12.1. Ecotoxicity**

96% of the mixture consists of components(s) of unknown hazards to the aquatic environment

**12.2 Persistence and degradability**

Product/Substance is inorganic. not applicable.

**12.3 Bioaccumulative potential** No information available.

**12.5 Results of PBT and vPvB assessment** The components in this formulation do not meet the criteria for classification as PBT or vPvB

**12.6 Other adverse effects** None known

## 13. Disposal Considerations

**Waste treatment methods** It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. It must undergo special treatment, e.g. at suitable disposal site, to comply with local regulations.

**Waste from residues/unused products** Reuse or recycle. Recover or recycle if possible. Dispose of in accordance with local regulations.

**Contaminated packaging** Empty containers should be taken to an approved waste handling site for recycling or disposal.

**California Waste Status** This product contains one or more substances that are listed with the State of California as a hazardous waste.

Chemical name	California Hazardous Waste Status
Cobalt	Toxic Ignitable
Chromium	Toxic Corrosive Ignitable
Molybdenum	Ignitable
Nickel	Toxic Ignitable
Manganese	Ignitable

## 14. Transport Information

**DOT** Not regulated

Chemical name	U.S. - DOT Reportable Quantities	DOT Marine Pollutant	DOT Severe Marine pollutant
Chromium	5000 lbs RQ (The RQ for these hazardous substances is limited to those pieces of the metal having a diameter smaller than 100 µm (0.004 inches).); 2270 kg RQ (The RQ for these hazardous substances is limited to those pieces of the metal having a diameter smaller than 100 µm (0.004 inches).)	-	-
Nickel	100 lbs RQ (The RQ for these hazardous substances is limited to those pieces of the metal having a diameter smaller than 100 µm (0.004 inches).); 45.4 kg RQ (The RQ for these hazardous substances is limited to those pieces of the metal having a diameter smaller than 100 µm (0.004 inches).)	-	-

**TDG** Not regulated

**MEX** Not regulated

**IMO / IMDG** Not regulated

ICAO / IATA-DGR

Not regulated

## 15. Regulatory Information

Chemical name	TSCA
Cobalt	Present Effective 06/01/1987, Sunset 06/01/1997
Chromium	Present
Molybdenum	Present
Nickel	Present
Silicon Metal	Present
Iron	Present
Manganese	Present
Carbon	Present
Tungsten	Present
Chemical name	Bolivia - hazardous substances regulated under Bolivia's Environmental Regulations for the Industrial Manufacturing Sector
Cobalt	Present
Nickel	Present

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

### U.S. Federal Regulations

Chemical name	CAS-No	weight-%	SARA 313 - Threshold Values %
Cobalt	7440-48-4	> 50	Present
Chromium	7440-47-3	25 - 50	Present
Molybdenum	7439-98-7	5 - 10	-
Nickel	7440-02-0	2.5 - 3	-
Silicon Metal	7440-21-3	1 - 2.5	-
Iron	7439-89-6	1 - 2.5	-
Manganese	7439-96-5	0.1 - 1	-
Carbon	7440-44-0	0.1 - 1	-
Tungsten	7440-33-7	0.1 - 1	-

### SARA 311/312 Hazard Categories

Acute health hazard	yes
Chronic Health Hazard	yes
Fire Hazard	no
Sudden release of pressure hazard	no
Reactive Hazard	no

### Clean Water Act

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Chromium	Not Applicable	Present	Present	Not Applicable
Nickel	Not Applicable	Present	Present	Not Applicable

### CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Chemical name	Hazardous Substances RQs	Extremely Hazardous Substances RQs	RQ
Chromium	5000 lb final RQ (no reporting of	-	5000 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); 2270 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)		releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 2270 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)
Nickel	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)	-	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)

## U.S. State Regulations

**California Proposition 65** This product contains the following Proposition 65 chemicals:

Chemical name	California - Proposition 65 - Carcinogens List	California - Proposition 65 - Developmental Toxicity	California - Proposition 65 - Reproductive Toxicity	California - 22 CCR - Toxic and Extremely Hazardous Carcinogenic Wastes
Cobalt	carcinogen, initial date 7/1/92 (powder)	-	-	-
Nickel	carcinogen, initial date 10/1/89 (metallic)	-	-	-

## U.S. State Right-to-Know Regulations

Chemical name	New Jersey	Massachusetts	Pennsylvania
Cobalt	sn 0520	Present	Environmental hazard (fume) Present
Chromium	sn 0432	Carcinogen; Extraordinarily hazardous	Environmental hazard; Special hazardous substance Present
Molybdenum	sn 1309	Present	Present
Nickel	sn 1341 (dust and fume)	Carcinogen; Extraordinarily hazardous	Environmental hazard; Special hazardous substance Present
Silicon Metal	sn 3125 (powder)	Present (dust, exempt when encapsulated or if particulates are not present and cannot be substantially generated through use of the product)	Present
Manganese	sn 1155 (dust and fume)	Present	Environmental hazard Present
Tungsten	sn 1959	Present	Present

## CANADA

### WHMIS Statement

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR

Chemical name	WHMIS Classifications of Components
Cobalt	D2A, D2B
Chromium	Uncontrolled product according to WHMIS classification criteria
Molybdenum	Uncontrolled product according to WHMIS classification criteria
Nickel	D2A, D2B; B6, D2A (Raney)
Silicon Metal	B4
Iron	Uncontrolled product according to WHMIS classification criteria
Manganese	D2A (including powder)

Carbon	Uncontrolled product according to WHMIS classification criteria
Tungsten	Uncontrolled product according to WHMIS classification criteria

## 16. Other Information

### Global Automotive Declarable Substance List Classifications

Chemical name	Global Automotive Declarable Substance List Classifications	Global Automotive Declarable Substance List Thresholds
Cobalt	Declarable Substance (FI)	0.1 %
Nickel	Declarable Substance (FI)	0.1 %

<b>NFPA</b>	Health hazard 2	Flammability 0	Instability 0	Physical and Chemical Hazards -
<b>HMIS</b>	Health hazard 2	Flammability 0	Physical hazards 0	Personal precautions -

Issuing Date 2015-07-09

Revision Date 2015-04-01

Revision Note No information available

#### Disclaimer

Kennametal urges each customer or recipient of this SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific SDSs, we are not and cannot be responsible for SDS's obtained from any source other than ourselves. If you have obtained an SDS from another source or if you are not sure that the SDS you have is current, please contact us for the most current version.

End of Safety Data Sheet