STANFORD ADVANCED MATERIALS

SAFETY DATA SHEET

Issue Date 29-Apr-2015 **Revision Date** 29-Apr-2015 **Version** 1

1. IDENTIFICATION

Product identifier

Product Name All General Carbide Corporation Grades containing Cobalt, Nickel, Nickel-Cobalt, or Nickel-Cobalt-Chromium

Other means of identification

Material Name Cemented Carbide Product with Cobalt, Nickel, Nickel-Cobalt, or Nickel-Cobalt-Chromium Binder

Chemical Family Refractory Metal Carbide

Recommended use of the chemical and restrictions on use

Recommended Use Die and Wear Parts

Uses advised against No information available

Details of the supplier of the safety data sheet

Manufacturer Address
Stanford Advanced Materials
Address : 23661 Birtcher Dr.,
Lake Forest, CA 92630 U.S.A.
Phone: (949) 407-8904
Fax: (949) 812-6690
sales@samaterials.com

Emergency telephone number

Employee Safety & Health Manager (949) 407-8904

(Not staffed 24/7)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Respiratory sensitization	Category 1
Skin sensitization	Category 1
Carcinogenicity	Category 1A
Specific target organ toxicity (repeated exposure)	Category 1
Combustible dust	-

Label elements

Emergency Overview

Danger

Hazard statements
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause an allergic skin reaction
May cause cancer
Causes damage to organs through prolonged or repeated exposure
May form combustible dust concentrations in air

Appearance Dark Gray; Solid Metal **Physical state** Solid **Odor** No Odor

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
In case of inadequate ventilation wear respiratory protection
Contaminated work clothing should not be allowed out of the workplace
Wear protective gloves
Do not breathe dust/fume/gas/mist/vapors/spray
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product

Precautionary Statements - Response
IF exposed or concerned: Get medical advice/attention
Specific treatment (See Section 4)
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
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 POISON CENTER or doctor/physician

Precautionary Statements - Storage
Store locked up

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)
Other Information
• May be harmful if swallowed
• Very toxic to aquatic life with long lasting effects
• Very toxic to aquatic life
Unknown Acute Toxicity ≥50% of the mixture consists of ingredient(s) of unknown toxicity

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	Weight-%
Tungsten Carbide	12070-12-1	50-97
Cobalt	7440-48-4	0-30
Nickel	7440-02-0	0-25
Tantalum Carbide (Ta4C5)	12070-06-3	0-22
Chromium	7440-47-3	0-5
Chromium Carbide	12012-35-0	0-5
Molybdenum	7439-98-7	0-5

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

4. FIRST AID MEASURES

First aid measures

Eye contact If irritation occurs, flush with copious amounts of water. If irritation persists, seek medical attention.

Skin Contact If irritation or rash occurs, thoroughly wash affected area with soap and water and isolate from exposure. If irritation or rash persists, seek medical attention.

Inhalation If symptoms of pulmonary involvement develop (coughing, wheezing, shortness of breath, etc.), remove from exposure and seek medical attention.

Ingestion If substantial quantities are swallowed, dilute with a large amount of water, induce vomiting and seek medical attention.

Most important symptoms and effects, both acute and delayed

Symptoms No information available.

Indication of any immediate medical attention and special treatment needed

Note to physicians Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
For powder fires, smother with dry sand, dry dolomite, ABC fire extinguisher, or flood with water.

Unsuitable extinguishing media No information available.

Specific hazards arising from the chemical
Hard cemented carbide product is not a fire hazard. Dusts generated in grinding operations may ignite if allowed to accumulate and subjected to an ignition source.

Dusts may present a fire or explosion hazard under rare favoring conditions of particle size, dispersion and strong ignition source. However, this is not expected to be a problem under normal handling conditions.

Explosion data
Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge None.

Protective equipment and precautions for firefighters
For a powder fire confined to a small area, use a respirator approved for toxic dusts and fumes. For a large fire, fire fighters should use a self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions If airborne dust is generated, use an appropriate approved respirator. Avoid contact with eyes, skin, and clothing. Wash hands thourghly after handling.

Other Information Ventilate area or spill. Clean up using methods which avoid dust generation such as vacuum (with appropriate filter to prevent airborne dust levels which exceed exposure limits), wet mop or wet clean-up. Keep containers closed when not in use.

Environmental precautions

Environmental precautions See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Pick up and transfer to properly labeled containers.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Wash hands thoroughly after handling and before eating or smoking. Wash exposed skin at the end of work shift. Do not shake clothing, rags or other items to remove dust. Dust should be removed by washing or vacuuming (with appropriate filters) the clothing, rags, or other items. Do not shake clothing to remove dust.

Other precautions Do not shake clothing, rags or other items to remove dust. Dust should be removed by washing or HEPA vacuuming.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep containers closed when not in use.

Incompatible materials Contact of dust with strong oxidizers may cause fire or explosions. Avoid contact with strong acids.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines .

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Chromium 7440-47-3	TWA: 0.5 mg/m^3	TWA: 1 mg/m^3 (vacated) TWA: 1 mg/m^3	IDLH: 250 mg/m^3 TWA: 0.5 mg/m^3
Cobalt 7440-48-4	TWA: 0.02 mg/m^3 TWA: 0.02 mg/m^3 Co	TWA: 0.1 mg/m^3 dust and fume (vacated) TWA: 0.05 mg/m^3 dust and fume	IDLH: 20 mg/m^3 dust and fume TWA: 0.05 mg/m^3 dust and fume
Molybdenum 7439-98-7	TWA: 10 mg/m^3 inhalable fraction TWA: 3 mg/m^3 respirable fraction	(vacated) TWA: 10 mg/m^3	IDLH: 5000 mg/m^3
Nickel 7440-02-0	TWA: 1.5 mg/m^3 inhalable fraction	TWA: 1 mg/m^3 (vacated) TWA: 1 mg/m^3	IDLH: 10 mg/m^3 IDLH: 10 mg/m^3 Ni TWA: 0.015 mg/m^3 TWA: 0.015 mg/m^3 except Nickel carbonyl Ni
Tungsten Carbide 12070-12-1	STEL: 10 mg/m^3 W TWA: 5 mg/m^3 W	(vacated) TWA: 5 mg/m^3 W (vacated) STEL: 10 mg/m^3 W	TWA: 5 mg/m^3 W STEL: 10 mg/m^3 W

Appropriate engineering controls

Engineering Controls Use local ventilation which is adequate to limit personal exposure to airborne dust levels which do not exceed the applicable exposure limits. If such equipment is not available use respirators as specified below.

Individual protection measures, such as personal protective equipment

Eye/face protection Safety glasses with side shields or goggles are recommended.

Skin and body protection Protective gloves or barrier creams are recommended when contact with dust or mist is likely. Prior to applying the barrier cream or use of protective gloves, wash thoroughly.

Respiratory protection Use an appropriate, NIOSH approved respirator if airborne dust concentrations exceed the applicable exposure limits. For proper selection of respirators, see also American National Standard Practices for Respiratory Protection Z88.2-1969. Harmful if inhaled. Dust or carbide powder can cause respiratory system damage if not protected with an approved respirator.

General Hygiene Considerations Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Solid		
Appearance	Dark Gray; Solid Metal	**Odor**	No Odor
Color	Dark Gray	**Odor threshold**	No Odor Threshold

Property	**Values**	**Remarks • Method**
pH	No information available	
Melting point/freezing point	No information available	
Boiling point / boiling range	No information available	

Flash point	No information available
Evaporation rate	No information available
Flammability (solid, gas)	No information available
Flammability Limit in Air	
Upper flammability limit:	No information available
Lower flammability limit:	No information available
Vapor pressure	No information available
Vapor density	No information available
Specific Gravity	11.0 to 15.5
Water solubility	insoluble
Solubility in other solvents	No information available
Partition coefficient	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Kinematic viscosity	No information available
Dynamic viscosity	No information available
Explosive properties	No information available
Oxidizing properties	No information available

Other Information

Softening point	No information available
Molecular weight	No information available
VOC Content (%)	None
Density	No information available
Bulk density	No information available

10. STABILITY AND REACTIVITY

Reactivity
No data available

Chemical stability
Stable under recommended storage conditions.

Possibility of Hazardous Reactions
None under normal processing.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid
No information available.

Incompatible materials
Contact of dust with strong oxidizers may cause fire or explosions. Avoid contact with strong acids.

Hazardous Decomposition Products
None.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information **Routes of Entry:** Inhalation acute; inhalation chronic; ingestion; skin contact; eye contact.

Inhalation Dust from grinding can cause irritation of the nose and throat. In some cases, it also has the potential for causing or aggravating transient or permanent respiratory or pulmonary disease, including occupational asthma, pulmonary fibrosis, and interstitial pneumonitis. It is reported that cobalt indicated a lack of correlation between onset of symptoms, length of exposure and the development of interstitial fibrosis. Symptoms may include productive coughing, wheezing, shortness of breath, chest tightness, weight loss, a high incidence of minor or marked radiological abnormalities, and the development of hypersensitivity asthma in some people. Respiratory or pulmonary disease is progressive and can lead to permanent disability or death.

Eye contact Can cause Irritation.

Skin Contact May cause irritation or an allergic skin rash due to cobalt sensitization. It has been reported that an allergic dermatitis has been caused by contact with cobalt and its compounds. Certain skin conditions, such as dry skin, may be aggravated by exposure.

Ingestion It has been suggested that ingestion of significant amounts of cobalt has the potential for causing blood, heart and other organ problems. Current scientific information indicates no adverse effects are likely from ingestion of small amounts of nickel dust generated from these products.

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Cobalt 7440-48-4	= 6170 mg/kg (Rat)	-	> 10 mg/L (Rat) 1 h
Nickel 7440-02-0	> 9000 mg/kg (Rat)	-	-

Information on toxicological effects

Symptoms No information available.

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

Sensitization No information available.
Germ cell mutagenicity No information available.
Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Chemical Name	ACGIH	IARC	NTP	OSHA
Chromium 7440-47-3	-	Group 3	-	-
Cobalt 7440-48-4	A3	Group 2A Group 2B	Reasonably Anticipated	X
Nickel 7440-02-0	-	Group 1 Group 2B	Known Reasonably Anticipated	X
Tungsten Carbide 12070-12-1	-	Group 2A	Reasonably Anticipated	X

Cobalt metal with tungsten carbide was evaluated by IARC (International Agency for Research on Cancer) as *probably carcinogenic to humans* (Group 2A).

Reproductive toxicity No information available.
STOT - single exposure No information available.
STOT - repeated exposure No information available.
Aspiration hazard No information available.

Numerical measures of toxicity - Product Information

Unknown Acute Toxicity ≥50% of the mixture consists of ingredient(s) of unknown toxicity
The following values are calculated based on chapter 3.1 of the GHS document.

12. ECOLOGICAL INFORMATION

Ecotoxicity

≥50% of the mixture consists of components(s) of unknown hazards to the aquatic environment

Chemical Name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Cobalt 7440-48-4	-	100: 96 h Brachydanio rerio mg/L LC50 static	-	-
Nickel 7440-02-0	0.18: 72 h Pseudokirchneriella subcapitata mg/L EC50 0.174 - 0.311: 96 h Pseudokirchneriella subcapitata mg/L EC50 static	100: 96 h Brachydanio rerio mg/L LC50 1.3: 96 h Cyprinus carpio mg/L LC50 semi-static 10.4: 96 h Cyprinus carpio mg/L LC50 static	-	100: 48 h Daphnia magna mg/L EC50 1: 48 h Daphnia magna mg/L EC50 Static

Persistence and degradability
No information available.

Bioaccumulation
No information available.

Other adverse effects No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes Dispose of in accordance with appropriate governmental regulations. May be sold as scrap or reclaim.

Contaminated packaging Do not reuse container.

Chemical Name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Chromium 7440-47-3	-	Included in waste streams: F032, F034, F035, F037, F038, F039	5.0 mg/L regulatory level	-
Nickel 7440-02-0	-	Included in waste streams: F006, F039	-	-

Chemical Name	California Hazardous Waste Status
Chromium 7440-47-3	Toxic Corrosive Ignitable
Chromium Carbide 12012-35-0	Toxic Corrosive Ignitable
Cobalt 7440-48-4	Toxic powder Ignitable powder Toxic
Molybdenum 7439-98-7	Ignitable powder
Nickel 7440-02-0	Toxic powder Ignitable powder

14. TRANSPORT INFORMATION

DOT Not regulated

IATA Not regulated

IMDG Not regulated

RID Not regulated

15. REGULATORY INFORMATION

International Inventories

TSCA	All ingredients are on the inventory or exempt from listing
DSL/NDSL	All ingredients are on the inventory or exempt from listing
EINECS/ELINCS	All ingredients are on the inventory or exempt from listing
ENCS	Not evaluated
IECSC	Not evaluated
KECL	All ingredients are on the inventory or exempt from listing
PICCS	Not evaluated
AICS	Not evaluated

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	SARA 313 - Threshold Values %
Chromium - 7440-47-3	1.0
Cobalt - 7440-48-4	0.1
Nickel - 7440-02-0	0.1

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

CWA (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 7440-47-3	-	X	X	-
Chromium Carbide 12012-35-0	-	X	-	-
Nickel 7440-02-0	-	X	X	-

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	CERCLA/SARA RQ	Reportable Quantity (RQ)
Chromium 7440-47-3	5000 lb 10 lb	-	RQ 5000 lb final RQ RQ 2270 kg final RQ RQ 10 lb final RQ RQ 4.54 kg final RQ
Nickel 7440-02-0	100 lb	-	RQ 100 lb final RQ RQ 45.4 kg final RQ

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical Name	California Proposition 65
Cobalt - 7440-48-4	Carcinogen
Nickel - 7440-02-0	Carcinogen

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Chromium 7440-47-3	X	X	X
Chromium Carbide 12012-35-0	X	-	X
Cobalt 7440-48-4	X	X	X
Molybdenum 7439-98-7	X	X	X
Nickel 7440-02-0	X	X	X
Tungsten Carbide 12070-12-1	X	-	-

U.S. EPA Label Information

EPA Pesticide Registration Number Not Applicable

Chemical Name	SARA 313 - Threshold Values %
Chromium - 7440-47-3	1.0
Cobalt - 7440-48-4	0.1
Nickel - 7440-02-0	0.1

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the CPR
WHMIS Hazard Class
D2A - Very toxic materials

Non-controlled

Chemical Name	NPRI
Cobalt	X
Nickel	X

16. OTHER INFORMATION

Revision Date 29-Apr-2015
Revision Note Conversion to SDS

Disclaimer

Although General Carbide Corporation has attempted to provide current and accurate information herein, General Carbide Corporation makes no representation regarding the accuracy of completeness of the information, and assumes no liability for any loss, damage, injury of any kind which may result from, or arise out of the use or reliance on information by any person.

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End of Safety Data Sheet