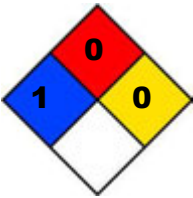


Carbide Technologies Inc. – MSDS: Cemented Carbide Product with Cobalt Binder

NFPA	OSHA PICTOGRAMS	PERSONAL PROTECTION EQUIPMENT
		 Safety Glasses  Dust Mask  Hand Protection  Wash Hands

Section 1, Identification

Product: Cemented Carbide Product with Cobalt Binder

Manufacturer: Carbide Technologies Inc
18101 Malyn Blvd
Fraser, MI 48026

Emergency Telephone Number: 586 296-5200

Telephone Number for Information: 586 296-5200

Section 2, Hazard(s) identification

EMERGENCY OVERVIEW

Form: solid odorless

Color: dark grey un-ground, silver grey as ground

CAUTION: Wet or dry grinding of cemented carbide products will produce dusts of potentially hazardous ingredients which can be inhaled, swallowed, or come in contact with the skin or eyes. During wet grinding, the dust can be suspended or dissolved in the coolant mist.

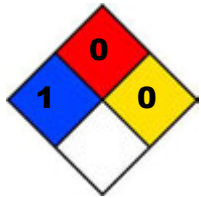
Primary Routes of Entry: Inhalation, ingestion, skin contact

Acute Health Effects: Dust from grinding is an irritant of the nose, throat, lungs, eyes, and mucous membranes. Skin exposure can cause an allergic red rash (cobalt dermatitis).

Chronic Health Effects: Chronic exposure to inhaled dust containing cobalt and tungsten have the potential to cause permanent respiratory diseases, including occupational asthma, interstitial pneumonitis and fibrosis (hard-metal disease), and emphysema. Symptoms include productive cough, wheezing, dyspnea (upon exertion), pleuritic chest pain, and weight loss. Skin sensitization is also noted in a small percentage of cases. Certain individuals may be hypersensitive to Cobalt metal dust. Reports outside the industry suggest that ingestion of significant amounts of cobalt can cause blood, heart, and other organ effects.

Carcinogenicity (OSHA, IARC and ACGIH): Cobalt metal with tungsten carbide is listed by IARC as Group 2A - probably carcinogenic to humans. Cobalt is listed by ACGIH as an animal carcinogen (A3). Cobalt is known to the State of California to cause cancer.

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Section 3, Composition/information on ingredients

	CAS Code	Composition % by wt	OSHA PEL-TWA	ACGIH TLV-TWA
Tungsten Carbide (limits as W)	12070-12-1	75 – 96	Not established	5 mg/m3
Cobalt	7440-48-4	4 – 25	0.1 mg/m3	0.02 mg/m3
Vanadium Carbide (limits for V2O5)	12070-10-9	0 – <1	0.05 mg/m3	0.05 mg/m3
Chromium Carbide (limits for chromium III compounds)	12012-35-0	0 – <1	0.5 mg/m3	0.5 mg/m3

Section 4, First-aid measures

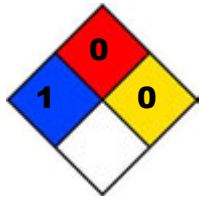
Inhalation: If symptoms of pulmonary involvement develop (coughing, wheezing, dyspnea, etc.), remove to fresh air. If symptoms persist, seek medical attention.

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

Eye Contact: Remove contact lenses at once. Flush eyes with water for at least fifteen minutes. If irritation persists, seek medical attention.

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

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Section 5, Fire and Explosion Data.

Flash Point: Not applicable

Lower Explosive Limit: Not applicable

Upper Explosive Limit: Not applicable

Cemented carbide products are not a fire hazard under normal conditions of use. However, dusts generated in grinding may be sensitive to static discharge or ignite if allowed to accumulate and then are exposed to an ignition source.

Extinguishing Media: For dust fires, smother with dry sand, dry dolomite, ABC type fire extinguisher, or flood with water.

Special Fire Fighting Procedures: For a dust fire confined to a small area, use a respirator approved for toxic dusts and fumes. For a large fire involving this material, fire fighters should use a self-contained breathing apparatus. See Section 2 and 8 for specific hazard identification and exposure control measures.

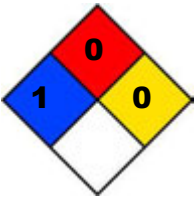
Unusual Fire and Explosion Hazards: Dusts may present a fire or explosion hazard under rare favoring conditions of particle size, dispersion, concentration, and strong ignition source. However, this is not expected to be a problem under normal handling conditions.

Hazardous Combustion Products: Oxides of cobalt and tungsten; carbon dioxide, and carbon monoxide. See Section 2 for specific hazard identification.

Section 6, Accidental release measures

Steps to be Taken in Case Material is Released or Spilled: Clean up area using methods that avoid dust generation such as a high efficiency particulate air (HEPA) vacuum, wet dust mop, or wet clean-up. Use an appropriate National Institute of Occupational Safety and Health (NIOSH)-approved respirator whenever airborne concentrations of hazardous components exceed exposure limits listed in Section 3.

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Section 7, Handling and storage

Under normal operating conditions, the use of cemented carbide products does not require special safety precautions beyond normal safety procedures for handling and using cutting tools, such as safety glasses and gloves. However, operations such as grinding, cutting, burning, and welding of cemented carbide products may generate dusts or fumes which may require special handling procedures. The procedures described below relate to these non-routine operations.

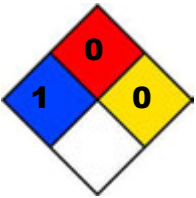
Hygienic Practices: Wash hands thoroughly after handling, and before eating or smoking. Wash exposed skin at the end of the work shift. Smoking and consumption of food or beverages should be restricted from areas where hazardous components may be present. Do not shake clothing, rags, or other items to remove dust. Dust should be removed by laundering or vacuuming (with appropriate filters) the clothing, rags, or other items.

Precautions to be Taken in Handling and Storage: Maintain good housekeeping procedures to prevent dust accumulation during grinding. Avoid dust inhalation and direct skin contact with dust. See Section 2 for specific health hazards.

Other Precautions: Clean up using methods that avoid dust generation such as a HEPA vacuum, wet dust mop, or wet clean-up. Use a NIOSH-approved respirator whenever airborne concentrations of hazardous components exceed exposure limits listed in Section 3. See Section 2 for specific health hazards.

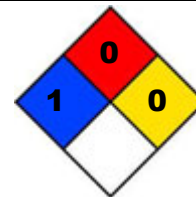
Note: Periodic medical monitoring is recommended for individuals regularly exposed to dust or fumes, with particular attention to any potential sensitization effects of such substances.

Carbide Technologies Inc. – MSDS: Cemented Carbide Product with Cobalt Binder

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Section 8, Exposure controls/personal protection

	OSHA PEL-TWA	ACGIH TLV-TWA
Tungsten Carbide (Limit as W)	Not established	5 mg/m3
Cobalt	0.1 mg/m3	0.02 mg/m3
Vanadium Carbide (limit for V2O5)	0.05 mg/m3	0.05 mg/m3
Chromium Carbide (Limit for chromium III compounds)	0.5 mg/m3	0.5 mg/m3

NFPA	OSHA PICTOGRAMS	PERSONAL PROTECTION EQUIPMENT			
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Section 9, Physical and chemical properties

Appearance and Odor: Dark Gray Solid, Odorless

Boiling Point: Not applicable

Vapor Pressure (mm Hg): Not applicable

Vapor Density (Air=1): Not applicable

Specific Gravity (H2O=1): Not applicable

Percent Volatile by Volume: Not applicable

Evaporation Rate: Not applicable

Solubility in Water: Insoluble

Section 10, Stability and reactivity

Stability: Stable

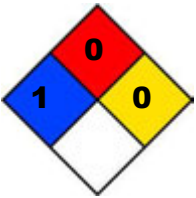
Conditions to Avoid: None known

Incompatibility: Strong acids. Contact of dust with strong oxidizers may cause fire or explosions.

Hazardous Decomposition Products: None

Hazardous Polymerization: Will Not Occur

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Section 11, Toxicological information

Cobalt: The International Agency for Research on Cancer (IARC) lists Cobalt metal with tungsten carbide as a Group 2A carcinogen (Probably Carcinogenic to Humans). Cobalt fumes or dust may cause pulmonary, skin, or eye irritation. Cobalt may be a sensitizing agent for skin and respiratory system. Chronic exposure may affect the heart, pancreas, thyroid gland, or bone marrow.

Rat Oral LDLo: 1500 mg/kg

Rabbit Oral LDLo: 20 mg/kg

Rat Intraperitoneal LDLo: 250 mg/kg

Rabbit Intratracheal LDLo: 100 mg/kg

Rat Intravenous LDLo: 100 mg/kg

Tungsten carbide and vanadium carbide: Toxicity has not been quantified. May cause pulmonary and skin sensitization and mucous membrane irritation in dust form.

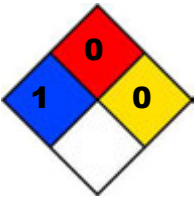
Chrome carbide: There is inadequate evidence for the carcinogenicity of chromium (7440-47-3) and most trivalent chromium compounds in experimental animals.

Section 12, Ecological information

Aquatic toxicity

Cobalt:	Algae (<i>Selenastrum capricornutum</i>):	EC10 72h: 0,006 mg/l EC50 72h: 0,035 mg/l NOEC 72h: 0,0053 mg/l
	Daphnia (Magna):	EC50 48h: > 100 mg/l
	Fish (<i>Brachydanio rerio</i>):	NOEC 96h: > 100 mg/l
	Bacteria (activated sludge):	EC50: 42 mg/l
Tungsten carbide:	Algae (<i>Scenedesmus subspicatus</i>):	EC50 72h: 130 mg/l (grow rate)
	Daphnia (Magna):	EC50 48h: > 1000 mg/l
	Fish (<i>Brachydanio rerio</i>):	LC0 96h: > 1000 mg/l LC50 96h: > 1000 mg/l
	Bacteria (activated sludge):	EC20 3h: >1000 mg/l EC50 3h: >1000 mg/l

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Section 13, Disposal considerations

Waste Disposal Method: Dispose of in accordance with appropriate government regulations. May be sold as scrap for reclamation.

Section 14, Transport information

DOT Proper Shipping Name: Not regulated by this mode of transportation

IMO Proper Shipping Name: Not regulated by this mode of transportation

IATA Proper Shipping Name: Not regulated by this mode of transportation

AFI Prop. Shipping Name: Not regulated by this mode of transportation

Section 15, Regulatory information

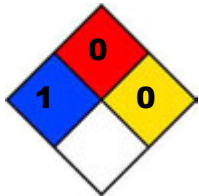
OSHA: This product, under normal conditions of use, is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dust generated while grinding, cutting, burning or welding this product may be hazardous as noted in Sections 2 and 3.

TSCA: Components of this product are listed on the TSCA inventory.

SARA: Chromium and cobalt are subject to the requirements of Section 313 of Title III of Superfund Amendment and Reauthorization Act of 1986.

State Regulatory Information: This product contains cobalt, which is listed in California Proposition 65 as a known cancer-causing chemical.

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Section 16, Other information

Date Prepared: 03/01/2014

Users Responsibilities: This Material Safety Data Sheet provides information consistent with recommended applications of these products and anticipated non-routine activities involving the product. It is the user's responsibility to identify and protect against health and safety hazards presented by modification of cemented carbide products after manufacture. Individuals handling cemented carbide products should be informed of all relevant hazards and recommended safety precautions, and should have access to the information contained in this MSDS.

Disclaimer: The information contained herein is based upon data provided by manufacturers and suppliers of raw materials used in the manufacture of cemented carbide products. The information is offered in good faith as accurate and correct, but no representations, guarantees, or warranties of any kind are made as to its accuracy or completeness, suitability for particular applications, hazards connected with the use of the product, or the results to be obtained from the use thereof. User assumes all risk and liability of any use or handling of any material beyond Carbide Technologies Inc's control. Variations in methods, conditions, equipment used to store, handle, or process the material, and hazards connected with the use of the product are solely the responsibility of the user and remain at its sole discretion.

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