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SAFETY DATA SHEET

Section 1. Identification

Product Name: Tungsten hexacarbonyl

Product Type: Solid

CAS Number: 14040-11-0

Product Number: W0110

Product Manufacturer: Ereztech LLC
11555 Medlock Bridge Road, Suite 100
Johns Creek, GA 30097

Product Information: (888) 658-1221

In Case of an Emergency: CHEMTREC: 1-800-424-9300 (USA);
+1 703-527-3887 (International); CCN836180
*** Contact manufacturer for all non-emergency calls.

Section 2. Hazards Identification

Appearance/Odor: White crystalline solid, odorless.

Classification: Not classified.

GHS Label Elements

Signal Word: None.

Hazard Statements: Not applicable.

Hazard Pictograms: Not applicable.

Precautionary Statements

Prevention:
P261: Avoid breathing dust/fumes/vapors.
P262: Do not get in eyes, on skin, or on clothing.
P271: Use only outdoors or in a well-ventilated area.
P280: Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:
P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338: IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage:
P403 + P233 + P235: Store in a well-ventilated place. Keep container tightly closed. Keep cool.

Disposal:
P501: Dispose of contents/ container to an approved wasted disposal plant.

Section 2. Hazards Identification

General: None.

OSHA/HCS Status: This material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Hazards Not Otherwise Classified (HNOC): None known.

Section 3. Composition/Information on Ingredients

Substance

Synonyms : Tungsten carbonyl; (OC-6-11)-Tungstencarbonyl; (oc-6-11)-tungstencarbonyl(w(co)6; Hexacarbonylwolfram; Tungsten carbonyl (W(CO)6); Tungsten carbonyl (W(CO)6), (OC-6-11)-; Tungstencarbonyl(W(CO)6); Tungstencarbonyl(W(CO)6)

Formula : C_6O_6W

Molecular Weight : 351.9 g/mol

CAS-No. : 14040-11-0

Ingredient Name	%	CAS Number
Tungsten hexacarbonyl	≥ 99	14040-11-0

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First Aid Measures

Description of Necessary First Aid Measures

General Advice: Move out of dangerous area. Consult a physician. Show this safety data sheet to the doctor in attendance.

Eye Contact: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Rinse for a minimum of 15 minutes. Check for and remove any contact lenses after initial rinse period and continue rinsing for an additional 15 minutes. Keep eyes wide open during rinsing process. Get medical attention.

Skin Contact: Remove all contaminated clothing and shoes. Wash off contaminated skin with soap and plenty of water. Get medical attention.

Inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Immediately call a POISON CENTER or doctor/physician.

Section 4. First Aid Measures

Ingestion: Do NOT induce vomiting. Immediately call a physician or POISON CONTROL CENTER. Rinse mouth. Remove dentures if any. Drink plenty of water. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most Important Symptoms/Effects, Acute And Delayed Potential Acute Health Effects

Eye Contact: Product may cause eye irritation. Symptoms may include stinging, tearing and redness.

Inhalation: Product may be harmful if inhaled and may cause respiratory irritation. Symptoms may include coughing, sneezing and a shortness of breath.

Skin Contact: Product may be harmful in contact with skin and may cause skin irritation.

Ingestion: Product may be harmful if swallowed.

Indication of Immediate Medical Attention and Special Treatment Needed, If Necessary

Notes to Physician: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled. Tungsten carbonyl is reported to have a weakly fibrinogenic and general toxicity.

Specific Treatments: No specific treatment.

Protection of First Responders: No action taken shall be taken involving any personal risk without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See Toxicological Information (Section 11)

Section 5. Fire Fighting Measures

General Hazards: None known.

Suitable Extinguishing Media: Use water fog, water spray, dry chemical or carbon dioxide (CO_2). Fight larger fires with water stream or alcohol resistant foam.

Unsuitable Extinguishing Media: None identified.

Unusual Fire and Explosion Hazards: Unopened containers may become pressurized and rupture during a fire. Use water spray to cool unopened containers. Thermal decomposition can lead to the production of irritating and toxic gases and vapors.

Product of Combustion: Decomposition products include carbon monoxide, carbon dioxide and tungsten oxide fumes.

Section 5. Fire Fighting Measures

Protection of Firefighters:

Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Avoid contact with skin or eyes. Avoid breathing dusts, aerosols, vapors and gases.

Fire-fighters should wear appropriate protection equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in a positive pressure mode.

Section 6. Accidental Release Measures

Personal Precautions, Protective Equipment and Emergency Procedures

For Non-Emergency Personnel:

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Remove all ignition sources. Prevent unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid dust formation and the inhalation of dusts/vapors/fumes. Provide adequate ventilation. Wear respiratory protection. Put on appropriate personal protective equipment.

For Emergency Responders:

If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For nonemergency personnel".

Environmental Precautions:

Do not allow dispersal of spilled material and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for Containment

Small Spill:

Move containers from spill area if safe to do so. Sweep up and place in dry, sealed container for disposal according to local regulations (see Section 13). Avoid contact with water. Avoid the creation and inhalation of dusts and aerosols. Dispose of via a licensed waste disposal contractor.

Large Spill:

Move containers from spill area if safe to do so. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Contain and collect spillage with a dry binding material (e.g. sand, earth, vermiculite or diatomaceous earth) and place in dry, sealed container for disposal according to local regulations (see Section 13).

Section 6. Accidental Release Measures

Large Spill (cont.):

Avoid contact with water/moisture and the creation/inhalation of dusts and aerosols. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product.

Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and Storage

Precautions:

Product is moisture sensitive; handle under a dry, inert gas. Nitrogen with less than 5 ppm each of moisture and oxygen is recommended. Avoid formation and inhalation of dusts and aerosols. Keep away from air, moisture, heat, light and incompatible materials. Keep container tightly sealed. Avoid contact with skin, eyes and clothing. Do not ingest. Avoid prolonged exposure. Ensure adequate ventilation.

Protective Measures:

Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing dusts/vapors/fumes/gases. Keep in the original container kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

General Occupational Hygiene:

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Safe Storage Conditions:

Product is moisture sensitive; store under an inert gas. Nitrogen with less than 5 ppm each of moisture and oxygen is recommended. Store in original container protected from direct sunlight in a dry and well-ventilated area, away from incompatible materials and food and drink. Keep container tightly closed and sealed until ready for use. Store locked up.

Section 8. Exposure Controls/Personal Protection

Introductory Remarks:

These recommendations provide general guidance for handling this product. Because work environments and material handling practices vary, safety procedures should be developed for each intended application.

Section 8. Exposure Controls/Personal Protection

Introductory Remarks (cont.): While developing safe handling procedures, do not overlook the need to clean equipment and conduct regular repairs. Waste from these procedures should be handled in accordance with Section 13.

Occupational Exposure Limits

List	Components	CAS-No.	Type	Value
ACGIH	Tungsten hexacarbonyl	14040-11-0	TLV	5.0 mg/m^3 as W TWA
			TLV	10.0 mg/m^3 as W STEL
NIOSH	Tungsten hexacarbonyl	14040-11-0	REL	5.0 mg/m^3 as W TWA
			REL	10.0 mg/m^3 as W ST

Engineering Controls: Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute. Provide an eyewash/shower station.

Environmental Exposure Controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual Protection Measures

Hygiene Measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Remove all soiled and contaminated clothing immediately. Do not inhale dusts/gases/fumes/vapors. Avoid contact with eyes and skin. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/Face Protection: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles, faceshield (8-inch minimum). Refer to 29 CFR 1910.133, ANSI Z87.1, or European Standard EN166.

Skin Protection

Hand Protection: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Section 8. Exposure Controls/Personal Protection

Hand Protection (cont.): Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: Chemical-resistant 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. Full contact material: Neoprene or nitrile rubber.

Other Skin Protection: Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory Protection: Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Section 9. Physical and Chemical Properties

Physical State: Crystalline solid.
Color: White.
Odor: Odorless.
Odor Threshold: No data available.
pH: No data available.
Melting Point: 150 °C (302 °F).
Boiling Point: 175 °C (347 °F).
Flash Point: 200 °C (392 °F).
Auto-Ignition Temperature: 300 °C (572 °F).
Flammability: No data available.

Section 9. Physical and Chemical Properties

Relative Density: 2.65 g/cm^3 @ 20 °C (68 °F).
Vapor Pressure: 1.2 mm Hg @ 67 °C (152.6 °F).
Vapor Density: 12.1 @ 20 °C (68 °F).
Water Solubility: Insoluble.
Evaporation Rate: No data available.

Section 10. Stability and Reactivity

Reactivity: No specific data available.
Chemical Stability: Stable at normal ambient temperature and pressure and under recommended storage conditions.
Conditions to Avoid: Air, moisture, heat, and light.
Incompatible Materials: Moist air, water, oxidizing agents.
Hazardous Decomposition Products: Under normal conditions of storage and use, hazardous decomposition products should not be produced. Product decomposes slowly in contact with moisture or water to produce carbon monoxide. Hazardous decomposition products formed under fire conditions: organic acid vapors, carbon oxides and tungsten oxide fumes. In the event of a fire: see section 5.
Possibility of Hazardous Reactions: Under normal conditions of storage and use, hazardous reactions are not expected to occur.

Section 11. Toxicological Information

Information on Toxicological Effects

Acute Toxicity

Product/Ingredient Name	Result	Species	Dose	Exposure
Tungsten hexacarbonyl	LD50 Oral	Rat	>5000 mg/kg	-

Irritation/Corrosion : No specific data available. Product may cause skin and eye irritation and may be harmful in contact with eyes or skin.
Sensitization : No specific data available.
Germ Cell Mutagenicity : No specific data available.
Carcinogenity
IARC : No component of this product present at levels greater than 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Section 11. Toxicological Information

ACGIH	:	No component of this product present at levels greater than 0.1% is identified as probable, possible or confirmed human carcinogen by ACGIH.
NTP	:	No component of this product present at levels greater than 0.1% is identified as probable, possible or confirmed human carcinogen by NTP.
OSHA	:	No component of this product present at levels greater than 0.1% is identified as probable, possible or confirmed human carcinogen by OSHA.
Reproductive Toxicity	:	No specific data available.
Teratogenicity	:	No specific data available.
Specific Target Organ Toxicity (Single Exposure)	:	Product may be harmful if inhaled and may cause respiratory tract irritation.
Specific Target Organ Toxicity (Repeat Exposure)	:	No specific data available.
Aspiration Hazard	:	No specific data available.
Information on the Likely Routes of Exposure	:	Ingestion/inhalation/dermal and eye contact.
Additional Information	:	While no extended toxicity data is available, it is reasonable to assume that when exposed to moisture/water, tungsten carbonyl will generate carbon monoxide which complexes with hemoglobin. Tungsten carbonyl is reported to have a weakly fibrinogenic effect and general toxicity. To the best of our knowledge, the chemical, physical and toxicological properties of this product have not been thoroughly investigated.

Section 12. Ecological Information

Numerical Measures of Toxicity

Toxicity to Fish	:	No specific data available.
Toxicity to Daphnia and Other Aquatic Invertebrates	:	No specific data available.
Toxicity to Algae	:	No specific data available.
Persistence and Degradability		
Biodegradability	:	No specific data available.
Bioaccumulative Potential	:	No specific data available.

Section 12. Ecological Information

Mobility in Soil : Product is not expected to be mobile based on its low water solubility.

Other Adverse Effects : This substance may be hazardous to the environment. An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Section 13. Disposal Considerations

Waste Treatment Methods

Product: Dispose of in accordance with local, state, and federal regulations. Refer to 40 CFR 260-299 for complete waste disposal regulations. Consult your local, state, or federal agency before disposing of any chemicals.

Contaminated Packaging: Empty containers retain product residue (dusts, aerosols, gases) and can be dangerous.

Section 14. Transport Information

	DOT	IMDG	IATA
UN Number	Not Regulated	Not Regulated	Not Regulated
UN Proper Shipping Name	-	-	-
Transport Hazard Classes	-	-	-
Packing Group	-	-	-
Environmental Hazards	-	-	-
Additional Information	-	-	-

Special Precautions for User : Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transporting in Bulk According to Annex II of MARPOL 73/78 and the IBC Code : Not applicable.

Section 15. Regulatory Information

TSCA (Toxic Substance Control Act)
This product is listed on the U.S. Toxic Substances Control Act Chemical Inventory (TSCA Inventory).

Section 15. Regulatory Information

SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards

None.

Massachusetts Right to Know Components

	CAS-No.	Revision Date
Tungsten	7440-33-7	

Pennsylvania Right to Know Components

	CAS-No.	Revision Date
Tungsten	7440-33-7	

New Jersey Right to Know Components

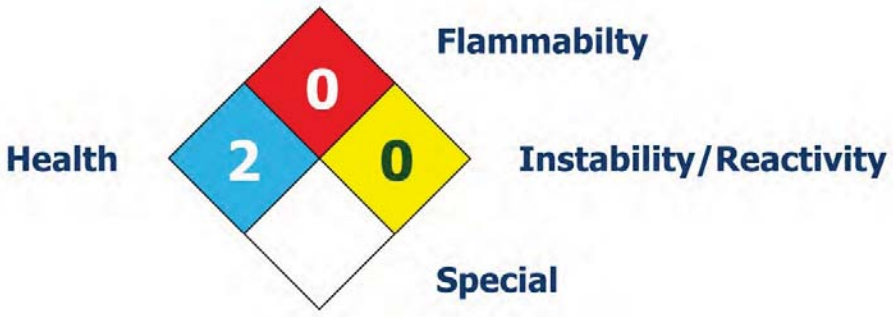
	CAS-No.	Revision Date
Tungsten	7440-33-7	

California Proposition 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

Section 16. Other Information

National Fire Protection Association (U.S.A.)



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Section 16. Other Information

HMIS Rating

HEALTH	**2**
FLAMMABILITY	**0**
PHYSICAL HAZARD	**0**

History

Date of Printing : 2/20/2020

Date of Issue/Date of Revision : 2/20/2020

Date of Previous Issue : 5/16/17

References : None available

Abbreviations and Acronyms

ACGIH: American Conference of Governmental Industrial Hygienists.
ATE: Acute Toxicity Estimate
CAS: Chemical Abstracts Service (division of the American Chemical Society).
DOT: US Department of Transportation.
GHS: Globally Harmonized System of Classification and Labeling of Chemicals.
HMIS: Hazardous Materials Identification System.
HNOC: Hazards Not Otherwise Classified.
IARC: International Agency for Research on Cancer.
IATA: International Air Transport Association.
IATA-DGR: Dangerous Goods Regulations by the "International Air Transport Association" (IATA).
IDLH: Immediately Dangerous to Life or Health (US National Institute for Occupation Health and Safety (NIOSH)).
IMDG: International Maritime Code for Dangerous Goods.
NFPA: National Fire Protection Association.
NIOSH: National Institute of Occupational Safety and Health.
NTP: National Toxicology Program.
OSHA: Occupational Safety and Health Administration.
PEL: Permissible Exposure Limits.
REL: Recommended Exposure Limits.
SARA: Superfund Amendments and Reauthorization Act.
STOT: Specific Target Organ Toxicity.
TLV: Threshold Limit Values (ACGIH).
TWA: Time Weighted Average.
VOC: Volatile Organic Compound.

Tungsten hexacarbonyl
Safety Data Sheet

Section 16. Other Information

Disclaimer

The information herein is believed to be accurate and is presented in good faith; however, no warranties or representations are made by Ereztech LLC regarding the accuracy or completeness of the information. Ereztech LLC shall not be liable for any damages resulting from the handling, or from the contact with the above product.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.