

MATERIAL SAFETY DATA SHEET

TDC Form # 703

SECTION 1 - HAZARDOUS INGREDIENTS

<u>Ingredients</u>	<u>CAS #</u>	<u>% (weight)</u>	<u>LC50, ppm (inhalation, rat)</u>	<u>LD50, mg/kg (Oral, rat)</u>
Tungsten	7440-33-7	98-99	N/Av	2 g/kg (route unknown)
Thorium dioxide	1314-20-1	1-2	N/Av	N/Av

SECTION 2 - PREPARATION INFORMATION

Prepared by: Thermal Dynamics Corporation

Telephone #: 603-298-5711

Preparation date: November 14, 2000

SECTION 3 - PRODUCT IDENTIFICATION

Product identifier: Thoriated Tungsten Electrodes

Product use: electrodes and inserts for electrodes other than air plasma gas

Supplier name and address:

Thermal Dynamics Corporation
82 Benning Street
West Lebanon, New Hampshire 03784
Telephone: 603-298-5711

Manufacturer name and address:

OSRAM Sylvania Inc.
Hawes Street
Towanda, PA 18848-0504
Telephone: 717- 268 - 5000

Emergency Telephone #: CHEMTREC 800 424 9300 USA / CANADA
703 527 3887 INTERNATIONAL

HMIS Rating: Health - 1*; Flammability - 0; Reactivity - 0

SECTION 4 - PHYSICAL DATA

- **Physical state, odor and appearance:** Gray metal solid, no odor.
- **Odor threshold:** N/Av
- **Specific gravity:** 19
- **Coefficient or water/oil distribution:** N/Av
- **Vapor pressure (mm Hg @ 20°C):** N/Av
- **Boiling point:** 5660°C
- **Melting point:** 3410°C (for pure tungsten; melting point of mixture will be lower)
- **pH:** N/Av
- **Vapor density (Air=1.0):** N/Av
- **Evaporation rate (n-BuAc=1.0):** N/Av
- **Volatiles, %:** None
- **Solubility in water (w/w):** Insoluble

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SECTION 5 - FIRE AND EXPLOSION DATA

- **Conditions of flammability:** Non-flammable. However, cutting and welding procedures may ignite combustible materials in work area if proper safety precautions are not met.
- **Means of extinction:** None required for product. If involved in fire, use whatever means of extinction available that is appropriate to the type of fire.
- **Sensitivity to mechanical impact/static discharge:** Not susceptible to mechanical impact or static discharge.
- **Flash point (Method):** None
- **Lower/upper flammable limits (% by volume):** N/Ap
- **Auto-ignition temperature:** N/Av
- **Hazardous combustion products:** None known.

SECTION 6 - REACTIVITY DATA

- **Stability:** Stable. Hazardous polymerization will not occur.
- **Incompatible materials:** None known.
- **Conditions of reactivity:** During cutting and welding, harmful products may occur (see below).
- **Hazardous decomposition:** products Fumes (oxides of metal being welded) and gases such as carbon monoxide, ozone and oxides of nitrogen) may be emitted, depending on the process, procedure, and metal being cut or welded. Some loss of metal due to evaporation and/or oxidation does occur.

SECTION 7 - TOXICOLOGICAL PROPERTIES

Routes of exposure and acute/chronic effects

- **Exposure limits:** ACGIH: For tungsten, TWA of 5 mg/m³, Ceiling of 10 mg/m³, as W.
- **Inhalation:** Short-term overexposure to cutting and welding fumes may result in discomfort such as dizziness, nausea and/or irritation of the eyes, nose and throat. Other effects depend on the metal being cut or welded and the work conditions. Plasma electrodes are non-consumable. However, some loss of electrode metal may occur depending on cutting or welding conditions. With the exception of two Russian studies that found early signs of pulmonary fibrosis in some workers exposed to tungsten and tungsten trioxide dust, most studies have shown tungsten to be toxicologically inert. Thorium dioxide is a naturally occurring radioactive element. It is an alpha emitter and, as such, its primary hazard lies in inhalation of dust or fumes. Normal handling of these electrodes are not expected to result in any significant external radiation exposure. Considerable experience in refining and use of thorium dioxide has not revealed any adverse effects from industrial exposure.
- **Skin contact:** Adverse skin reactions from contact with electrodes are unlikely. However, burns may occur from touching hot metal. Radioactive alpha particles normally cannot penetrate the upper layers of skin tissue.
- **Eye contact:** Fumes and/or gases produced during cutting and welding may irritate the eyes. Wear eye protection (see below) to prevent "welder's flash", irritation or burning caused by ultraviolet light damaging eye tissue when the victim looks directly at the arc.
- **Ingestion:** Unlikely to occur.
- **Chronic effects:** No known long-term effects. However, overexposure to any fume or dust may eventually damage the lungs, so reduce exposure as far as possible.
- **Carcinogenicity:** Thorium dioxide has been identified as a carcinogen by IARC. Evidence for its ability to cause cancer has come solely from its internal medical use.
- **Teratogenicity, mutagenicity, other reproductive effects:** Some tests indicate reproductive effects for tungsten.

- **Sensitization to material:** By itself, thorium metal is known to be able to cause dermatitis.
- **Synergistic materials:** None known.

SECTION 8 - FIRST AID

- **Inhalation:** Remove victim to fresh air. If breathing difficulty does not improve rapidly, get patient to a doctor.
- **Skin:** Wash skin with mild soap and water. Rinse thoroughly. See a doctor right away from burns or irritation resulting from the cutting and welding process.
- **Eyes:** If irritation occurs, flush eyes with plenty of water. Get medical attention if irritation persists.
- **Ingestion:** If swallowed, get medical attention.

SECTION 9 - PREVENTIVE MEASURES

- **Spill, leak or release:** Does not normally apply.
- **Waste disposal:** Consult federal, provincial and local for allowed means of disposal.

PROTECTIVE EQUIPMENT

- **Respiratory protection:** Wear a NIOSH-approved respirable fume respirator when welding in confined spaces and whenever fume concentrations exceed applicable limits for thorium, tungsten or other welding fumes.
- **Engineering controls:** Use enough general ventilation and/or local exhaust at the arc to keep the fumes and gases below applicable limits in the worker's breathing zone and the general area. If such equipment is not available, use respirators as specified above.
- **Protective gloves:** Welders' gloves are recommended.
- **Eye protection:** Wear helmet or use face shield with appropriate filter lens. Provide protective screens and flash goggles, if necessary, to shield others.
- **Other protective equipment:** Wear hand and body protection to prevent injury from arc radiation, sparks and electrical shock. At a minimum this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats, shoulder protection, as well as dark substantial clothing. Welders should be trained not to touch live electrical parts and to insulate themselves from work and ground.

STORAGE AND HANDLING

- **Handling procedures and equipment:** Avoid inhaling dusts or fumes. Follow accepted welding safety procedures.
- **Storage requirements:** Store in a cool, dry area.
- **Special shipping information:** None (See Section 10).

SECTION 10 - REGULATION INFORMATION

(Not meant to be all-inclusive - selected regulations represented)

NOTICE: The information herein is presented in good faith and believed to be accurate as of the effective date shown on this page. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another; it is the buyer's responsibility to ensure that its activities comply with federal, provincial or state, and local laws. The following specific information is made for the purpose of complying with numerous federal, provincial or state, and local laws and requirements. See MSDS for health and safety information.

Canadian Regulations:

WHMIS INFORMATION: Class D2A (Toxic and Infectious Substances, Other Toxic Effects, Very Toxic Material)

TDG INFORMATION: Not regulated as dangerous goods.

U.S. Regulations:

SARA 313 INFORMATION: This product contains thorium dioxide, which is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendment Reauthorization Act of 1986 and 40 CFR Part 372.

Department of Transportation (DOT): Not hazardous according to DOT criteria.

Additional notes or references:

Abbreviations:

ACGIH: American Conference of Governmental Industrial Hygienists
IARC: International Agency for Research on Cancer
N/Ap: Not applicable
N/Av: Not available
NIOSH: National Institute for Occupational Safety and Health
TCC: Tagliabue Closed Cup
WHMIS: Workplace Hazardous Materials Information System

References:

1. Van Nostrand Reinhold, Dangerous Properties of Industrial Materials, Seventh Edition, N. Irving Sax.
2. Canadian Centre for Occupational Health and Safety. RTECS (Registry of Toxic Effects) and CHEMINFO databases.
3. ACGIH, Threshold Limit Values and Biological Exposure Indices for 2000.
4. International Agency for Research on Cancer Monographs.