

Safety Data Sheet

according to 91/155/EEC including Directive 93/112/EC and Directive 2001/58/EC

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TUNGSTEN ELECTRODE LWT

1 Identification of Substance, Preparation and Company

Identification of product: TUNGSTEN ELECTRODE

Use of product: Non-melting electrode in TIG welding process; electrodes for light engineering; electrodes for plasma smelting; plasma cutting, plasma spraying (thermal spraying); emission cathodes for electronic pipes.

Emergency phone number: Umweltbundesamt (Federal Environmental Agency), room 2.4 (GSA)
Bismarckplatz 1; 14193 Berlin, Germany
☎ +49 (30) 8903 2441
+49 (30) 8903 2020
+49 (30) 8903 2049

2 Composition / Data on Components

Substance	Formula	CAS No.	EINECS No.	Molecular weight	Classific. accord. to DI. 67/548/EEC
Tungsten	W	7440-33-7	231-143-9	183.85 g/mol	none
Lanthanum oxide	La ₂ O ₃	1312-81-8	215-200-5	325.82 g/mol	none
Cerium oxide	Ce ₂ O ₃	1345-13-7	215-718-1	328.24 g/mol	none
Zirconium oxide	ZrO ₂	1314-23-4	215-227-2	123.22 g/mol	none
Yttrium oxide	Y ₂ O ₃	1314-36-9	215-233-5	225.82 g/mol	none

3 Potential Dangers

This product does not feature hazardous properties for the purpose of the EU directive 67/548/EEC (Dangerous Substances) and 99/45/EC (Dangerous Preparations regulations) and of the Act on the Protection against Hazardous Substances (Chemicals Act) of June 2002.

Danger warning for humans: Any precautions usually applied for the handling of chemicals must be complied with. Avoid the development of dust and smoke. Do not inhale dust and smoke.

Danger warning for environment: Waste has to be disposed of in a safe and secure manner. The international regulations apply.

Classification system: not listed

4 First Aid Measures

After contact with the eyes: Rinse eyes for several minutes under running water, with the eye lid open. Consult a doctor if condition persists.

After contact with skin: In general, the product is not skin-irritating. Remove dust thoroughly by washing with soap.

After inhaling: Remove the affected person from the danger area and consult a doctor.

After ingesting: Thoroughly rinse mouth and consult doctor.

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FOR ALL CASES - CONSULT A MEDICAL SPECIALIST IF YOU ARE EXPERIENCING STRONG SYMPTOMS.

5 Fire Fighting Measures

General information	The metal in compact form is not flammable.
Appropriate extinguishing agents:	Extinguishing powder class D, water jet, sand
NOT appropriate extinguishing agents:	Water, ABC powder, Halon, CO ₂
Special risks:	Dangerous disintegration products, see chapter 10
Special protection equipment:	During fire fighting, self-contained breathing apparatus is recommended which complies with the regulations for use under positive pressure.

6 Measures for Accidental Release

Precautions for persons:	For release of dust or smoke – extracting devices and breathing protection with particle filter P2 or P3, recommended P3, colour code: white ¹ .
Measures for protection of environment:	Procure to avoid release into environment. Waste, dust filters and recipients are to be disposed of in a safe and secure way, according to the respective national regulations in force. Grey washing or grinding water is to be captured and disposed of.
Method for cleaning/retaining:	mechanical sweeping

7 Handling and Storage

Handling	Avoid the incorporation of dust during processing by use of appropriate extraction devices and breathing protection with particle filter P2 or P3; recommended P3, colour code: white. Avoid the formation of dust.
Storage	store in a dry place
Intended use	This product is intended for use as a non-melting electrode for the TIG welding process. Dust and smoke emerging during this process must be extracted by means of appropriate devices featuring filters or gas scrubbers.

8 Restriction of Exposure and Personal Protection Equipment

Exposure limits:

Germany
Dust exposure TRGS 900²

Identity of substance		limit mg/m ³	notes
Identification	EU no. CAS no.		
Tungsten	231-143-9 7440-33-7	5 E	DK, 25

Austria MAK	Daily medium 5 mg/m ³ Short term value 10 mg/m ³		
Denmark OEL	TWA: 5 mg (week)/m ³		J an 1999 ³
Netherlands MAC	TWA (8h) 5 mg/m ³		2002 ⁴
Poland OEL	MAC (TWA): 5 mg (week)/m ³		J an 1999 ³
Russia OEL		STEL: 2 mg/m ³	J an 1999 ³

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Norway OEL	TWA: 5 mg (week)/m ³		J an 1999 ³
Sweden OEL	NGV: 5 mg (week)/m ³		J an 1999 ³
UK OEL	TWA 5 mg (week)/m ³	STEL:10 mg (week)/m ³	Sep 2000 ³
USA, NIOSH, REL	TWA 5 mg (week)/m ³	STEL: 10mg/m ³	DHHS,1992 ³
USA, MSHA	TWA 5 mg (week)/m ³		DTLVS,1972 ³
USA, ACGIH, REL	TWA 5 mg (week)/m ³	STEL:10 mg/m ³	RTK #1959 ⁵

Restriction and supervision of exposure

Exposure: General

Change of contaminated clothing; Washing of hands after handling, possibly also showering
Keep away from food, beverages and animal feed.

Exposure: At workplace

PSA breathing protection

Extraction device, mask with particle filter (protection class P2) recommended for dust/aerosols. Protection class and type of mask must be adjusted according to the actual dust exposure, especially during cleaning and maintenance work⁵.

PSA hand protection

UV protection welding gloves, general protection and hygiene measures.

Eye protection

Goggles, face protection shield recommended.

Body protection

Ban on food, drinks and smoking in the workplace in connection with work hygienic measures, e.g. washing hands.

Exposure: Environment

Remaining items, residues have to be disposed of according to the respective national regulations in force.

9 Physical and Chemical Characteristics

General information

Form:	solid
colour:	metallic grey
odour:	inodorous
melting point:	3,680 K
boiling point:	5,828 K
ignition temperature:	not existent
oxidising characteristics	not applicable
vapour pressure at 20°C (mm Hg):	0 hPa
Density at 20°C:	

18.5 g/cm³

Solubility:

Insoluble in water; insoluble in fat; very acid-resistant; slowly soluble in HNO₃ + HF; soluble in alkaline oxidation melts

Electrical conductivity

18.20 ± 0.2 m/Ωmm²

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10 Stability and Reactivity

Stability:	Product is stable under normal conditions. No disintegration when used as intended.
Conditions to be avoided:	Presence of oxygen and high temperatures ($> 600^{\circ}\text{C}$) cause oxidation, from 977°C sublimation (tungsten trioxide WO_3 , CAS 1314-35-8).
Substances to be avoided:	Contact with strong acids and/or bases; or with halogens (fluorine, chlorine, bromine, iodine and their compounds); or with oxidation agents (e.g. perchlorate, peroxide, permanganate, chlorate, nitrates, nitrites, chromates); or with alkali/earth alkali metals (e.g. lithium, sodium, potassium; magnesium, calcium) can cause strong reactions (danger of strong exothermal reactions, danger of formation of flammable gases, danger of formation of insalubrious / poisonous substances / gases), and must be avoided.
Dangerous disintegration products:	Emerge through oxidation oxides of the product, which can evaporate (tungsten trioxide WO_3 , CAS 1314-35-8) or be released.

11 Toxicological Information

Acute toxicity:	<p>This product does not feature or just slight acute oral, dermal toxicity or toxicity through inhalation.</p> <p>W LD_{50} oral, rat: $>2000 \text{ mg/kg}^7$ LD_{50} dermal, rat: $>2000 \text{ mg/kg}^7$ LC_{50} inhalative, rat: $>5.4 \text{ mg/l}$, 4h exposition⁷</p> <p>La_2O_3 Clear epidemiologically secured data concerning lanthanoides and particularly La_2O_3 caused vocational illnesses are not present so far. LD_{50} oral, rat: 5 g/kg^8.</p> <p>Ce_2O_3 Substance-specific data for acute effect particularly of Ce_2O_3 are missing widely. With oral application all examined inorganic cerium compounds, also the soluble $\text{Ce}(\text{III})$ salts, have shown a small acute toxicity⁹.</p> <p>Y_2O_3 With an attempt at rodents signs of an acutely toxic effect (accelerated respiration) were observed after a 4h-Inhalation of concentrations off approx. 32 mg/m^3. LD_{50} oral, rat: 5 g/kg^{10}.</p> <p>ZrO_2 Quantitative data to the toxicity are not present. After inhalation of dust: Irritations of the respiratory. Dangerous characteristics are improbable¹¹.</p> <p>Further information from literature, see ³</p>
Chronic toxicity:	<p>Findings after intratracheal application of 50 mg tungsten dust/week during 3 weeks on guinea pigs lead to the conclusion that the substance is relatively inert. Still, an effect on the lung tissue could be proved (interstitial cellular proliferation), which must not be neglected. W dust, which was given to very young rats with their food over 70 days in concentrations of 2; 5 or 10%, caused a 15% reduction of the development of the body weight in the female, but not in the male animals¹².</p>
Primary irritation	<p>of skin: Due to its extent, the irritation caused by the product does not need to be classified¹³.</p> <p>of the eye: Due to its extent, the irritation caused by the product does not need to be classified¹³.</p>
Sensitisation:	No sensitising effects known ⁷ .

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12 Ecological Data

Ecological toxicity:

Amphibians: LC₅₀:2.9 mg/l (toad, gastrophryne carolinensis, 7d)¹⁴ fish:
LC₅₀:15.6 mg/L (rainbow trout, oncorhynchus mykiss, 28d)¹⁴
Biodegradability: not applicable.

Mobility:

Tungsten compounds can be found in soils and water as wolframat (e.g. WO₄²⁻) and other polyanions. There are no reports on organic tungsten compounds. The extraction coefficient for tungsten rises under the condition of decreasing ph-values (ph=5:100-50,000; ph=6.5:10-6,000; ph=8-9:5-90). These values prove slow or zero mobility of tungsten compounds in soils and water. In nature, tungsten compounds can be found as ions or insoluble solid matter. Therefore the volatilisation of surfaces of soils and water represents a less important environmental impact. Most tungsten compounds are characterised by low vapour pressures at 25°C¹⁵. For more literature references, see¹⁶.

Persistence and biodegradability:

Biodegradability:

Not applicable.

Abiotic degradability:

Tungsten features types of various oxidation values (0, 2+, 3+, 4+, 5+, 6+). The most stable type is 6+, the other types are quite unstable. As ion, tungsten exists in combination with one or more elements, e.g. with oxygen. In water, tungsten compounds can be found as tungstate (e.g. WO₄²⁻) and other polyanions. There are no reports on organic tungsten compounds. Bibasic tungsten only exists as a halogen compound. Tungsten strongly tends to form complexes (e.g. formation of heteropoly acids with oxides of phosphor, arsine, vanadium, silicon, and more). Tungsten forms a series of oxohalogenides (e.g. WOCl₄).

Bioaccumulation potential:

No data available

Other information:

Water hazard class: not hazardous to water (German Water Hazard Classes accord. to VwVwS (German Administrative Regulation for Substances Hazardous to Water) from 17th May, 1999)

13 Notes on Disposal

Waste disposal according to international, national and regional regulations. Contact your local office responsible for this.

Product:

This material and its container must be disposed of in a safe way. For information on recycling/reutilisation, please contact the manufacturer/distributor.

Recommendation:

Obey the national regulations for the disposal.

Unclean packaging:

Can be handled as non-hazardous waste.

14 Information on Transport

EU regulations

Transport regulations do not apply to these products – no hazardous material.

15 Specifications

Specification acc. to EEC directive:

215-225-1, 215-200-5, 215-718-1, 215-227-2, 215-233-5

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EU regulations:

Directive 67/548/EEC idgF (Dangerous Substances)
Directive 99/45/EC idgF (Dangerous Preparations regulations)

German regulations:

Technical Regulation Air: TRGS 900

Other countries:

National provisions must be obeyed.

16 Other Information

This safety data sheet has been prepared for the described product and must only be used for the described product. The data refers to the current state of research and knowledge. It is meant to describe the product specified in this safety data sheet with regards to the required safety precautions. The data provided does not guarantee any characteristics of the described product. If this product is used as a component of another product or if it is modified by processing, the information in this safety data sheet may not be applicable. The conditions and methods of handling, storage, usage and disposal are not within our control. Due to these and other reasons we do not take responsibility and refuse any liability for reasons, the cause of which can be seen in handling, storage, usage or disposal of the product. The user is responsible for forwarding the information in this data sheet to the employee in an appropriate manner.

Sources:

- ¹ Auerdata Edition 1998 and BG-Regel 190 (ZH 1/701) „Einsatz von Atemschutzgeräten“, Version 10.96
- ² Edition BArbBI No. 10/2000, last modified 31st March, 2004, BArbBI No. 5/2004
- ³ Registry of toxic effects of chemical substances (RTECS), <http://www.cdc.gov/niosh/rtecs/start.html>, Query 2005-12-15
- ⁴ Tungsten and tungsten compounds, (CAS No: 7440-33-7), Health-based Reassessment of Administrative Occupational Exposure Limits; Committee on Updating of Occupational Exposure Limits, a committee of the Health Council of the Netherlands, No. 2000/15OSH/058, The Hague, 31 October 02
- ⁵ New Jersey DHSS, Hazardous Substance Fact Sheet, Tungsten (CAS 7440-33-7), Rev. Nov. 2000
- ⁶ BGI 746; „Umgang mit thoriumoxidhaltigen Wolframelektroden beim Wolfram-Inertgasschweißen (WIG)“, Chapter 4.
- ⁷ Acute Toxicity Studies, Huntingdon Life Sciences, 1999
- ⁸ BGIA GESTIS – Stoffdatenbank, Query 2005-12-15
<http://biade.itrust.de/biade/lpext.dll?f=templates&fn=main-hit-h.htm&2.0>
- ⁹ BGIA GESTIS – Stoffdatenbank, Query 2005-12-15
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- ¹³ Acute Toxicity Studies, Huntingdon Life Sciences, 1999
- ¹⁴ ECOTOX, Ecotoxicology Database USEPA (www.epa.gov/ecotox), Query 2003-19-03.
- ¹⁵ Hazardous Substance Database, HSDB, National Library of Medicine (<http://toxnet.nlm.nih.gov>), Query 2005-12-19
- ¹⁶ Dermatas et al.; Solubility, Sorption and Soil Respiration Effects of Tungsten and Tungsten Alloys; Environmental Forensics, 5: 2004-5-13