1. **Identification of the substance/preparation and of the company**

1.1. Identification of the substance or preparation

   Tungsten with 0.8 to 4.2 weight-% thorium oxide

   Identification on the label / trade name

   TIG Electrodes WThX (X=10, 20, 30, 40) according to ISO 6848:2004

   TIG Electrodes EWTh-1/EWTh-2 according to ANSI/AWS A5.12M

1.2. Use of the product

1.2.1. Identified uses

   Non melting electrode for TIG welding; electrodes for lightning; electrodes for plasma melting, plasma cutting, plasma spraying (thermal spraying); emission cathodes for electronic

1.2.2. Uses advised against

   unknown

1.3. Company Identification

   Gesellschaft fuer Wolfram Industrie mbH
   Permanederstrasse 34
   D 83278 Traunstein, Deutschland
   phone +49 (861) 98 79-0
   fax +49 (861) 98 79-101

   E-mail (competent person)
   Dr.-Ing. Hany Gobran - gobran@tungsten-technology.com
   Dipl.-Ing. Martin Zimmermann - zimmermann@tungsten-technology.com

   Information contact
   info@tungsten-technology.com
   phone +49 (861) 98 79-0

1.4. Emergency telephone

   Wolfram Industrie (Only available during office hours.):
   +49 (861) 98 79-0

   Umweltbundesamt, Z. 2.4 (GSA), Bismarckplatz 1, D-14193 Berlin
   +49 (30) 89 03-24 41
   +49 (30) 89 03-20 20
   +49 (30) 89 03-20 49

2. **Hazards identification**

2.1. Hazards description

   The formulation is not rated as hazardous according to 1999/45/EG. According to the I.A.E.A.-criteria the product is rated as LOW LEVEL RADIOACTIVITY. The classification complies with the current EU lists although it has been amended by information from specialised literature and company data.

2.2. Information pertaining to special dangers for human and environment

   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.
   Waste has to be disposed of in a safe and secure manner. The international regulations for the handling of radioactive apply. In Germany the StrlSchV (Regulations for Radiation Protection) apply.

Adverse physicochemical effects

unknown

Adverse human health effects and symptoms

May cause cancer.

Adverse environmental effects

unknown

Other hazards

unknown
### 3. Composition/information on ingredients

#### 3.1. Product related information

#### 3.2. Hazardous ingredients

<table>
<thead>
<tr>
<th>Substance name</th>
<th>CAS-No.</th>
<th>EG-No.</th>
<th>REACH-Reg.-No.</th>
<th>Concentration [%]</th>
<th>Classification</th>
<th>R-phrases</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tungsten</td>
<td>7440-33-7</td>
<td>231-143-9</td>
<td>01-2119488910-30-0003</td>
<td>&gt; 95,8</td>
<td>Hazardous attribute</td>
<td></td>
<td>R11 affects only powder/dust</td>
</tr>
<tr>
<td>Thorium oxide</td>
<td>1314-20-1</td>
<td>215-225-1</td>
<td>n. b.</td>
<td>0.8 – 4.2</td>
<td>radioactive</td>
<td>R45-23/24/25-33</td>
<td>Substance affected by 96/29/Euratom.</td>
</tr>
</tbody>
</table>

#### 3.3. Additional information

The REACh registration number of the thorium oxide is unknown.

### 4. First aid measures

#### 4.1. General information

For all cases – contact a medical specialist if you are experiencing strong symptoms.

#### 4.2. In case of inhalation

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

#### 4.3. In case of skin contact

In general the product is not skin irritating. Remove dust thoroughly by washing with soap.

#### 4.4. In case of eye contact

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

#### 4.5. In case of ingestion

Thoroughly rinse mouth and consult a doctor.

#### 4.6. Self-protection of the first aider

Pay attention to self-protection!

#### 4.7. Information to physician

- **Symptoms**: Pulmonary irritation
- **Hazards**: Pulmonary irritation, contamination of pulmonary tissue
- **Treatment**: In the case of lung irritation: Primary treatment by using Corticoide spray, e.g. Auxiloson spray, Pulmicort-dosage-spray (Auxiloson and Pulmicort are registered trademarks).

### 5. Fire-fighting measures

#### 5.1. Suitable extinguishing media

Extinguishing powder for class D, sand, try salt, try cement

#### 5.2. Extinguishing media which must not be used for safety reasons

- water, ABC-powder, halon, carbon dioxide

#### 5.3. Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases

- Low radioactive product

#### 5.4. Special protective equipment for fire-fighters:

During the fire fighting self-contained breathing apparatus must be used which complies with the regulations for use under positive pressure, as well as complete personal protection equipment which applies for fires where radioactive material might be involved.

#### 5.5. Additional Information

- **Fire class**: D – fires of metals
6. Accidental release measures

6.1. Personal precautions
For releases of dust or smoke – extracting devices and breathing protection with particle filter P2 or P3, recommended P3 colour code white.

6.2. Environmental precautions
Procure to avoid release into environment. Waste, dust filters and recipients are to be disposed of in a safe and secure way, according to respective national regulations in force. Grey washing or grinding water is to be captured and disposed of.

6.3. Methods for cleaning up
Mechanical sweeping. Avoid generation of dust.

6.4. Additional information
Don’t use a brush or compressed air for cleaning surfaces or clothing.

7. Handling and storage

7.1. Handling
Advises on safe handling
It is recommended to design all work processes always so that the following is excluded: Inhalation of dust/particles/smoke.

Protective measures
Avoid 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.

Measures to prevent aerosol and dust generation:
see protective measures

7.2. Storage
Technical measures and storage conditions
store in a dry place

Hints on joint storage
Keep away from: oxidising agent, food and feeding stuffs.

Storage class
Low radioactive substances

7.3. Specific uses
Recommendations
Non melting electrode for TIG welding; electrodes for lightning; electrodes for plasma melting, plasma cutting, plasma spraying (thermal spraying); emission cathodes for electronic.

To minimise the risk of radiation for welders we recommend using radiation free electrodes like WS2 WITSTAR® or WLa 20 WITSTAR®.

Industrial sector specific solutions:
BGI 746: Handling of thoriated tungsten electrodes during tungsten inert gas welding (TIG) chapter 4 (Germany)

8. Exposure controls/Personal protection

8.1. Exposure limit values
Germany
Dust exposures TRGS 900

<table>
<thead>
<tr>
<th>Substance name</th>
<th>EG-Nr.</th>
<th>Peak limitation mg/m³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tungsten</td>
<td>231-143-9</td>
<td>5 E</td>
<td>DK, 25</td>
</tr>
<tr>
<td>Thorium oxide</td>
<td>215-225-1</td>
<td>n. a.</td>
<td>n. a.</td>
</tr>
</tbody>
</table>

Radiation exposure: Product is not listed in TRGS 905. The following dose limits apply for the effective dose in the calendar year:

- no persons at “work”, who are not exposed to radiation during work: 6 mSv
- for persons, who are exposed to radiation during work: 20 mSv
- for the complete dose as a consequence of the profession: 400 mSv
- for persons under 18 years of age: 6 mSv
8.2. Exposure controls

8.2.1. Occupational exposure controls

Change of contaminated clothing. Washing hands after handling, possibly also showering. Keep away from food, drinks and feeding stuffs.

Personal protection equipment:

Respiratory 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 work.

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 hygiene measures, e.g. washing hands.

8.2.2. Environmental exposure controls

Remaining items, residues and contaminated filters have to be disposed of according to the respective national regulations in force (e.g. StrlSchV in Germany).

9. Physical and chemical Properties

9.1. Appearance

Physical state solid

Colour metallic grey

Odour odourless

9.2. Important health, safety and environmental information

Safety relevant basis data

pH value (20 °C) n. a.

Melting point [°C] 3382

Boiling point [°C] 5530

Ignition temperature [°C] n. a.
Safety Data Sheet
According to Regulation (EC) No 1907/2006 (REACH)

Tungsten Electrode WTh10, WTh20, WTh30, WTh40 (EWTh-1, EWTh-2)

Density at 20 °C [g/cm³]
- WTh10: 19.0
- WTh20: 18.8
- WTh30: 18.6
- WTh40: 18.5

Water solubility at 20 °C [g/l] insoluble
Solubility at 20 °C [g/l] insoluble in fat; very acid resistant; slowly soluble in HNO₃+HF (aqua regia); soluble in alkaline oxidation melts

9.3. Other information
Electrical conductivity [m/Ω mm²] 18.20
Specific activity [Bq/g]
- WTh10: 29 – 43 (Thorium 232) on average 35.7
- WTh20: 61 – 78 (Thorium 232) on average 71.3
- WTh30: 100 – 114 (Thorium 232) on average 107
- WTh40: 136 – 150 (Thorium 232) on average 142.6

10. Stability and Reactivity
10.1. Conditions to avoid
Presence of oxygen and high temperatures (> 600 °C) cause oxidation, from 977 °C sublimation of tungsten trioxide (WO₃, CAS 1314-35-8) and release of thorium oxide (ThO₂, CAS 1314-20-1).

10.2. Materials to avoid
Contact with strong acids and/or bases; or with halogens (fluorine, chlorine, bromine, iodine and their compounds); or with oxidising agents (e. g. Perchlorate, peroxy, permanganate, chloride, nitrates, nitrates, 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) must be avoided.

10.3. Hazardous decomposition products
Emerge through oxidation oxides of the product which can evaporate (tungsten trioxide WO₃ CAS 1314-35-8) or be released (thorium oxide ThO₂ CAS 1314-20-1). R45 – May cause cancer.

11. Toxicological information
11.1. Toxicokinetics, metabolism and distribution
n. a.

11.2. Acute effects (toxicological tests)
This product does not feature an acute oral, dermal toxicity or toxicity through inhalation.

\[
\begin{align*}
W & : LD_{50} \text{ oral, rat: } >2000 \text{ mg/kg} \\
& : LD_{50} \text{ dermal, rat: } >2000 \text{ mg/kg} \\
& : LC_{50} \text{ inhalative rat: } >5.4 \text{ mg/l, 4 h Exposition} \\
\text{ThO₂} & : LD_{50} \text{ parenteral mammal: } 8 \text{ mg/kg} \\
& : LD_{50} \text{ intratracheal, rat: } >1.140 \text{ mg/kg}
\end{align*}
\]

Further information from literature see chapter 16.5.

Chronic effects
Finding after intratracheal application of 50 mg tungsten dust per week during 3 weeks on guinea pigs lead to conclusion that the substance is relatively inert. Still an effect on the pulmonary tissue could be proved (interstitial cellular proliferation), which must not be neglected. Tungsten 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 animals.

Thorium oxide: no data available.

Sensitisation
No sensitising effects known.

In case of skin contact:
Due to its extent the irritation caused by the product does not need to be classified.
11.3. Experiences made in practice

Observations relevant to classification: n. a.

Other observations: n. a.

11.4. General remarks

The component thorium is a slightly radioactive element. A potential hazard consists mainly in alpha radiation emitted by thorium, especially during incorporation. A potentially carcinogenic risk cannot be excluded. If handled according to the provisions, no insalubrious effects are known.

12. Ecological information

12.1. Ecotoxicity

Amphibians: LC₅₀ 2,9 mg/l (toad, gastrophryne carolinensis, 7 d)
Fish: LC₅₀ 15,6 mg/l (rainbow trout, oncorhynchus mykiss, 28 d)

Biodegradability: not applicable

12.2. Mobility

Known or predicted distribution to environmental compartments:

Tungsten compounds can be found in soils and water as tungstate (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 °C. For more literature references, see chapter 16.5.

12.3. Persistence and degradability

Abiotic degradation

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. Bicubic tungsten only exists as a halogen compound. Tungsten strongly tends to form complexes (e. g. formation of heteropoly acids with oxides of phosphor, arsenic, vanadium, silicon, and more). Tungsten forms a series of oxohalogenides (e. g. WOCl₄).

Biodegradation: not applicable

Bioaccumulative potential: no data available

12.4. Results of PBT assessment

This substance does not meet the criteria for classification as PBT or vPvB.

12.5. Other adverse effects

no data available

12.6. Further ecological information

Water hazard class: not hazardous to water (German water Hazard Classes according to German Administrative Regulation for Substances Hazardous to Water from 1999-05-17)

13. Disposal considerations

13.1. Appropriate disposal/product

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

13.2. EWC/AVV waste code

12 01 04 - non-ferrous metal dust and particles
12 01 13 – welding wastes

13.3. Appropriate disposal / package

Unclean packaging can be handled as non-hazardous waste.
13.4. Additional information
Waste disposal according to international, national and regional provisions. Contact your local office responsible for this.

14. Transport information
14.1. Land transport (ADR/RID/GGVSEB) UN 2909: radioactive substances, released package, products made of natural thorium; class 7; LQ not possible
14.2. Sea transport (IMDG%Code/GGVSee) UN 2909: radioactive substances, released package, products made of natural thorium; class 7; LQ not possible; EmS: F-I, S-S; pack up category A
14.3. Air transport (ICAO-TI/IATA-DGR) UN 2909: radioactive substances, released package, products made of natural thorium; class 7

15. Regulatory information
15.1. EU-Legislation 67/548/EWG idgF (Dangerous Substances) 99/45/EG idgF (Dangerous Preparations regulations) 96/29/Euratom (only affecting thorium oxide)
Chemical Safety Assessment no data available
Labelling 215-225-1
Hazard symbols and hazard statements not available
Hazardous components for labelling not available
R-phrases R11 Easily flammable (only dusts)
R45 May cause cancer.
S-phrases S13 Von Keep away from food, drink and animal feeding stuffs.
S20/21 When using do not eat, drink or smoke.
S22/23 Do not breathe dust and smoke.
S53 Avoid exposure - obtain special instructions before use.

15.2. National regulations
Germany Employers' Liability Insurance Associations: BGI 746
Technical Regulation Air: TRGS 900

Other countries National provisions must be obeyed.

16. Other information
16.1. Relevant R-phrases (Number and full text) not available
16.2. Training instructions not available
16.3. Recommended restrictions on use not available
16.4. Further 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.
16.5. Data sources

- TRGS 905 Verzeichnis krebserzeugender, erbgutverändernder oder fortpflanzungsgefährdender Stoffe, last changed on BArbBl Nr. 3/2003
- Regulation on Radiation Protection (StrlSchV) from 20.07.2001
- Registry of toxic effects of chemical substances (RTECS) http://www.cdc.gov/niosh/rtecs/start.html Stand 01/2010
- 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, 2002-10-31
- New Jersey DHSS, Hazardous Substance Fact Sheet, Tungsten (CAS-No: 7440-33-7), Rev. 11/2000
- BGI 746: Umgang mit thoriumoxidhaltigen Wolframelektroden beim Wolfram-Inertgasschweißen (WIG), chapter 4
- Acute Toxicity Studies, Huntingdon Life Science, 1999
- BGIA GESTIS substance database http://biade.itrust.de/biade/lpext.dll?f=templates&fn=main-h.htm Stand 01/2010
- ECOTOX Ecotoxicology Database USEPA (http://www.epa.gov/ecotox) Stand 01/2010
- Dermatas er al.: Solubility, Sorption and Soil Respiration Effects of Tungsten and Tungsten Alloys; Environmental Forensics, issue 5, S. 5-13, 2004