Material Safety Data Sheet
According to OSHA and ANSI

1 Identification of the substance/mixture and of the company/undertaking

Product identifier
Product name: Tungsten powder
Stock number: 44210
CAS Number:
7440-33-7
EC number:
231-143-9

Relevant identified uses of the substance or mixture and uses advised against.

Sector of Use SU24 Scientific research and development

Details of the supplier of the safety data sheet

Manufacturer/Supplier:
Alfa Aesar, A Johnson Matthey Company
Johnson Matthey Catalog Company, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Tel: 800-343-0660
Fax: 800-322-4757
Email: tech@alfa.com
www.alfa.com

Information Department: Health, Safety and Environmental Department
Emergency telephone number:
During normal hours the Health, Safety and Environmental Department at (800) 343-0660. After normal hours call Carechem 24 at (866) 928-0789.

2 Hazards identification

Classification of the substance or mixture

GHS02 Flame

H228 Flammable solid.

Classification according to Directive 67/548/ECC or Directive 1999/45/EC

F; Highly flammable

R11: Highly flammable.

Information concerning particular hazards for human and environment: Not applicable

Label elements

Labelling according to EU guidelines:

Code letter and hazard designation of product:
F Highly flammable

Risk phrases:
11 Highly flammable.

Safety phrases:
33 Take precautionary measures against static discharges.

Hazard description:

WHMIS classification
B4 - Flammable solid

Classification system

HMIS ratings (scale 0-4)

<table>
<thead>
<tr>
<th>HEALTH</th>
<th>FIRE</th>
<th>REACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

Health (acute effects) = 1
Flammability = 3
Reactivity = 1

Other hazards

Results of PBT and vPvB assessment
PBT: Not applicable.
vPvB: Not applicable.

(Contd. on page 2)
3 Composition/information on ingredients

Chemical characterization: Substances
CAS# Description:
7440-33-7 Tungsten
Identification number(s):
EC number: 231-143-9

4 First aid measures

Description of first aid measures
After inhalation
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
After skin contact
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
After eye contact
Rinse opened eye for several minutes under running water. Then consult a doctor.
After swallowing
Seek medical treatment.

Information for doctor
Most important symptoms and effects, both acute and delayed
No further relevant information available.
Indication of any immediate medical attention and special treatment needed
No further relevant information available.

5 Firefighting measures

Extinguishing media
Suitable extinguishing agents Special powder for metal fires. Do not use water.
For safety reasons unsuitable extinguishing agents Water
Special hazards arising from the substance or mixture
In case of fire, the following can be released:
Metal oxide fume
Advice for firefighters
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Keep away from ignition sources
Environmental precautions:
Do not allow material to be released to the environment without proper governmental permits.
Methods and material for containment and cleaning up:
Ensure adequate ventilation.
Keep away from ignition sources.
Reference to other sections
See Section 7 for information on safe handling
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

Handling
Precautions for safe handling
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
Information about protection against explosions and fires:
Protect against electrostatic charges.
Conditions for safe storage, including any incompatibilities
Storage
Requirements to be met by storerooms and receptacles: Store in a cool location.
Information about storage in one common storage facility:
Store away from oxidizing agents.
Do not store together with acids.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.
Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Control parameters

Components with limit values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th>Chemical</th>
<th>PEL</th>
<th>REL</th>
<th>TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>7440-33-7 Tungsten</td>
<td>10 mg/m³</td>
<td>5 mg/m³</td>
<td>10 mg/m³</td>
</tr>
</tbody>
</table>

Additional information: No data

Exposure controls

Personal protective equipment

General protective and hygienic measures
The usual precautionary measures for handling chemicals should be followed. Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Maintain an ergonomically appropriate working environment.

Breathing equipment: Use suitable respirator when high concentrations are present.

Protection of hands:
Impervious gloves
Check protective gloves prior to each use for their proper condition.

Material of gloves
The selection of suitable gloves not only depends on the material, but also on quality. Quality will vary from manufacturer to manufacturer.

Body protection: Protective work clothing.

9 Physical and chemical properties

Information on basic physical and chemical properties
General Information

Appearance: Powder
Color: Light grey
Odor: Not determined
Odour threshold: Not determined

Change in condition
Melting point/Melting range: 3410°C (6170 °F)
Boiling point/Boiling range: 5900°C (10652 °F)
Sublimation temperature / start: Not determined

Flammability (solid, gaseous) Highly flammable.

Ignition temperature: Not determined
Decomposition temperature: Not determined

Auto igniting: Not determined.

Explosion limits:
Lower: Not determined
Upper: Not determined

Vapor pressure: Not applicable.

Density at 20°C (68 °F): 19.3 g/cm³ (161.059 lbs/gal)
Bulk density at 20°C (68 °F): 4000 kg/m³
Material Safety Data Sheet
According to OSHA and ANSI

Product name: Tungsten powder

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative density</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Vapour density</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Solubility in / Miscibility with</td>
<td>Insoluble</td>
</tr>
<tr>
<td>Water</td>
<td></td>
</tr>
<tr>
<td>Segregation coefficient (n-octanol/water):</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Viscosity:</td>
<td></td>
</tr>
<tr>
<td>dynamic</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>kinematic</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Other information</td>
<td>No further relevant information available.</td>
</tr>
</tbody>
</table>

10 Stability and reactivity

Reactivity
Chemical stability
Thermal decomposition / conditions to be avoided:
Decomposition will not occur if used and stored according to specifications.
Possibility of hazardous reactions: No dangerous reactions known.
Incompatible materials: Oxidizing agents.
Hazardous decomposition products: Metal oxide fume.

11 Toxicological information

Information on toxicological effects
Acute toxicity:
Primary irritant effect:
on the skin: May cause irritation
on the eye: May cause irritation
Sensitisation: No sensitizing effects known.
Additional toxicological information:
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute and/or other multiple dose toxicity data for components in this product.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains reproductive and/or mutation data for components in this product.

12 Ecological information

Toxicity
Acquatic toxicity: No further relevant information available.
Persistence and degradability: No further relevant information available.
Behavior in environmental systems:
Bioaccumulative potential: No further relevant information available.
Mobility in soil: No further relevant information available.
Additional ecological information:
General notes:
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
Do not allow material to be released to the environment without proper governmental permits.
Results of PBT and vPvB assessment:
PBT: Not applicable.
vPvB: Not applicable.
Other adverse effects: No further relevant information available.

13 Disposal considerations

Waste treatment methods
Recommendation: Consult state, local or national regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation: Disposal must be made according to official regulations.
14 Transport information

<table>
<thead>
<tr>
<th>UN-Number</th>
<th>UN3089</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOT, ADR, IMDG, IATA</td>
<td>UN3089</td>
</tr>
</tbody>
</table>

**UN proper shipping name**

DOT, ADR, IMDG, IATA: METAL POWDER, FLAMMABLE, N.O.S. (Tungsten)

ADR: 3089 METAL POWDER, FLAMMABLE, N.O.S. (Tungsten)

**Transport hazard class(es)**

DOT, IMDG, IATA

- **Class**: 4.1 (F3) Flammable solids, self-reactive substances and solid desensitised explosives
- **Label**: 4.1

ADR

- **Class**: 4.1 Flammable solids, self-reactive substances and solid desensitised explosives
- **Label**: 4.1

**Packing group**

DOT, ADR, IMDG, IATA: II

**Environmental hazards:**

Marine pollutant: No

**Special precautions for user**

Warning: Flammable solids, self-reactive substances and solid desensitised explosives

**Danger code (Kemler):**

Risk phrases:
11 Highly flammable

Safety phrases:
33 Take precautionary measures against static discharges.

**EMS Number:**

F-G-S-G

**Segregation groups**

Heavy metals and their salts (including their organometallic compounds), powdered metals

**Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**

Not applicable.

**UN "Model Regulation":**

UN3089, METAL POWDER, FLAMMABLE, N.O.S. (Tungsten), 4.1, II

15 Regulatory information

**Safety, health and environmental regulations/legislation specific for the substance or mixture**

**Product related hazard informations:**

**Hazard symbols:**

F Highly flammable

**Risk phrases:**

11 Highly flammable

**Safety phrases:**

33 Take precautionary measures against static discharges.

**National regulations**

All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.

All components of this product are listed on the Canadian Domestic Substances List (DSL).

**Information about limitation of use:**

For use only by technically qualified individuals.

**Other regulations, limitations and prohibitive regulations**

REACH - Pre-registered substances Substance is listed.

**Chemical safety assessment:**

A Chemical Safety Assessment has not been carried out.
16 Other information

Employers should use this information only as a supplement to other information gathered by
them, and should make independent judgement of suitability of this information to ensure
proper use and protect the health and safety of employees. This information is furnished
without warranty, and any use of the product not in conformance with this Material Safety
Data Sheet, or in combination with any other product or process, is the responsibility of the
user.

Department issuing MSDS: Health, Safety and Environmental Department.

Contact:
Zachariah C. Holt
Global EHS Manager

Abbreviations and acronyms:
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International
Carriage of Dangerous Goods by Road)
RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning
the International Transport of Dangerous Goods by Rail)
INDG: International Maritime Code for Dangerous Goods
IATA: International Air Transport Association
ICAO: International Civil Aviation Organization
EINECS: European Inventory of Existing Commercial Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)