# SAFETY DATA SHEET

Zirconium (pieces)

## 1. Identification

<table>
<thead>
<tr>
<th>Product Identifier</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product name</strong></td>
<td>Zirconium (pieces)</td>
</tr>
<tr>
<td><strong>Internal identification</strong></td>
<td>Replaces M-1000-340</td>
</tr>
<tr>
<td><strong>Synonyms; trade names</strong></td>
<td>zirconium powder (pyrophoric)</td>
</tr>
<tr>
<td><strong>CAS number</strong></td>
<td>7440-67-7</td>
</tr>
</tbody>
</table>

**Recommended use of the chemical and restrictions on use**

| **Application** | Physical vapor deposition of thin films |
| **Uses advised against** | No specific uses advised against are identified. |

**Details of the supplier of the safety data sheet**

| **Supplier** | Kurt J Lesker Company |
| **Manufacturer** | Kurt J Lesker Company |
| | 1925 Route 51 |
| | Jefferson Hills, PA 15025 |
| | +1 412-387-9200 |
| Kurt J Lesker Company LTD |
| United Kingdom |
| 15-16 Burgess Road |
| Hastings, East Sussex, TN35 4NR |
| England |
| Customer Service: +44 (0) 1424 458100 |
| msds@lesker.com |

**Emergency telephone number**

| **Emergency telephone** |  |
| **North America [USA, Canada, Mexico]** | 1-866-519-4752 |
| **Mainland China** | (+86) 4001 2001 74 |
| **Europe** | (int'l call prefix)-1-760-476-3961 |
| **Asia Pacific** | (int'l call prefix)-1-760-476-3960 |
| **Middle East & Africa** | (int'l call prefix)-1-760-476-3959 |

## 2. Hazard(s) identification

**Classification of the substance or mixture**

| **Physical hazards** | Not Classified |
| **Health hazards** | Not Classified |
| **Environmental hazards** | Not Classified |

**Label elements**

| **Hazard statements** | NC Not Classified |

**Other hazards**

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Based on available knowledge of this material, it has been determined to be non-hazardous and will not pose a risk to persons or the environment in its provided form. However, any cutting, welding, melting, grinding, or use for deposition will produce dust, fume, or particulates containing component elements of this material. Exposure to these components may present significant health hazards. Note: Fine particulate may be a combustible dust which, when dispersed in air, may present an explosion hazard.

3. Composition/information on ingredients

Mixtures

<table>
<thead>
<tr>
<th>Zirconium (pieces)</th>
<th>60-100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS number: 7440-67-7</td>
<td></td>
</tr>
</tbody>
</table>

Classification
Not Classified

The Full Text for all Hazard Statements are Displayed in Section 16.

Composition comments
The exact percentage is withheld as a trade secret in accordance with 29 CFR 1910.1200.

4. First-aid measures

Description of first aid measures

General information
If in doubt, get medical attention promptly. Show this Safety Data Sheet to the medical personnel.

Inhalation
No specific recommendations. If throat irritation or coughing persists, proceed as follows. Move affected person to fresh air and keep warm and at rest in a position comfortable for breathing. Loosen tight clothing such as collar, tie or belt. Get medical attention if any discomfort continues.

Ingestion
No specific recommendations. If throat irritation or coughing persists, proceed as follows. Rinse mouth. Get medical attention if any discomfort continues.

Skin Contact
No specific recommendations. Rinse with water. Get medical attention if any discomfort continues.

Eye contact
Rinse with water. Get medical attention if any discomfort continues.

Protection of first aiders
Use protective equipment appropriate for surrounding materials.

Most important symptoms and effects, both acute and delayed

General information
The severity of the symptoms described will vary dependent on the concentration and the length of exposure.

Inhalation
No specific symptoms known.

Ingestion
No specific symptoms known. May cause discomfort if swallowed.

Skin contact
Prolonged contact may cause dryness of the skin.

Eye contact
No specific symptoms known. May be slightly irritating to eyes.

Indication of immediate medical attention and special treatment needed

Notes for the doctor
Treat symptomatically.

Specific treatments
No special treatment required.

5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media
The product is not flammable. Extinguish with alcohol-resistant foam, carbon dioxide or dry powder. Use fire-extinguishing media suitable for the surrounding fire.
Zirconium (pieces)

<table>
<thead>
<tr>
<th>Unsuitable extinguishing media</th>
<th>Do not use water, if avoidable.</th>
</tr>
</thead>
</table>

### Special hazards arising from the substance or mixture

<table>
<thead>
<tr>
<th>Specific hazards</th>
<th>Spontaneously ignites. Reacts with water.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous combustion products</td>
<td>Thermal decomposition or combustion products may include the following substances: Harmful gases or vapors.</td>
</tr>
</tbody>
</table>

### Advice for firefighters

| Protective actions during firefighting | Avoid breathing fire gases or vapors. Evacuate area. Control run-off water by containing and keeping it out of sewers and watercourses. If risk of water pollution occurs, notify appropriate authorities. |
| Special protective equipment for firefighters | Wear positive-pressure self-contained breathing apparatus (SCBA) and appropriate protective clothing. Standard Firefighter's clothing including helmets, protective boots and gloves will provide a basic level of protection for chemical incidents. |

### 6. Accidental release measures

#### Personal precautions, protective equipment and emergency procedures

| Personal precautions | No specific recommendations. For personal protection, see Section 8. Evacuate area. Spontaneously ignites. |
| Environmental precautions | Avoid discharge into drains or watercourses or onto the ground. |

#### Methods and material for containment and cleaning up

| Methods for cleaning up | Reuse or recycle products wherever possible. Collect spillage with a shovel and broom, or similar and reuse, if possible. Collect and place in suitable waste disposal containers and seal securely. Flush contaminated area with plenty of water. Wash thoroughly after dealing with a spillage. Dispose of contents/container in accordance with national regulations. |

### Reference to other sections

For personal protection, see Section 8.

### 7. Handling and storage

#### Precautions for safe handling

| Usage precautions | Read and follow manufacturer's recommendations. Wear protective clothing as described in Section 8 of this safety data sheet. Keep away from food, drink and animal feeding stuffs. Keep container tightly sealed when not in use. |
| Advice on general occupational hygiene | Wash promptly if skin becomes contaminated. Take off contaminated clothing and wash before reuse. Wash contaminated clothing before reuse. |

#### Conditions for safe storage, including any incompatibilities

| Storage precautions | No specific recommendations. Store contents under inert gas. Avoid contact with water. |
| Storage class | Water-reactive storage. |

### Specific end use(s)

| Specific end use(s) | The identified uses for this product are detailed in Section 1.2. |

### 8. Exposure Controls/personal protection

#### Control parameters

| Occupational exposure limits | |

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Zirconium (pieces)

Long-term exposure limit (8-hour TWA): ACGIH 5 mg/m³
Short-term exposure limit (15-minute): ACGIH 10 mg/m³ as Zr
A4

Zirconium (pieces)
Long-term exposure limit (8-hour TWA): ACGIH 5 mg/m³
Short-term exposure limit (15-minute): ACGIH 10 mg/m³ as Zr
A4
ACGIH = American Conference of Governmental Industrial Hygienists.
A4 = Not Classifiable as a Human Carcinogen.

Immediate danger to life and health 50 mg/m³

Zirconium (pieces) (CAS: 7440-67-7)

Immediate danger to life and health 50 mg/m³

Exposure controls
Appropriate engineering controls No specific ventilation requirements.

Eye/face protection No specific eye protection required during normal use. Large Spillages: Eyewear complying with an approved standard should be worn if a risk assessment indicates eye contact is possible.

Hand protection No specific hand protection recommended. Large Spillages: Wear protective gloves.

Hygiene measures Wash hands thoroughly after handling. Wash at the end of each work shift and before eating, smoking and using the toilet. Do not eat, drink or smoke when using this product.

Respiratory protection No specific recommendations. Provide adequate ventilation. Large Spillages: If ventilation is inadequate, suitable respiratory protection must be worn.

Environmental exposure controls Not regarded as dangerous for the environment.

9. Physical and Chemical Properties

Information on basic physical and chemical properties

Appearance Solid.
Color Grey.
Odor No characteristic odor.
Odor threshold Not applicable.
pH Not applicable.
Melting point 1855°C
Initial boiling point and range Not available.
Flash point Not applicable.
Evaporation rate Not applicable.
Flammability (solid, gas) Not applicable.
Upper/lower flammability or explosive limits Not applicable.
<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium (pieces)</td>
<td></td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>Not available.</td>
</tr>
<tr>
<td>Vapor density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Relative density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Bulk density</td>
<td>Not available.</td>
</tr>
<tr>
<td>Solubility(ies)</td>
<td>Insoluble in water.</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Not available.</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>91.224</td>
</tr>
</tbody>
</table>

10. Stability and reactivity

- **Reactivity**: There are no known reactivity hazards associated with this product.
- **Stability**: Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions.
- **Possibility of hazardous reactions**: Reacts strongly with water. May ignite itself if exposed to air.
- **Conditions to avoid**: There are no known conditions that are likely to result in a hazardous situation.
- **Materials to avoid**: Air. Oxidizing agents. Water.
- **Hazardous decomposition products**: Does not decompose when used and stored as recommended. Thermal decomposition or combustion products may include the following substances: Harmful gases or vapors.

11. Toxicological information

- **Toxicological effects**: Not regarded as a health hazard under current legislation.
- **Acute toxicity - oral**
  - Notes (oral LD₅₀): Based on available data the classification criteria are not met.
- **Acute toxicity - dermal**
  - Notes (dermal LD₅₀): Based on available data the classification criteria are not met.
- **Acute toxicity - inhalation**
  - Notes (inhalation LC₅₀): Based on available data the classification criteria are not met.
- **Skin corrosion/irritation**
  - Animal data: Based on available data the classification criteria are not met.
- **Serious eye damage/irritation**
  - Based on available data the classification criteria are not met.
- **Respiratory sensitization**
  - Based on available data the classification criteria are not met.
- **Skin sensitization**
  - Based on available data the classification criteria are not met.
- **Germ cell mutagenicity**
### Zirconium (pieces)

**Genotoxicity - in vitro**
Based on available data the classification criteria are not met.

**Carcinogenicity**
Based on available data the classification criteria are not met.

**IARC carcinogenicity**
None of the ingredients are listed or exempt.

**Reproductive toxicity**
- **Reproductive toxicity - fertility**
  Based on available data the classification criteria are not met.
- **Reproductive toxicity - development**
  Based on available data the classification criteria are not met.

**Specific target organ toxicity - single exposure**
- **STOT - single exposure**
  Not classified as a specific target organ toxicant after a single exposure.

**Specific target organ toxicity - repeated exposure**
- **STOT - repeated exposure**
  Not classified as a specific target organ toxicant after repeated exposure.

**Aspiration hazard**
Not relevant. Solid.

**General information**
No specific health hazards known. The severity of the symptoms described will vary dependent on the concentration and the length of exposure.

**Inhalation**
No specific symptoms known.

**Ingestion**
No specific symptoms known. May cause discomfort if swallowed.

**Skin Contact**
Prolonged contact may cause dryness of the skin.

**Eye contact**
No specific symptoms known. May be slightly irritating to eyes.

**Route of entry**
Ingestion Inhalation Skin and/or eye contact

**Target Organs**
No specific target organs known.

### 12. Ecological Information

**Ecotoxicity**
Not regarded as dangerous for the environment. However, large or frequent spills may have hazardous effects on the environment.

**Toxicity**
Based on available data the classification criteria are not met.

**Persistence and degradability**
- **Persistence and degradability**
  Reacts with water.

**Bioaccumulative potential**
No data available on bioaccumulation.

**Mobility in soil**
No data available.

**Other adverse effects**
None known.

### 13. Disposal considerations

**Waste treatment methods**
Zirconium (pieces)

General information
The generation of waste should be minimized or avoided wherever possible. Reuse or recycle products wherever possible. This material and its container must be disposed of in a safe way.

Disposal methods
Dispose of surplus products and those that cannot be recycled via a licensed waste disposal contractor. Waste, residues, empty containers, discarded work clothes and contaminated cleaning materials should be collected in designated containers, labeled with their contents. Incineration or landfill should only be considered when recycling is not feasible. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of the local water authority.

14. Transport information

General
The product is not covered by international regulations on the transport of dangerous goods (IMDG, IATA, DoT).

UN Number
Not applicable.

UN proper shipping name
Not applicable.

Transport hazard class(es)
No transport warning sign required.

Packing group
Not applicable.

Environmental hazards
Environmentally Hazardous Substance
No.

Special precautions for user
Not applicable.

Transport in bulk according to
Not applicable.
Annex II of MARPOL 73/78
and the IBC Code

15. Regulatory information

US Federal Regulations
SARA Section 302 Extremely Hazardous Substances Tier II Threshold Planning Quantities
None of the ingredients are listed or exempt.

CERCLA/Superfund, Hazardous Substances/Reportable Quantities (EPA)
None of the ingredients are listed or exempt.

SARA Extremely Hazardous Substances EPCRA Reportable Quantities
None of the ingredients are listed or exempt.

SARA 313 Emission Reporting
None of the ingredients are listed or exempt.

CAA Accidental Release Prevention
None of the ingredients are listed or exempt.

FDA - Essential Chemical
None of the ingredients are listed or exempt.
Zirconium (pieces)

FDA - Precursor Chemical
None of the ingredients are listed or exempt.

SARA (311/312) Hazard Categories
None of the ingredients are listed or exempt.

OSHA Highly Hazardous Chemicals
None of the ingredients are listed or exempt.

US State Regulations
California Proposition 65 Carcinogens and Reproductive Toxins
None of the ingredients are listed or exempt.

California Air Toxics "Hot Spots" (A-I)
None of the ingredients are listed or exempt.

California Air Toxics "Hot Spots" (A-II)
None of the ingredients are listed or exempt.

California Directors List of Hazardous Substances
None of the ingredients are listed or exempt.

Massachusetts "Right To Know" List
All the ingredients are listed or exempt.

Rhode Island "Right To Know" List
All the ingredients are listed or exempt.

Minnesota "Right To Know" List
All the ingredients are listed or exempt.

New Jersey "Right To Know" List
All the ingredients are listed or exempt.

Pennsylvania "Right To Know" List
All the ingredients are listed or exempt.

Inventories
US - TSCA
All the ingredients are listed or exempt.

US - TSCA 12(b) Export Notification
None of the ingredients are listed or exempt.

Philippines - PICCS
All the ingredients are listed or exempt.

New Zealand - NZIOC
All the ingredients are listed or exempt.

16. Other Information

SDS No. 4979

End of SDS