SAFETY DATA SHEET

Section 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier
Product Code SAC050
Product Name Zirconium Hydride
UN/ID no 1437
Synonyms Zirconium Hydride, Zirconium Dihydride: Product #306

1.2. Relevant identified uses of the substance or mixture and uses advised against
Recommended Use Zirconium Product Manufacture
Uses advised against

1.3. Details of the supplier of the safety data sheet
Manufacturer ATI, 1000 Six PPG Place, Pittsburgh, PA 15222 USA

1.4. Emergency telephone number
Emergency Telephone Chemtrec: +1-703-741-5970

Section 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture
Regulation (EC) No 1272/2008
Flammable solids Category 1

2.2. Label elements

Danger
Hazard statements Flammable solids

Appearance Powder Physical state Solid Odour Odourless

Precautionary Statements - Prevention
Wear protective gloves/protective clothing/eye protection
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
If dust clouds can occur, use explosion-proof electrical/ventilating/lighting/equipment
In case of fire: Use salt (NaCl) or class D dry powder for extinction

2.3 Hazards not otherwise classified (HNOC)
Not applicable
Other Information .

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
Synonyms Zirconium Hydride, Zirconium Dihydride: Product #306.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>EC No</th>
<th>CAS No</th>
<th>Weight-%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium Hydride</td>
<td>-</td>
<td>7704-99-6</td>
<td>&gt; 99</td>
</tr>
</tbody>
</table>

Section 4: FIRST AID MEASURES

4.1. Description of first aid measures
Inhalation If excessive amounts of smoke, fume, or particulate are inhaled during processing, remove to fresh air and consult a qualified health professional.
Skin Contact None under normal use conditions.
Eye contact In the case of particles coming in contact with eyes during processing, treat as with any foreign object.
Ingestion IF SWALLOWED. Call a POISON CENTER or doctor/physician if you feel unwell.

4.2. Most important symptoms and effects, both acute and delayed
Symptoms None anticipated.

4.3. Indication of any immediate medical attention and special treatment needed
Note to doctors Treat symptomatically.

Section 5: FIREFIGHTING MEASURES

5.1. Extinguishing media
Suitable extinguishing media Isolate large fires and allow to burn out. Smother small fires with salt (NaCl) or class D dry powder fire extinguisher.

Unsuitable extinguishing media Do not spray water on burning metal as an explosion may occur. This explosive characteristic is caused by the hydrogen and steam generated by the reaction of water with the burning material

5.2. Special hazards arising from the substance or mixture
Intense heat Very fine, high surface area material resulting from grinding, buffing, polishing, or similar processes of this product may ignite spontaneously at room temperature WARNING: Fine particles resulting from grinding, buffing, polishing, or similar processes of this product may form combustible dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimise combustible dust hazard
Hazardous combustion products
Not applicable.

5.3. Advice for firefighters

Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions
Use personal protective equipment as required.

For emergency responders

6.2. Environmental precautions

Collect spillage to prevent release to the environment.

6.3. Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Sweep up and shovel into suitable containers. Avoid creating uncontrolled dust.

6.4. Reference to other sections

See Section 12: ECOLOGICAL INFORMATION.

Section 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Advice on safe handling
Very fine, high surface area material resulting from grinding, buffing, polishing, or similar processes of this product may ignite spontaneously at room temperature. WARNING: Fine particles resulting from grinding, buffing, polishing, or similar processes of this product may form combustible dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimise combustible dust hazard.

General Hygiene Considerations
Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Conditions
Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). For long-term storage, keep sealed in argon-filled steel drums.

Incompatible materials
Dissolves in hydrofluoric acid. Ignores in the presence of fluorine. When heated above 200°C, reacts exothermically with the following: Chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.

7.3. Specific end use(s)

Risk Management Methods (RMM)
The information required is contained in this Safety Data Sheet.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters
**Chemical Name** | **European Union** | **United Kingdom** | **France** | **Spain** | **Germany**  
--- | --- | --- | --- | --- | ---  
Zirconium Hydride | - | - | - | - | -  
7704-99-6  
**Chemical Name** | **Italy** | **Portugal** | **Netherlands** | **Finland** | **Denmark**  
--- | --- | --- | --- | --- | ---  
Zirconium Hydride | - | - | - | - | -  
7704-99-6  
**Chemical Name** | **Austria** | **Switzerland** | **Poland** | **Norway** | **Ireland**  
--- | --- | --- | --- | --- | ---  
Zirconium Hydride | - | - | - | - | -  
7704-99-6

**Derived No Effect Level (DNEL)**  
No DNELs are available for this product as a whole.

**Predicted No Effect Concentration (PNEC)**  
No PNECs are available for this product as a whole.

### 8.2. Exposure controls

#### Engineering Controls

Avoid generation of uncontrolled particles.

#### Personal protective equipment

**Eye/face protection**  
When airborne particles may be present, appropriate eye protection is recommended. For example, tight-fitting goggles, foam-lined safety glasses or other protective equipment that shield the eyes from particles.

**Skin and body protection**  
Fire/flame resistant/retardant clothing may be appropriate during hot work with the product.

**Respiratory protection**  
When particulates/fumes/gases are generated and if exposure limits are exceeded or irritation is experienced, proper approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminate concentrations. Respiratory protection must be provided in accordance with current local regulations.

#### Environmental exposure controls

Section 6: ACCIDENTAL RELEASE MEASURES.

### Section 9: PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks • Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical state</strong></td>
<td>Solid</td>
<td></td>
</tr>
<tr>
<td><strong>Appearance</strong></td>
<td>Powder</td>
<td>Odour</td>
</tr>
<tr>
<td><strong>Colour</strong></td>
<td>metallic dark grey to black</td>
<td>Odour threshold</td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td>Odourless</td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Melting point / freezing point</strong></td>
<td>Evolves hydrogen above 300 °C / 570 °F</td>
<td></td>
</tr>
<tr>
<td><strong>Boiling point / boiling range</strong></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Flash point</strong></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Evaporation rate</strong></td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Flammability (solid, gas)</strong></td>
<td>-</td>
<td>Flammable</td>
</tr>
<tr>
<td><strong>Flammability Limit in Air</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Upper flammability limit</strong></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Lower flammability limit</strong></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Vapour pressure</strong></td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Vapour density</strong></td>
<td>-</td>
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<tr>
<td><strong>Specific Gravity</strong></td>
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</tr>
<tr>
<td><strong>Water solubility</strong></td>
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<tr>
<td><strong>Solubility(ies)</strong></td>
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</tr>
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<td><strong>Partition coefficient</strong></td>
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<td>Not applicable</td>
</tr>
<tr>
<td><strong>Autoignition temperature</strong></td>
<td>-</td>
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</tr>
<tr>
<td><strong>Decomposition temperature</strong></td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Kinematic viscosity</strong></td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Dynamic viscosity</strong></td>
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<td>Not applicable</td>
</tr>
<tr>
<td><strong>Explosive properties</strong></td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td><strong>Oxidising properties</strong></td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>
9.2. Other information

- Softening point
- Molecular weight
- VOC Content (%): Not applicable
- Density
- Bulk density: 170 lb/ft³

Section 10: STABILITY AND REACTIVITY

10.1. Reactivity
Not applicable

10.2. Chemical stability
Stable under normal conditions.

Explosion data
- Sensitivity to Mechanical Impact: None.
- Sensitivity to Static Discharge: None.

10.3. Possibility of hazardous reactions

Hazardous polymerisation
Hazardous polymerisation does not occur.

Possibility of Hazardous Reactions
None under normal processing.

10.4. Conditions to avoid
Dust formation and dust accumulation.

10.5. Incompatible materials
Dissolves in hydrofluoric acid. Ignotes in the presence of fluorine. When heated above 200°C, reacts exothermically with the following: Chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.

10.6. Hazardous decomposition products
Not applicable.

Section 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information

- Inhalation: Product not classified.
- Eye contact: Product not classified.
- Skin Contact: Product not classified.
- Ingestion: Product not classified.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium Hydride</td>
<td>&gt; 5000 mg/kg bw</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Information on toxicological effects

Symptoms
None known.

Delayed and immediate effects as well as chronic effects from short and long-term exposure
Acute toxicity       Product not classified.
Skin corrosion/irritation  Product not classified.
Serious eye damage/eye irritation  Product not classified.
Sensitisation  Product not classified.
Germ cell mutagenicity  Product not classified.
Carcinogenicity  Product not classified.
Reproductive toxicity  Product not classified.
STOT - single exposure  Product not classified.
STOT - repeated exposure  Product not classified.
Aspiration hazard  Product not classified.

### Section 12: ECOLOGICAL INFORMATION

#### 12.1. Toxicity

This product as shipped is not classified for aquatic toxicity

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Toxicity to microorganisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium Hydride</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

#### 12.2. Persistence and degradability

.

#### 12.3. Bioaccumulative potential

.

#### 12.4. Mobility in soil

#### 12.5. Results of PBT and vPvB assessment

The PBT and vPvB criteria do not apply to inorganic substances.

#### 12.6. Other adverse effects

### Section 13: DISPOSAL CONSIDERATIONS

#### 13.1. Waste treatment methods

- **Waste from residues/unused products**: Disposal should be in accordance with applicable regional, national and local laws and regulations.
- **Contaminated packaging**: Disposal should be in accordance with applicable regional, national and local laws and regulations.

### Section 14: TRANSPORT INFORMATION
Section 15: REGULATORY INFORMATION

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

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>French RG number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium Hydride</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7704-99-6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

European Union

Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

Authorisations and/or restrictions on use:
This product does not contain substances subject to authorisation (Regulation (EC) No. 1907/2006 (REACH), Annex XIV).
product does not contain substances subject to restriction (Regulation (EC) No. 1907/2006 (REACH), Annex XVII).

**International Inventories**

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSL/NDSL</td>
<td>Complies</td>
</tr>
<tr>
<td>EINECS/ELINCS</td>
<td>Complies</td>
</tr>
<tr>
<td>ENCS</td>
<td>Complies</td>
</tr>
<tr>
<td>IECSC</td>
<td>Not Listed</td>
</tr>
<tr>
<td>KECL</td>
<td>Complies</td>
</tr>
<tr>
<td>PICCS</td>
<td>Complies</td>
</tr>
<tr>
<td>AICS</td>
<td>Not Listed</td>
</tr>
</tbody>
</table>

**Legend:**

- TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
- DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
- EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
- ENCS - Japan Existing and New Chemical Substances
- IECSC - China Inventory of Existing Chemical Substances
- KECL - Korean Existing and Evaluated Chemical Substances
- PICCS - Philippines Inventory of Chemicals and Chemical Substances
- AICS - Australian Inventory of Chemical Substances

**15.2. Chemical safety assessment**

No chemical safety assessment has been performed for this product.

**Section 16: OTHER INFORMATION**

<table>
<thead>
<tr>
<th>Issue Date</th>
<th>31-May-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revision Date</td>
<td>05-Jun-2019</td>
</tr>
<tr>
<td>Revision Note</td>
<td>Updated Section(s): 1, 3, 11, 14.</td>
</tr>
</tbody>
</table>

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

**Note:**
The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Additional information available from: Safety data sheets and labels available at ATImetals.com

End of Safety Data Sheet