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

1.1. Product identifier

Product Code  SAC018
Product Name  Zirconium Oxide

Synonyms  All anhydrous Zirconium Dioxide products, All grades of zirconium oxide, including spectrographic grade, jet milled, reactor grade (Product #304)

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

Recommended Use  Chemical intermediate

Uses advised against

1.3. Details of the supplier of the safety data sheet

Manufacturer Address  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

2.2. Label elements

Appearance  Powder  Physical state  Powder  Odour  Odourless

2.3 Hazards not otherwise classified (HNOC)

Not applicable

Other Information  

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms  All anhydrous Zirconium Dioxide products, All grades of zirconium oxide, including spectrographic grade, jet milled, reactor grade (Product #304).
**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.

**Self-protection of the first aider**
Use personal protective equipment as required.

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: FIRE FIGHTING MEASURES**

5.1. Extinguishing media

**Suitable extinguishing media**
Non-combustible.

**Unsuitable extinguishing media**
Non-combustible

5.2. Special hazards arising from the substance or mixture

Non-combustible

**Hazardous combustion products**
Not applicable.

5.3. Advice for firefighters

Wear self-contained breathing apparatus and protective suit. Use personal protective equipment as required.

**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**
Use personal protective equipment as required.

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 or shovel material into dry 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
Handle in accordance with good industrial hygiene and safety practice.

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 in properly labelled containers.

Incompatible materials
None known.

7.3. Specific end use(s)

Risk Management Methods (RMM)
Not required.

---

**Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**

8.1. Control parameters

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>European Union</th>
<th>United Kingdom</th>
<th>France</th>
<th>Spain</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium Dioxide 1314-23-4</td>
<td>-</td>
<td>TWA: 5 mg/m³</td>
<td>-</td>
<td>STEL: 10 mg/m³</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TWA: 5 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Chemical Name</td>
<td>Italy</td>
<td>Portugal</td>
<td>Netherlands</td>
<td>Finland</td>
<td>Denmark</td>
</tr>
<tr>
<td>Zirconium Dioxide 1314-23-4</td>
<td>-</td>
<td>STEL: 10 mg/m³</td>
<td>-</td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 5 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA: 5 mg/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Name</td>
<td>Austria</td>
<td>Switzerland</td>
<td>Poland</td>
<td>Norway</td>
<td>Ireland</td>
</tr>
<tr>
<td>Zirconium Dioxide 1314-23-4</td>
<td>TWA: 5 mg/m³</td>
<td>TWA: 5 mg/m³</td>
<td>STEL: 10 mg/m³</td>
<td>TWA: 5 mg/m³</td>
<td>TWA: 5 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TWA: 5 mg/m³</td>
<td>STEL: 10 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Derived No Effect Level (DNEL)  No information available

Predicted No Effect Concentration (PNEC)  No information available.

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
Wear protective gloves.
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</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Powder</td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>Powder</td>
<td>Odour</td>
</tr>
<tr>
<td>Colour</td>
<td>white</td>
<td>Odour threshold</td>
</tr>
<tr>
<td>Property</td>
<td>Values</td>
<td>Remarks</td>
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<tr>
<td>pH</td>
<td>-</td>
<td></td>
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<tr>
<td>Melting point/freezing point</td>
<td>2710 °C / 4910 °F</td>
<td>Not applicable</td>
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<tr>
<td>Boiling point / boiling range</td>
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<td></td>
</tr>
<tr>
<td>Flash point</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>-</td>
<td>Not flammable</td>
</tr>
<tr>
<td>Flammability Limit in Air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper flammability limit</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Lower flammability limit</td>
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<td></td>
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<tr>
<td>Vapour pressure</td>
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<td>Not applicable</td>
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<tr>
<td>Vapour density</td>
<td>-</td>
<td>Not applicable</td>
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<tr>
<td>Specific Gravity</td>
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</tr>
<tr>
<td>Water solubility</td>
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<tr>
<td>Solubility(ies)</td>
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<td></td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition temperature</td>
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<td>Not applicable</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
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<td>Not applicable</td>
</tr>
<tr>
<td>Dynamic viscosity</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Oxidising properties</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                   | 110-130 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
None known.

10.6. Hazardous decomposition products
None known.

Section 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information

<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 Dioxide</td>
<td>&gt;5000 mg/kg bw</td>
<td>-</td>
<td>&gt;4.3 mg/L</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 Micro-organisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium Dioxide</td>
<td>The 15 d NOEC of zirconium dichloride oxide to Chlorella vulgaris was greater than 200 mg/L</td>
<td>The 96 h LL50 of zirconium dioxide to Danio rerio was greater than 100 mg/L</td>
<td>-</td>
<td>The 48 h EC50 of zirconium dioxide to Daphnia magna was greater than 100 mg/L</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

IMDG
14.1 UN/ID no Not regulated
14.2 Proper shipping name Not regulated
14.3 Hazard Class Not regulated
14.4 Packing Group Not regulated
14.5 Marine pollutant Not applicable
14.6 Special Provisions None
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable

RID
14.1 UN/ID no Not regulated
14.2 Proper shipping name Not regulated
14.3 Hazard Class Not regulated
14.4 Packing Group Not regulated
14.5 Environmental hazard Not applicable
14.6 Special Provisions None

ADR
14.1 UN/ID no Not regulated
14.2 Proper shipping name Not regulated
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 Dioxide</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1314-23-4</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). This 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>Status</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>Complies</td>
</tr>
<tr>
<td>KECL</td>
<td>Complies</td>
</tr>
<tr>
<td>PICCS</td>
<td>Complies</td>
</tr>
<tr>
<td>AICS</td>
<td>Complies</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

Issue Date 28-May-2015
Revision Date 17-Mar-2017
Revision Note Updated Section(s): 4, 6.

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.

End of Safety Data Sheet

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