Safety Data Sheet

Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier
Product Name: • Calcia-Zirconia – Codes 9304, 9305, 9307, 7009, 7019, #235, #252

1.2 Relevant identified uses of the substance or mixture and uses advised against
Relevant identified use(s) • TSP

1.3 Details of the supplier of the safety data sheet
Manufacturer • Saint-Gobain
One New Bond St.
Mail Stop 525-203 Worcester, MA 01615-0137
United States
http://www.ceramicmaterials.saint-gobain.com
cermatworcester@saint-gobain.com

Telephone (General) • 1-800-243-0028

1.4 Emergency telephone number
Manufacturer • 800-535-5053 - Infotrac Inc.
Manufacturer • 800-424-9300 - CHEMTREC

Section 2: Hazards Identification

EU/EEC

2.1 Classification of the substance or mixture
CLP • Skin Corrosion 1C - H314
     Serious Eye Damage 1 - H318

2.2 Label Elements
CLP

DANGER

Hazard statements • H314 - Causes severe skin burns and eye damage.
H318 - Causes serious eye damage

Precautionary statements

**Prevention**
- P260 - Do not breathe dust.
- P264 - Wash thoroughly after handling.
- P280 - Wear protective gloves/protective clothing/eye protection/face protection.

**Response**
- P304+P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P310 - Immediately call a POISON CENTER or doctor/physician.
- P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P363 - Wash contaminated clothing before reuse.
- P312 - Specific treatment see supplemental first aid information.
- P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P301+P330+P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

**Storage/Disposal**
- P405 - Store locked up.
- P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other Hazards

**CLP**
- According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

UN GHS

According to: UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

2.1 Classification of the substance or mixture

**UN GHS**
- Skin Corrosion 1C
- Serious Eye Damage 1

2.2 Label elements

**UN GHS**

DANGER

**Hazard statements**
- Causes severe skin burns and eye damage.
- Causes serious eye damage

Precautionary statements

**Prevention**
- Do not breathe dust.
- Wash thoroughly after handling.
- Wear protective gloves/protective clothing/eye protection/face protection.

**Response**
- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- Immediately call a POISON CENTER or doctor/physician.
- IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
- Wash contaminated clothing before reuse.
- Specific treatment, see supplemental first aid information.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

**Storage/Disposal**
- Store locked up.
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other hazards
2.1 Classification of the substance or mixture

OSHA HCS 2012
- Skin Corrosion 1C
- Serious Eye Damage 1

2.2 Label elements

OSHA HCS 2012
DANGER

Hazard statements
- Causes severe skin burns and eye damage.
- Causes serious eye damage

Precautionary statements

Prevention
- Do not breathe dust.
- Wash thoroughly after handling.
- Wear protective gloves/protective clothing/eye protection/face protection.

Response
- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- Immediately call a POISON CENTER or doctor/physician.
- IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
- Wash contaminated clothing before reuse.
- Specific treatment, see supplemental first aid information.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

Storage/Disposal
- Store locked up.
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other hazards

OSHA HCS 2012

Canada

According to: WHMIS

2.1 Classification of the substance or mixture

WHMIS
- Corrosive - E

2.2 Label elements

WHMIS

2.3 Other hazards

WHMIS
- In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).
Section 3 - Composition/Information on Ingredients

3.1 Substances

- Material does not meet the criteria of a substance.

3.2 Mixtures

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Identifiers</th>
<th>%</th>
<th>LD50/LC50</th>
<th>Classifications According to Regulation/Directive</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium oxide</td>
<td>CAS:1314-23-4</td>
<td>92% TO</td>
<td>NDA</td>
<td>UN GHS: Not Classified, EU CLP: Not Classified, OSHA HCS 2012: Not Classified</td>
<td>NDA</td>
</tr>
<tr>
<td></td>
<td>EC Number:215-227-2</td>
<td>96%</td>
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<td></td>
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<tr>
<td>Calcium oxide</td>
<td>CAS:1305-78-8</td>
<td>3% TO</td>
<td>NDA</td>
<td>UN GHS: Skin Corr. 1C; Eye Dam. 1, EU CLP: Skin Corr. 1C, H314; Eye Dam. 1, H318</td>
<td>NDA</td>
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<tr>
<td></td>
<td>EC Number:215-138-9</td>
<td>6%</td>
<td></td>
<td>OSHA HCS 2012: Skin Corr. 1C; Eye Dam. 1</td>
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</tr>
<tr>
<td>Hafnium oxide</td>
<td>CAS:12055-23-1</td>
<td>1% TO</td>
<td>NDA</td>
<td>UN GHS: Eye Irrit. 2; Skin Irrit. 3, EU CLP: Not Classified, OSHA HCS 2012: Eye Irrit. 2</td>
<td>NDA</td>
</tr>
<tr>
<td></td>
<td>EINECS:235-013-2</td>
<td>3%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 4 - First Aid Measures

4.1 Description of first aid measures

Inhalation

- Move victim to fresh air. Administer oxygen if breathing is difficult. Do not use mouth-to-mouth method if victim inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Give artificial respiration if victim is not breathing. Get medical attention immediately.

Skin

- In case of contact with substance, immediately flush skin with running water for at least 20 minutes. Remove and isolate contaminated clothing. If irritation develops and persists, get medical attention.

Eye

- In case of contact with substance, immediately flush eyes with running water for at least 20 minutes. If eye irritation persists: Get medical advice/attention.

Ingestion

- If swallowed, rinse mouth with water (only if the person is conscious) Do NOT induce vomiting. Do not use mouth-to-mouth method if victim ingested the substance. Obtain medical attention immediately if ingested.

4.2 Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to Physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Section 5 - Firefighting Measures

5.1 Extinguishing media
Suitable Extinguishing Media

• In case of fire use media as appropriate for surrounding fire.

Unsuitable Extinguishing Media

• No data available

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards

• No particular fire or explosion hazards known.

Hazardous Combustion Products

• No data available

5.3 Advice for firefighters

• Structural firefighters’ protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
• Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
• Wear positive pressure self-contained breathing apparatus (SCBA).
• SMALL FIRES: Move containers from fire area if you can do it without risk.

Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions

• Ventilate enclosed areas. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Emergency Procedures

• ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Do not get water inside container.

6.2 Environmental precautions

• Prevent entry into waterways and sewers.

6.3 Methods and material for containment and cleaning up

Containment/Clean-up Measures

• Stop leak if you can do it without risk.
• Avoid generating dust.
• Carefully shovel or sweep up spilled material and place in suitable container.

6.4 Reference to other sections

• Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Section 7 - Handling and Storage

7.1 Precautions for safe handling

Handling

• Handle and open container with care. Use only with adequate ventilation. Wear appropriate personal protective equipment, avoid direct contact. Do not breathe dust. Avoid contact with skin, eyes, and clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

7.2 Conditions for safe storage, including any incompatibilities

Storage

• Keep container tightly closed. Store in low humidity.

7.3 Specific end use(s)

• Refer to Section 1.2 - Relevant identified uses.

Section 8 - Exposure Controls/Personal Protection
## 8.1 Control parameters

### Exposure Limits/Guidelines

<table>
<thead>
<tr>
<th>Result</th>
<th>ACGIH</th>
<th>China</th>
<th>Denmark</th>
<th>Finland</th>
<th>France</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hafnium oxide</strong></td>
<td>TWAs</td>
<td>0.5 mg/m³ TWA (as Hf)</td>
<td>Not established</td>
<td>Not established</td>
<td>0.5 mg/m³ TWA (as Hf)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>as Hafnium compounds</td>
<td></td>
<td></td>
<td>as Hafnium compounds</td>
</tr>
</tbody>
</table>

| **Calcium oxide** (1305-78-8) | TWAs                   | 2 mg/m³ TWA | 2 mg/m³ TWA | 2 mg/m³ TWA | 2 mg/m³ TWA [VME] |
|                               | STELs                  | 5 mg/m³ STEL | Not established | Not established | Not established |
|                               |                        | 5 mg/m³ STEL (as Zr) | Not established | Not established | Not established |
|                               |                        | 10 mg/m³ STEL (as Zr) | as Zirconium compounds | Not established | Not established |
|                               |                        | 10 mg/m³ STEL (as Zr) | as Zirconium compounds | Not established | Not established |

| **Zirconium oxide** | TWAs                      | 5 mg/m³ TWA (as Zr) | 5 mg/m³ TWA (as Zr) | 5 mg/m³ TWA (as Zr) | 1 mg/m³ TWA (as Zr) |
|                     | STELs                     | 10 mg/m³ STEL (as Zr) | 10 mg/m³ STEL (as Zr) | Not established | Not established |
|                     |                            | 10 mg/m³ STEL (as Zr) | as Zirconium compounds | Not established | Not established |

### Exposure Limits/Guidelines (Con’t.)

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<thead>
<tr>
<th>Result</th>
<th>Germany DFG</th>
<th>Germany TRGS</th>
<th>Greece</th>
<th>Hungary</th>
<th>Ireland</th>
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<td>STELs</td>
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<td>Not established</td>
<td>Not established</td>
<td>5 mg/m³ STEL [CK]</td>
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<td>Ceilings</td>
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<td>Not established</td>
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<td>MAKs</td>
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<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td></td>
<td>TWAs</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
<td>Not established</td>
</tr>
<tr>
<td></td>
<td>STELs</td>
<td>Not established</td>
<td>Not established</td>
<td>10 mg/m³ STEL (as Zr)</td>
<td>20 mg/m³ STEL [CK] (as Zr)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>as Zirconium compounds</td>
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<td>as Zirconium compounds</td>
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### Exposure Limits/Guidelines (Con’t.)

<table>
<thead>
<tr>
<th>Result</th>
<th>NIOSH</th>
<th>OSHA</th>
<th>Poland</th>
<th>Portugal</th>
<th>Spain</th>
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<tr>
<td><strong>Hafnium oxide</strong></td>
<td>TWAs</td>
<td>Not established</td>
<td>0.5 mg/m³ TWA (as Hf)</td>
<td>0.5 mg/m³ TWA [NDS] (as Hf)</td>
<td>0.5 mg/m³ TWA [VLE-MP] (as Hf)</td>
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<tr>
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<td></td>
<td>as Hafnium</td>
<td>0.5 mg/m³ TWA (as Hf)</td>
<td>as Hafnium</td>
<td>as Hafnium</td>
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</table>
### Exposure Limits/Guidelines (Con’t.)

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<th>Sweden</th>
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<tbody>
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<td>STELs</td>
<td>2.5 mg/m³ STV (inhalable dust)</td>
</tr>
<tr>
<td>TWAs</td>
<td>1 mg/m³ LLV (inhalable dust)</td>
</tr>
</tbody>
</table>

### Exposure Control Notations

**Portugal**
- Zirconium oxide as Zirconium compounds: **Carcinogens**: (A4 - Not Classifiable as a Human Carcinogen)
  - ACGIH
- Zirconium oxide as Zirconium compounds: **Carcinogens**: (A4 - Not Classifiable as a Human Carcinogen)
  - Germany DFG
  - Calcium oxide (1305-78-8): **Pregnancy**: (no risk to embryo/fetus if exposure limits adhered to)

### Exposure Limits Supplemental

**ACGIH**
- Calcium oxide (1305-78-8): **TLV Basis - Critical Effects**: (upper respiratory tract irritation)
- Hafnium oxide as Hafnium compounds: **TLV Basis - Critical Effects**: (eye and upper respiratory tract irritation; liver damage)

### 8.2 Exposure controls

#### Engineering Measures/Controls
- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. Ensure that dust handling systems (such as exhaust ducts, dust collectors, vessels and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment).

#### Personal Protective Equipment

##### Respiratory
- For limited exposure use an N95 dust mask. For prolonged exposure use an air-purifying respirator with high efficiency particulate air (HEPA) filters. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.
Eye/Face
• Wear safety goggles.

Skin/Body
• Wear appropriate gloves. Wear long sleeves and/or protective coveralls.

Environmental Exposure
• Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways. Follow best practice for site management and disposal of waste.

Key to abbreviations
ACGIH = American Conference of Governmental Industrial Hygiene
LLV = Limit Level Value is the exposure limit for 8-hour work day
MAK = Maximale Arbeitsplatz Konzentration is the maximum permissible concentration
NIOSH = National Institute of Occupational Safety and Health
OSHA = Occupational Safety and Health Administration

Section 9 - Physical and Chemical Properties

9.1 Information on Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Solid</th>
<th>Appearance/Description</th>
<th>Yellow/white powder.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form</td>
<td>Solid</td>
<td>Appearance/Description</td>
<td>Yellow/white powder.</td>
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<td>Color</td>
<td>Yellow/white</td>
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<tr>
<td>Odor Threshold</td>
<td>Data lacking</td>
<td>Odor</td>
<td>Data lacking</td>
</tr>
</tbody>
</table>

General Properties

| Boiling Point | Data lacking | Melting Point/Freezing Point | Data lacking |
| Decomposition Temperature | Data lacking | pH | Data lacking |
| Specific Gravity/Relative Density | Data lacking | Water Solubility | Data lacking |
| Viscosity | Data lacking | Explosive Properties | Data lacking |
| Oxidizing Properties: | Data lacking | Data lacking |

Vapour Pressure

| Data lacking | Data lacking | Data lacking |
| Evaporation Rate | Data lacking | Data lacking |

Flammability

| Flash Point | Data lacking | UEL | Data lacking |
| LEL | Data lacking | Autoignition | Data lacking |
| Flammability (solid, gas) | Data lacking | Data lacking |

Environmental

| Octanol/Water Partition coefficient | Data lacking |

9.2 Other Information
• No additional physical and chemical parameters noted.

Section 10: Stability and Reactivity

10.1 Reactivity
• No dangerous reaction known under conditions of normal use.

10.2 Chemical stability
• Stable under normal temperatures and pressures.
10.3 Possibility of hazardous reactions
- Hazardous polymerization will not occur.

10.4 Conditions to avoid
- Avoid creating dusts.

10.5 Incompatible materials
- No data available

10.6 Hazardous decomposition products
- No data available

---

Section 11 - Toxicological Information

11.1 Information on toxicological effects

<table>
<thead>
<tr>
<th>GHS Properties</th>
<th>Classification</th>
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<tr>
<td>Acute toxicity</td>
<td>EU/CLP • Data lacking</td>
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<tr>
<td></td>
<td>OSHA HCS 2012 • Data lacking</td>
</tr>
<tr>
<td></td>
<td>UN GHS • Data lacking</td>
</tr>
<tr>
<td>Aspiration Hazard</td>
<td>EU/CLP • Data lacking</td>
</tr>
<tr>
<td></td>
<td>OSHA HCS 2012 • Data lacking</td>
</tr>
<tr>
<td></td>
<td>UN GHS • Data lacking</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>EU/CLP • Data lacking</td>
</tr>
<tr>
<td></td>
<td>OSHA HCS 2012 • Data lacking</td>
</tr>
<tr>
<td></td>
<td>UN GHS • Data lacking</td>
</tr>
<tr>
<td>Germ Cell Mutagenicity</td>
<td>EU/CLP • Data lacking</td>
</tr>
<tr>
<td></td>
<td>OSHA HCS 2012 • Data lacking</td>
</tr>
<tr>
<td></td>
<td>UN GHS • Data lacking</td>
</tr>
<tr>
<td>Skin corrosion/Irritation</td>
<td>EU/CLP • Skin Corrosion 1C</td>
</tr>
<tr>
<td></td>
<td>OSHA HCS 2012 • Skin Corrosion 1C</td>
</tr>
<tr>
<td></td>
<td>UN GHS • Skin Corrosion 1C</td>
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<tr>
<td>Skin sensitization</td>
<td>EU/CLP • Data lacking</td>
</tr>
<tr>
<td></td>
<td>OSHA HCS 2012 • Data lacking</td>
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<td></td>
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<tr>
<td>STOT-RE</td>
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</tr>
<tr>
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<td>UN GHS • Data lacking</td>
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<tr>
<td>Toxicity for Reproduction</td>
<td>EU/CLP • Data lacking</td>
</tr>
<tr>
<td></td>
<td>OSHA HCS 2012 • Data lacking</td>
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<td>UN GHS • Data lacking</td>
</tr>
<tr>
<td>Respiratory sensitization</td>
<td>EU/CLP • Data lacking</td>
</tr>
<tr>
<td></td>
<td>OSHA HCS 2012 • Data lacking</td>
</tr>
<tr>
<td></td>
<td>UN GHS • Data lacking</td>
</tr>
</tbody>
</table>
Potential Health Effects

Inhalation
- **Acute (Immediate)**: May cause corrosive burns - irreversible damage.
- **Chronic (Delayed)**: Repeated or prolonged exposure to corrosive fumes may cause bronchial irritation with chronic cough.

Skin
- **Acute (Immediate)**: Causes severe skin burns and eye damage.
- **Chronic (Delayed)**: Repeated or prolonged exposure to corrosive materials will cause dermatitis.

Eye
- **Acute (Immediate)**: Causes serious eye damage.
- **Chronic (Delayed)**: Repeated or prolonged exposure to corrosive materials or fumes may cause conjunctivitis.

Ingestion
- **Acute (Immediate)**: May cause irreversible damage to mucous membranes.
- **Chronic (Delayed)**: Repeated or prolonged exposure to corrosive materials or fumes may cause gastrointestinal disturbances.

Section 12 - Ecological Information

12.1 Toxicity
- Material data lacking.

12.2 Persistence and degradability
- Material data lacking.

12.3 Bioaccumulative potential
- Material data lacking.

12.4 Mobility in Soil
- Material data lacking.

12.5 Results of PBT and vPvB assessment
- No PBT and vPvB assessment has been conducted.

12.6 Other adverse effects
- No studies have been found.

Section 13 - Disposal Considerations

13.1 Waste treatment methods

**Product waste**
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

**Packaging waste**
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information
14.1 UN number | 14.2 UN proper shipping name | 14.3 Transport hazard class(es) | 14.4 Packing group | 14.5 Environmental hazards
--- | --- | --- | --- | ---
DOT | NDA | NDA | NDA | NDA
TDG | NDA | NDA | NDA | NDA
IMO/IMDG | NDA | NDA | NDA | NDA
IATA/ICAO | NDA | NDA | NDA | NDA

14.6 Special precautions for user
- None specified.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
- Data lacking.

### Section 15 - Regulatory Information

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

**SARA Hazard Classifications**
- Acute

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium oxide</td>
<td>1305-78-8</td>
<td>Yes</td>
</tr>
<tr>
<td>Hafnium oxide</td>
<td>12055-23-1</td>
<td>No</td>
</tr>
<tr>
<td>Zirconium oxide</td>
<td>1314-23-4</td>
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</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS</th>
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<th>Canada NDSL</th>
<th>China</th>
<th>EU EINECS</th>
<th>EU ELNICS</th>
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<tr>
<td>Calcium oxide</td>
<td>1305-78-8</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<td>Hafnium oxide</td>
<td>12055-23-1</td>
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<td>Calcium oxide</td>
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<td>Yes</td>
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<tr>
<td>Hafnium oxide</td>
<td>12055-23-1</td>
<td>Yes</td>
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</tr>
<tr>
<td>Zirconium oxide</td>
<td>1314-23-4</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Canada

#### Labor

**Canada - WHMIS - Classifications of Substances**
- Hafnium oxide
- Calcium oxide
- Zirconium oxide

**Canada - WHMIS - Ingredient Disclosure List**
- Hafnium oxide
- Calcium oxide

Preparation Date: 10/July/2015
Revision Date: 14/July/2015
### Environment

**Canada - CEPA - Priority Substances List**
- Hafnium oxide 12055-23-1 Not Listed
- Calcium oxide 1305-78-8 Not Listed
- Zirconium oxide 1314-23-4 Not Listed

**China**

**Environment**
- **China - Ozone Depleting Substances - First Schedule**
  - Hafnium oxide 12055-23-1 Not Listed
  - Calcium oxide 1305-78-8 Not Listed
  - Zirconium oxide 1314-23-4 Not Listed

- **China - Ozone Depleting Substances - Second Schedule**
  - Hafnium oxide 12055-23-1 Not Listed
  - Calcium oxide 1305-78-8 Not Listed
  - Zirconium oxide 1314-23-4 Not Listed

- **China - Ozone Depleting Substances - Third Schedule**
  - Hafnium oxide 12055-23-1 Not Listed
  - Calcium oxide 1305-78-8 Not Listed
  - Zirconium oxide 1314-23-4 Not Listed

**Other**

- **China - Annex I & II - Controlled Chemicals Lists**
  - Hafnium oxide 12055-23-1 Not Listed
  - Calcium oxide 1305-78-8 Not Listed
  - Zirconium oxide 1314-23-4 Not Listed

- **China - Dangerous Goods List**
  - Hafnium oxide 12055-23-1 Not Listed
  - Calcium oxide 1305-78-8 Not Listed
  - Zirconium oxide 1314-23-4 Not Listed

**Germany**

**Labor**

- **Germany - Immission Control - Qualifying Quantities for Major Accident Prevention**
  - Hafnium oxide 12055-23-1 Not Listed
  - Calcium oxide 1305-78-8 Not Listed
  - Zirconium oxide 1314-23-4 Not Listed

- **Germany - Immission Control - Qualifying Quantities for Safety Reporting**
  - Hafnium oxide 12055-23-1 Not Listed
  - Calcium oxide 1305-78-8 Not Listed
  - Zirconium oxide 1314-23-4 Not Listed

- **Germany - TRGS 505 - Specific Lead Regulations**
  - Hafnium oxide 12055-23-1 Not Listed
  - Calcium oxide 1305-78-8 Not Listed
  - Zirconium oxide 1314-23-4 Not Listed
### Germany - TRGS 511 - Specific Ammonium Nitrate Regulations

<table>
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<tr>
<th>Substance</th>
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<th>Status</th>
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<td>Calcium oxide</td>
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<td>Zirconium oxide</td>
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### Environment

#### Germany - TA Luft - Types and Classes

<table>
<thead>
<tr>
<th>Substance</th>
<th>ID Number</th>
<th>Status</th>
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<tbody>
<tr>
<td>Hafnium oxide</td>
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<td>Not Listed</td>
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<tr>
<td>Calcium oxide</td>
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<tr>
<td>Zirconium oxide</td>
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#### Germany - TA Luft - Emission Limits for Carcinogenic Substances

<table>
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<th>Status</th>
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<td>Calcium oxide</td>
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<tr>
<td>Zirconium oxide</td>
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#### Germany - TA Luft - Emission Limits for Fibers

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<tbody>
<tr>
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<tr>
<td>Calcium oxide</td>
<td>1305-78-8</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Zirconium oxide</td>
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#### Germany - TA Luft - Emission Limits for Inorganic Dusts

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<th>Substance</th>
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<tbody>
<tr>
<td>Hafnium oxide</td>
<td>12055-23-1</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Calcium oxide</td>
<td>1305-78-8</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Zirconium oxide</td>
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#### Germany - TA Luft - Emission Limits for Inorganic Gases

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<tr>
<th>Substance</th>
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<td>Hafnium oxide</td>
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<td>Not Listed</td>
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<tr>
<td>Calcium oxide</td>
<td>1305-78-8</td>
<td>Not Listed</td>
</tr>
<tr>
<td>Zirconium oxide</td>
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#### Germany - TA Luft - Emission Limits for Organic Substances

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<th>Substance</th>
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<tr>
<td>Calcium oxide</td>
<td>1305-78-8</td>
<td>Not Listed</td>
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<tr>
<td>Zirconium oxide</td>
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### Germany - Water Classification (VwVwS) - Annex 1

<table>
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<tr>
<th>Substance</th>
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<tbody>
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<td>Hafnium oxide</td>
<td>12055-23-1</td>
<td>Not Listed</td>
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<tr>
<td>Calcium oxide</td>
<td>1305-78-8</td>
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<tr>
<td>Zirconium oxide</td>
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### Germany - Water Classification (VwVwS) - Annex 2 - Water Hazard Classes

<table>
<thead>
<tr>
<th>Substance</th>
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<tbody>
<tr>
<td>Hafnium oxide</td>
<td>12055-23-1</td>
<td>Not Listed, ID Number 322, hazard class 1</td>
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<tr>
<td>Calcium oxide</td>
<td>1305-78-8</td>
<td>low hazard to waters</td>
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<tr>
<td>Zirconium oxide</td>
<td>1314-23-4</td>
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### Germany - Water Classification (VwVwS) - Annex 3

<table>
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<th>Substance</th>
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<tbody>
<tr>
<td>Hafnium oxide</td>
<td>12055-23-1</td>
<td>Not considered hazardous to water</td>
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<tr>
<td>Calcium oxide</td>
<td>1305-78-8</td>
<td>Not Listed, ID Number 2894, not considered hazardous to water</td>
</tr>
<tr>
<td>Zirconium oxide</td>
<td>1314-23-4</td>
<td>Not Listed</td>
</tr>
</tbody>
</table>
### United States

#### Labor

**U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**U.S. - OSHA - Specifically Regulated Chemicals**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

#### Environment

**U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**U.S. - CERCLA/SARA - Section 313 - Emission Reporting**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

### United States - California

**Environment**

**U.S. - California - Proposition 65 - Carcinogens List**
- Hafnium oxide: 12055-23-1 Not Listed
### United States - California

#### Proposition 65

**Developmental Toxicity**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**Maximum Allowable Dose Levels (MADL)**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**No Significant Risk Levels (NSRL)**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**Reproductive Toxicity - Female**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**Reproductive Toxicity - Male**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

### United States - Pennsylvania

#### Labor

**RTK (Right to Know) - Environmental Hazard List**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

**RTK (Right to Know) - Special Hazardous Substances**
- Hafnium oxide: 12055-23-1 Not Listed
- Calcium oxide: 1305-78-8 Not Listed
- Zirconium oxide: 1314-23-4 Not Listed

### 15.2 Chemical Safety Assessment

- No Chemical Safety Assessment has been carried out.

### 15.3 Other Information

- **WARNING:** This product contains a chemical known to the State of California to cause cancer.

### Section 16 - Other Information

#### Relevant Phrases (code & full text)

- H314 - Causes severe skin burns and eye damage.
- H372 - Causes damage to organs through prolonged or repeated exposure.
- R34 - Causes burns.
R35 - Causes severe burns.
R41 - Risk of serious damage to eyes.
R48/23 - Toxic: danger of serious damage to health by prolonged exposure through inhalation.

Disclaimer/Statement of Liability

• Reasonable care has been taken in the preparation of this information, but the supplier gives no warranty of merchantability or of fitness for a particular purpose. Any product purchased is sold on the assumption the purchaser will make his own tests to determine the quality and suitability of the product. Supplier expressly disclaims any and all liability for incidental and/or consequential property damage arising out of the use of this product. No information provided shall be deemed to be a recommendation to use any product in conflict with any existing patent rights. Read the Safety Data Sheet before handling product.

Key to abbreviations
NDA = No data available