SECTION 1. IDENTIFICATION

GHS product identifier  Alumina Zirconia Composite Ceramic
Chemical name  Fired or Sintered Zirconia Ceramic Formed Parts
Other means of identification  CZ1, CZ3, CZ6, CZ8, CZ9, AZ-25, AZ-67, AZ-93, CZ-9, CZR, CZRy, ZTA, ZTA-A3, ZTA-90
Product Type  Solid

RELEVANT IDENTIFIED USES OF THE SUBSTANCE OR MIXTURE AND USES ADVISED AGAINST

Identified uses  Not available
Supplier's details  CoorsTek, Inc.
14143 Denver West Parkway, Suite 400
Golden, CO 80401
Phone: +1 303 271 7100
Fax: +1 303 271 7009
Email: coorsteksd@coorstek.com
Website: www.coorstek.com

Emergency telephone number  +1 303 271 7100
(with hours of operation)  8am-5pm MDT (M-F)

SECTION 2. HAZARDS IDENTIFICATION

OSHA/HCS status  While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

Classification of the substance or mixture  Not classified

GHS LABEL ELEMENTS

Signal word  No signal word
Hazard statements  No known significant effects or critical hazards

PRECAUTIONARY STATEMENTS

Prevention  Not applicable
Response  Not applicable
Storage  Not applicable
Disposal  Not applicable
Hazards not otherwise classified  None known
SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance/mixture: Mixture
Chemical name: Fired or Sintered Zirconia Ceramic Formed Parts
Other means of identification: CZ1, CZ3, CZ6, CZ8, CZ9, AZ-25, AZ-67, AZ-93, CZR, CZRy, ZTA, ZTA-A3, ZTA-90

CAS NUMBER/OTHER IDENTIFIERS

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>% CAS NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium dioxide</td>
<td>10 - 70</td>
</tr>
<tr>
<td>Aluminium oxide</td>
<td>30 - 90</td>
</tr>
<tr>
<td>Zinc oxide</td>
<td>0 - 5</td>
</tr>
<tr>
<td>Chromium (III) oxide</td>
<td>0 - 5</td>
</tr>
<tr>
<td>Yttrium oxide</td>
<td>0 - 5</td>
</tr>
<tr>
<td>Magnesium oxide</td>
<td>0 - 3</td>
</tr>
</tbody>
</table>

Any concentration shown as a range is to protect confidentiality or is due to batch variation. There are no ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

SECTION 4. FIRST AID MEASURES

DESCRIPTION OF NECESSARY FIRST AID MEASURES

Eye contact: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Get medical attention if irritation occurs.

Inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.

Skin contact: Flush contaminated skin with plenty of water. Get medical attention if symptoms occur.

Ingestion: Not a likely route of exposure. If large amounts of product are ingested, give two glasses of water and get prompt medical attention. Never give anything by mouth to an unconscious person.
SECTION 4. FIRST AID MEASURES, CONTINUED

MOST IMPORTANT SYMPTOMS/EFFECTS, ACUTE AND DELAYED

Potential acute health effects

- **Eye contact**: High dust concentrations from grinding, sanding, or machining formed parts in a way that generates dust may cause mechanical eye irritation.
- **Inhalation**: High dust concentrations from grinding, sanding, or machining formed parts in a way that generates dust may cause upper respiratory irritation.
- **Skin contact**: Prolonged skin contact with dust may result in dryness. If no dust is generated from fired parts, no acute effects are known.
- **Ingestion**: No known significant effects or critical hazards

OVER-EXPOSURE SIGNS/SYMPTOMS

- **Eye contact**: No known significant effects or critical hazards
- **Inhalation**: No known significant effects or critical hazards
- **Skin contact**: No known significant effects or critical hazards
- **Ingestion**: No known significant effects or critical hazards

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT, IF NECESSARY

- **Notes to physician**: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- **Specific treatments**: No specific treatment
- **Protection of first-aiders**: No action shall be taken involving any personal risk or without suitable training.
  
  See toxicological information (Section 11)

SECTION 5. FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA

- **Suitable extinguishing media**: Material does not burn. Use an extinguishing agent suitable for the surrounding fire.
- **Unsuitable extinguishing media**: None known
- **Specific hazards arising from the chemical**: No specific fire or explosion hazard
- **Hazardous thermal decomposition products**: Decomposition products may include the following materials: metal oxide/oxides
- **Special protective actions for fire-fighters**: No special measures are required.
- **Special protective equipment for fire-fighters**: Firefighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
SECTION 6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES

For non-emergency personnel
No action shall be taken involving any personal risk or without suitable training. Keep unnecessary and unprotected personnel from entering. Put on appropriate personal protective equipment.

For emergency responders
If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in “For nonemergency personnel”.

Environmental precautions
Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP

Spill
Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor. If fired powder is released, wear an N-95 dust mask or half-face respirator and polymer gloves and clean up with a shovel, wet mop, or vacuum system. If the powder is mixed with water, dam any drains in the area with absorbent material and clean up using mops, wet vacuums or similar equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

SECTION 7. HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING

Protective measures
Put on appropriate personal protective equipment (see Section 8).

Advice on general occupational hygiene
Eating, drinking, and smoking should be prohibited in areas where this material is handled, stored, and processed. Workers should wash hands and face before eating, drinking, and smoking. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities
Store in accordance with local regulations. Do not store in unlabeled containers. Any dust generated during handling or processing should be removed by wet mopping or vacuuming.
SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

CONTROL PARAMETERS

Occupational exposure limits

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NIOSH REL (United States, 10/2013).</strong></td>
<td></td>
</tr>
<tr>
<td>CEIL: <strong>15 mg/m³</strong> Form: Dust</td>
<td></td>
</tr>
<tr>
<td>TWA: <strong>5 mg/m³</strong> 10 hours. Form: Dust and fumes</td>
<td></td>
</tr>
<tr>
<td>STEL: <strong>10 mg/m³</strong> 15 minutes. Form: Fertilizer and/or industrial use</td>
<td></td>
</tr>
<tr>
<td><strong>OSHA PEL (United States, 6/2016)</strong></td>
<td></td>
</tr>
<tr>
<td>TWA: <strong>5 mg/m³</strong> 8 hours. Form: Fertilizer and/or industrial use</td>
<td></td>
</tr>
<tr>
<td>TWA: <strong>5 mg/m³</strong> 8 hours. Form: Respirable fraction</td>
<td></td>
</tr>
<tr>
<td>TWA: <strong>15 mg/m³</strong> 8 hours. Form: Total dust</td>
<td></td>
</tr>
<tr>
<td><strong>ACGIH TLV (United States, 3/2016)</strong></td>
<td></td>
</tr>
<tr>
<td>TWA: <strong>2 mg/m³</strong> 8 hours. Form: Respirable fraction</td>
<td></td>
</tr>
<tr>
<td>STEL: <strong>10 mg/m³</strong> 15 minutes. Form: Respirable fraction</td>
<td></td>
</tr>
</tbody>
</table>

**Appropriate engineering controls**

Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

**Environmental exposure controls**

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

INDIVIDUAL PROTECTION MEASURES

**Hygiene measures**

Wash hands, forearms, and face thoroughly after handling chemical products, before eating, smoking, and using the lavatory, and at the end of the working period.

**Eye/face protection**

Recommended: safety glasses or goggles.

**SKIN PROTECTION**

**Hand protection**

Wear polymer gloves if prolonged exposure to powder is expected. Use of a barrier cream can reduce potential skin rash due to extremely dry skin.

**Body protection**

Not required under normal conditions of use

**Other skin protection**

Not required under normal conditions of use

**Respiratory protection**

Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.
SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Physical state  Solid [Formed Parts]
Color            White
Odor            None
Odor threshold  Not applicable
pH              Not applicable
Melting point  >1700°C (>3092°F)
Boiling point  >2200°C (>3992°F)
Flash point    Not applicable
Evaporation rate Not applicable
Flammability (solid, gas) Material does not burn
Lower and upper explosive (flammable) limits Not applicable
Vapor pressure Not applicable
Vapor density Not applicable
Relative density 3.7
Solubility Insoluble in the following materials: cold water and hot water
Solubility in water Negligible solubility in water
Partition coefficient: n-octanol/water Not applicable
Auto-ignition temperature Not flammable
Decomposition temperature Not available
Viscosity Not applicable

SECTION 10. STABILITY AND REACTIVITY

Reactivity No specific test data related to reactivity available for this product or its ingredients.
Chemical stability The product is stable.
Possibility of hazardous reactions Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid No specific data
Incompatible materials Reactive or incompatible with the following materials: oxidizing materials and moisture
Hazardous decomposition products Under normal conditions of storage and use, hazardous decomposition products should not be produced.
### SECTION 11. TOXICOLOGICAL INFORMATION

#### INFORMATION ON TOXICOLOGICAL EFFECTS

- **Acute toxicity**: There is no data available.
- **Irritation/Corrosion**: There is no data available.
- **Sensitization**: There is no data available.
- **Mutagenicity**: There is no data available.

#### Carcinogenicity

<table>
<thead>
<tr>
<th>NAME</th>
<th>OSHA</th>
<th>IARC</th>
<th>NTP</th>
<th>ACGIH</th>
<th>EPA</th>
<th>NIOSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zirconium dioxide</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>A4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aluminium oxide</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>A4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chromium (III) oxide</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>A4</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

- **Reproductive toxicity**: There is no data available.
- **Teratogenicity**: There is no data available.

#### Specific target organ toxicity (single exposure)

- **Specific target organ toxicity (repeated exposure)**: There is no data available.

#### Aspiration hazard

- There is no data available.

#### Information on the likely routes of exposure

- **Inhalation**

#### POTENTIAL ACUTE HEALTH EFFECTS

- **Eye contact**: High dust concentrations from grinding, sanding, or machining formed parts in a way that generates dust may cause mechanical eye irritation.
- **Inhalation**: High dust concentrations from grinding, sanding, or machining formed parts in a way that generates dust may cause upper respiratory irritation.
- **Skin contact**: Prolonged skin contact with dust may result in dryness. If no dust is generated from fired parts, no acute effects are known.
- **Ingestion**: No known significant effects or critical hazards

#### SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS

- **Eye contact**: No known significant effects or critical hazards
- **Inhalation**: No known significant effects or critical hazards
- **Skin contact**: No known significant effects or critical hazards
- **Ingestion**: No known significant effects or critical hazards
SECTION 11. TOXICOLOGICAL INFORMATION, CONTINUED

DELAYED AND IMMEDIATE EFFECTS AND ALSO CHRONIC EFFECTS FROM SHORT AND LONG TERM EXPOSURE

Short term exposure
- **Potential immediate effects**: No known significant effects or critical hazards
- **Potential delayed effects**: No known significant effects or critical hazards

Long term exposure
- **Potential immediate effects**: No known significant effects or critical hazards
- **Potential delayed effects**: No known significant effects or critical hazards

**Potential chronic health effects**
- **General**: No known significant effects or critical hazards
- **Carcinogenicity**: No known significant effects or critical hazards
- **Mutagenicity**: No known significant effects or critical hazards
- **Teratogenicity**: No known significant effects or critical hazards
- **Developmental effects**: No known significant effects or critical hazards
- **Fertility effects**: No known significant effects or critical hazards

NUMERICAL MEASURES OF TOXICITY
- **Acute toxicity estimates**: There is no data available.

SECTION 12. ECOLOGICAL INFORMATION

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>RESULT</th>
<th>SPECIES</th>
<th>EXPOSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingredient: zinc oxide</td>
<td>Acute IC50 1.85 mg/L Marine water</td>
<td>Algae - Skeletonema costatum</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Acute IC50 46 μg/L Fresh water</td>
<td>Algae - Pseudokirchneriella subcapitata - Exponential growth phase</td>
<td>72 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 98 μg/L Fresh water</td>
<td>Daphnia - Daphnia magna - Neonate</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 1.1 ppm Fresh water</td>
<td>Fish - Oncorhynchus mykiss</td>
<td>96 hours</td>
</tr>
</tbody>
</table>

Persistence and degradability
- There is no data available.

Bioaccumulative potential

<table>
<thead>
<tr>
<th>PRODUCT/INGREDIENT NAME</th>
<th>LogP&lt;sub&gt;ow&lt;/sub&gt;</th>
<th>BCF</th>
<th>POTENTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc oxide</td>
<td>-</td>
<td>60960</td>
<td>High</td>
</tr>
</tbody>
</table>

MOBILITY IN SOIL

- **Soil/water partition coefficient (K<sub>ow</sub>)**: Not available
- **Other adverse effects**: No known significant effects or critical hazards.
SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains, and sewers.

SECTION 14. TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th></th>
<th>DOT</th>
<th>IMDG</th>
<th>IATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN Number</td>
<td>Not regulated</td>
<td>Not regulated</td>
<td>Not regulated</td>
</tr>
<tr>
<td>UN proper shipping name</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transport hazard class(es)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Packing group</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>Environmental hazards</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Additional information</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

AERG: Not applicable.

Special precautions for user Transport within users’ premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

SECTION 15. REGULATORY INFORMATION

U.S. Federal regulations

- **TSCA 8(a) CDR Exempt/Partial exemption:** Not determined
- **United States inventory (TSCA 8b):** All components are listed or exempted.
- **Clean Water Act (CWA) 307:** Zinc oxide; Chromium (III) oxide

Clean Air Act Section 112 (b)

- Listed

Hazardous Air Pollutants (HAPs)

- Not listed

Clean Air Act Section 602 Class I Substances

- Not listed

Clean Air Act Section 602 Class II Substances

- Not listed

DEA List I Chemicals (Precursor Chemicals)

- Not listed

DEA List II Chemicals (Essential Chemicals)

- Not listed
SECTION 15. REGULATORY INFORMATION, CONTINUED

SARA 302/304 Composition/information on ingredients
No products were found.

SARA 304 RQ
Not applicable

SARA 311/312 Classification
Not applicable

SARA 313

<table>
<thead>
<tr>
<th>PRODUCT NAME</th>
<th>CAS NUMBER</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form R - reporting requirements Zinc oxide</td>
<td>1314-13-2</td>
<td>≥5 - ≤10</td>
</tr>
<tr>
<td>Chromium (III) oxide</td>
<td>1308-38-9</td>
<td>≥5 - ≤10</td>
</tr>
<tr>
<td>Supplier notification Zinc oxide</td>
<td>1314-13-2</td>
<td>≥5 - ≤10</td>
</tr>
<tr>
<td>Chromium (III) oxide</td>
<td>1308-38-9</td>
<td>≥5 - ≤10</td>
</tr>
</tbody>
</table>

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

STATE REGULATIONS
- **Massachusetts**: The following components are listed: Zirconium dioxide; Aluminium oxide; Zinc oxide; Chromium (III) oxide
- **New York**: None of the components are listed.
- **New Jersey**: The following components are listed: Aluminium oxide; Zinc oxide; Chromium (III) oxide
- **Pennsylvania**: The following components are listed: Aluminium oxide; Zinc oxide; Chromium (III) oxide
- **California Prop. 65**: No products were found.

SECTION 16. OTHER INFORMATION

Procedure used to derive the classification

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>JUSTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not classified.</td>
<td></td>
</tr>
</tbody>
</table>

HISTORY
- **Date of issue mm/dd/yyyy**: 02/15/2017
- **Date of previous issue**: 04/30/2014
- **Version**: 2
- **Prepared by**: KMK Regulatory Services Inc.
- **Notice to reader**: To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.