1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION:
Product Name: Aluminum Oxide (Common names: alumina, sapphire)  
Date of Prep: June 18, 2009  
Revision: H

2. COMPOSITION/INFORMATION ON INGREDIENTS:

<table>
<thead>
<tr>
<th>CHEMICAL INGREDIENT NAME</th>
<th>CAS NUMBER</th>
<th>EC NUMBER</th>
<th>% BY WT.</th>
<th>EXPOSURE LIMITS</th>
<th>EU LABEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>aluminum oxide</td>
<td>1344-28-1</td>
<td>2156916</td>
<td>99+</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION: No data available.

4. FIRST AID MEASURES:

Inhalation: Remove to fresh air.
Skin Contact: Wash with soap and water.
Eye Contact: Immediately flush with water for a minimum of 15 minutes.
Ingestion: Get medical attention.

5. FIRE-FIGHTING MEASURES:

Flammable Properties: No data available.
Extinguishing Media: Water spray, carbon dioxide, dry chemical.
Unique Aspects Contributing To a Fire:
Special Fire Fighting Procedures:
Note: As in any fire, wear a self-contained breathing apparatus and full protective gear.

6. ACCIDENTAL RELEASE MEASURES: Sweep up, place in bag and hold for waste disposal.

7. HANDLING AND STORAGE: Keep container tightly closed and in a dry, well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION:

Handle in accordance with good laboratory practices.

Respiratory Protection: Not normally needed. If exposure limits are exceeded, use approved respirator.
Eye Protection: Safety glasses with side shields.
Skin Protection: Neoprene or other chemical resistant gloves. Disposable nitrile is acceptable for light, intermittent exposure.
Engineering Controls: No special requirements. Handle in an area with good general room ventilation.
9. PHYSICAL AND CHEMICAL PROPERTIES:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>White</td>
</tr>
<tr>
<td>Physical State</td>
<td>Solid or powder</td>
</tr>
<tr>
<td>Flash Point</td>
<td>N/A</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>10mm Hg @ 1732°C</td>
</tr>
<tr>
<td>Odor</td>
<td>N/A</td>
</tr>
<tr>
<td>Explosion Limits</td>
<td>N/A</td>
</tr>
<tr>
<td>Vapor Density (air=1)</td>
<td>N/A</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>2.67-3.86g/ml</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>2230°C</td>
</tr>
<tr>
<td>Melting Point</td>
<td>2050°C</td>
</tr>
<tr>
<td>pH</td>
<td>N/A</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>Isoluble</td>
</tr>
<tr>
<td>Melting Point</td>
<td>N/A</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY:

| Hazardous Polymerization        | ☑Will Not Occur                      |
| Stability                       | Stable                               |

<table>
<thead>
<tr>
<th>Hazardous Decomposition/Combustion Products</th>
<th>Conditions &amp; Materials to Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>No data available.</td>
<td>Strong acids and bases, halogens.</td>
</tr>
</tbody>
</table>

11. TOXICOLOGICAL INFORMATION:

Primary Route(s) of Exposure Under Normal Use:

- Target Organ(s): Lungs, bones.
- Acute Effects: Not available.
- Chronic Effects: Coughing, chest pains, difficulty in breathing.

Other Information: Chemical ingredient(s) not classified as carcinogen(s) by OSHA, IARC, NTP, ACGIH or California. ACGIH rating: A4.

12. ECOLOGICAL INFORMATION: No data available.

13. DISPOSAL CONSIDERATIONS: Observe all federal, state and local environmental regulations.

14. TRANSPORT INFORMATION:

<table>
<thead>
<tr>
<th>U.S. DOT</th>
<th>IATA/ICAO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Name: None.</td>
<td>Non-hazardous for air transport.</td>
</tr>
<tr>
<td>Hazard Class: Non-hazardous for transport</td>
<td></td>
</tr>
<tr>
<td>UN/NA #:</td>
<td></td>
</tr>
<tr>
<td>Packing Group #:</td>
<td></td>
</tr>
</tbody>
</table>

15. REGULATORY INFORMATION:

<table>
<thead>
<tr>
<th>U.S. TOSCA</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>This product has been classified according to the hazard criteria of the CPR and this MSDS contains all of the information required by the CPR.</td>
</tr>
</tbody>
</table>

16. OTHER INFORMATION:

<table>
<thead>
<tr>
<th>U.S. EPA SARA</th>
<th>National Fire Protection Association Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>313 Chemicals</td>
<td>CERCLA RQ</td>
</tr>
<tr>
<td>Yes</td>
<td>4= Severe Hazard</td>
</tr>
<tr>
<td></td>
<td>3=Serious Hazard</td>
</tr>
<tr>
<td></td>
<td>2=Moderate Hazard</td>
</tr>
<tr>
<td></td>
<td>1=Slight Hazard</td>
</tr>
<tr>
<td></td>
<td>0=Minimal Hazard</td>
</tr>
<tr>
<td></td>
<td>HEALTH</td>
</tr>
<tr>
<td></td>
<td>FLAMMABILITY</td>
</tr>
<tr>
<td></td>
<td>REACTIVITY</td>
</tr>
<tr>
<td></td>
<td>OTHER</td>
</tr>
</tbody>
</table>

Notes: Not Established (NE) means a value has not been set or there is no information available. Not Applicable (NA) means that the topic is not pertinent.

The information contained herein has been compiled from data presented in various technical sources believed to be accurate. Waters makes no warranties and assumes no liability in connection with the use of this information. It is the user’s responsibility to determine the suitability of this information and to assure the adoption of necessary precautions.