SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Al-Doped LLZO Solid State Electrolyte
MANUFACTURER: MSE Supplies LLC
DIVISION: MSE Supplies Battery Division
ADDRESS: MSE Supplies LLC, 4400 E Broadway Blvd, Suite 600, Tucson AZ 85711 USA
PHONE: +1-520-789-6673
EMAIL: info@msesupplies.com
Non-emergency assistance: 1-888-525-3070
CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300
Issue Date: 09/12/17

SECTION 2: INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>C.A.S. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>La2O3</td>
<td>1312-81-8</td>
</tr>
<tr>
<td>ZrO2</td>
<td>7440-67-7</td>
</tr>
<tr>
<td>Al2O3</td>
<td>1344-28-1</td>
</tr>
<tr>
<td>Li2CO3</td>
<td>554-13-2</td>
</tr>
</tbody>
</table>

SECTION 3: HAZARDS IDENTIFICATION

3.1 EMERGENCY OVERVIEW

Specific Physical Form: Powder
Odor, Color, Grade: odorless, white powder
General Physical Form: Solid

Immediate health, physical, and environmental hazards: This document has been prepared in accordance with the U.S. OSHA Hazard Communication Standard, which requires the inclusion of all known hazards of the product or ingredients regardless of the potential risk. The risks of the hazards communicated in this document may vary depending on the potential for exposure.

3.2 POTENTIAL HEALTH EFFECTS

Eye Contact:
Mechanical eye irritation: Signs/symptoms may include pain, redness, tearing and corneal abrasion.

Skin Contact:
Mechanical Skin irritation: Signs/symptoms may include abrasion, redness, pain, and itching.

Inhalation:
Respiratory Tract Irritation: Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Ingestion:
Gastrointestinal Irritation: Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

SECTION 4: FIRST AID MEASURES
4.1 FIRST AID PROCEDURES

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

**Eye Contact:** Flush eyes with large amounts of water. If signs/symptoms persist, get medical attention.
**Skin Contact:** Wash affected area with soap and water. If signs/symptoms develop, get medical attention.
**Inhalation:** Remove person to fresh air. If signs/symptoms develop, get medical attention.
**If Swallowed:** Do not induce vomiting unless instructed to do so by medical personnel. Give victim two glasses of water. Never give anything by mouth to an unconscious person. Get medical attention. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband

SECTION 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

**Flammability of the Product:** Non-flammable.
**Auto-Ignition Temperature:** Not applicable.
**Flash Points:** Not applicable.
**Flammable Limits:** Not applicable.
**Products of Combustion:** Not available.
**Fire Hazards in Presence of Various Substances:** Not applicable.
**Explosion Hazards in Presence of Various Substances:** Not applicable.
**Risks of explosion of the product in presence of static discharge:** Not available.
**Fire Fighting Media and Instructions:** Not applicable.
**Special Remarks on Fire Hazards:** Not available

5.2 EXTINGUISHING MEDIA

Ordinary combustible material. Use fire extinguishers with class A extinguishing agents (e.g., water, foam).

5.3 PROTECTION OF FIRE FIGHTERS

**Special Fire Fighting Procedures:** Wear full protective equipment (Bunker Gear) and a self-contained breathing apparatus (SCBA).

**Unusual Fire and Explosion Hazards:** Non-flammable: ordinary combustible material.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

**Small Spill**
Use appropriate tools to put the spilled solid in a convenient waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid. Finish cleaning by spreading water on the contaminated surface and
dispose of according to local and regional authority requirements.

**Large Spill**
Use a shovel to put the material into a convenient waste disposal container. Neutralize the residue with a dilute solution of acetic acid. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

6.2. Environmental precautions
Place in a closed container approved for transportation by appropriate authorities. Dispose of collected material as soon as possible.

SECTION 7: HANDLING AND STORAGE

7.1 HANDLING
Avoid eye contact. Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water.

7.2 STORAGE
Store the material in inert gas protected glove box or dry room. Avoid moisture.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 ENGINEERING CONTROLS
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

8.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

8.2.1 Eye/Face Protection
Avoid eye contact.
The following eye protection(s) are recommended: Safety Glasses with side shields

8.2.2 Skin Protection
Avoid skin contact. Select and use gloves and/or protective clothing to prevent skin contact based on the results of an exposure assessment. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible materials.

8.2.3 Respiratory Protection
Dust respirator. Be sure to use an approved/certified respirator or equivalent.

8.2.4 Prevention of Swallowing
Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. Do not ingest.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Specific Physical Form:</th>
<th>Powder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odor, Color, Grade:</td>
<td>odorless, white powder</td>
</tr>
<tr>
<td>General Physical Form:</td>
<td>Solid</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>No Data Available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>No flash point</td>
</tr>
</tbody>
</table>
Flammable Limits (LEL) | Not Applicable
Flammable Limits (UEL) | Not Applicable
Boiling Point | Not Applicable
Vapor Density | Not Applicable
Vapor Pressure | Not Applicable
Specific Gravity | >=1.0 [Ref Std: WATER=1]
pH | 8-9
Melting Point | ~1350°C
Solubility in Water | Nil Evaporation
Evaporation Rate | Not Applicable
Volatile Organic Compounds | Not Applicable
Kow - Oct/Water partition coef | No Data Available
Percent volatile | No Data Available
VOC Less H2O & Exempt Solvents | Not Applicable
Viscosity | Not Applicable

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable.
Materials and Conditions to Avoid: Not known
Conditions to avoid: None known
Materials to avoid: None known
Hazardous Polymerization: Hazardous polymerization will not occur.

Hazardous Decomposition or By-Products

<table>
<thead>
<tr>
<th>Substance</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>N/A</td>
</tr>
</tbody>
</table>

SECTION 11: TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation. Ingestion.
Toxicity to Animals: Not available
Acute dermal toxicity: Not known
Chronic Effects on Humans: Not available.
Other Toxic Effects on Humans: Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).
Special Remarks on Toxicity to Animals: Not available.
Special Remarks on Chronic Effects on Humans: Not available

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

Not determined.

CHEMICAL FATE INFORMATION

Not determined.

SECTION 13: DISPOSAL CONSIDERATIONS
Waste must be disposed of in accordance with federal, state and local environmental control regulations

**EPA Hazardous Waste Number (RCRA):** Not regulated

### SECTION 14: TRANSPORT INFORMATION

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

### SECTION 15: REGULATORY INFORMATION

**US FEDERAL REGULATIONS**
Contact MSE Supplies for more information.

**311/312 Hazard Categories:**
- Fire Hazard - No
- Pressure Hazard - No
- Reactivity Hazard - No
- Immediate Hazard - Yes
- Delayed Hazard - No

**STATE REGULATIONS**
Not available

**CHEMICAL INVENTORIES**
Not available

### SECTION 16: OTHER INFORMATION

**NFPA Hazard Classification**

- Health: 1
- Flammability: 0
- Reactivity: 0
- Special Hazards: None

**Disclaimer:** MSE Supplies LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user’s responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. This document has been prepared using data from sources considered to be technically reliable and the information is believed to be correct. MSE Supplies LLC makes no warranties, expressed or implied, as to the accuracy of the information contained herein. MSE Supplies cannot anticipate all conditions under which this information and its products may be used and the actual conditions of use are beyond its control. The user is responsible to evaluate all available information when using this product for any particular use and to comply with all Federal, State, Provincial and Local laws, statutes and regulations.