1. Product and Company Identification

Product Name: Tantalum-doped Lithium Lanthanum Zirconate
Product Number: EQ-Lib-LLZTO
Synonym: LLZTO
CAS#: 
Chemical Formula: Li$_{6.4}$La$_{3}$Zr$_{1.4}$Ta$_{0.6}$O$_{12}$
Identified uses: Scientific research and development

1.3 Contact Information:
MTI Corporation
860 South 19th Street
Richmond, CA 94804, USA
Tel: 510-525-3070
Fax: 510-525-4705
Email: info@mtixtl.com
Website: www.mtixtl.com

1.4 Non-emergency assistance:
1-888-525-3070
Emergency assistance: Company: CHEMTEL (MTI Contract# MIS2559467) Day or Night
Tel (Within USA and Canada): 1-800-255-3924
Tel (Outside USA and Canada): 1-813-248-0585

2. Hazards Identification

Emergency Overview: GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Skin corrosion (Category 1B), H314
Respiratory Irritation (Category 2), H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

HMIS Rating
Health hazard: 3
Chronic Health Hazard: *
Flammability: 0
Physical Hazard: 1

GHS Label elements, including precautionary statements
Pictogram

Signal
Hazard statement(s)
H314 Causes severe skin burns and eye damage
H335 May cause respiratory irritation
Precautionary statement(s)
P260 Do not breathe dust/fume/gas/mist/vapors/spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
3. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Synonym:</th>
<th>LLZTO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula:</td>
<td>Li₆.₄La₃Zr₁.₄Ta₁.₆O₁₂</td>
</tr>
<tr>
<td>Molecular Weight:</td>
<td>861.67 g/mol</td>
</tr>
</tbody>
</table>

4. First Aid Measures

4.1 Description of first aid measures

**General advice**
Instantly remove any clothing soiled by the product.

**If inhaled**
Supply patient with fresh air. If not breathing, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist. Seek immediate medical advice.

**In case of skin contact**
Instantly wash with water and soap and rinse thoroughly. Seek immediate medical advice.

**In case of eye contact**
Rinse opened eye for several minutes under running water. Then consult doctor.

**If swallowed**
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Seek medical treatment.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. Firefighting Measures

5.1 Extinguishing media

**Suitable extinguishing media**
CO₂, extinguishing powder or water jet. Fight larger fires with water jet or alcohol-resistant foam.

5.2 Special hazards arising from the substance mixture
Tantalum-doped Lithium Lanthanum Zirconate
Lithium oxide, Zirconium oxide, Lanthanum oxide, Tantalum oxide

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary. Wear full protective suit.

5.4 Further Information
None

6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. For personal protection see section 8.

6.2 Environmental precautions
Do not allow product to enter drains, sewage systems, or other water courses system or water bodies.

6.3 Methods and materials for containment and cleaning up
Use neutralizing agent. Dispose according to local regulations (see section 13).

6.4 Reference to other sections
For disposal see section 13.

7. Handling and Storage

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapor or mist.
Handle under dry protective gas.
Keep containers tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation/exhaustion at the workplace.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Requirements to be met by storerooms and containers:
No special requirements.
Information about storage in one common storage facility:
Store away from air.
Store away from water.
Store away from oxidizing agents.
Further information about storage conditions:
Store under dry inert gas.
This product is moisture sensitive.
This product is air sensitive.
Keep container tightly sealed.
Store in cool, dry conditions in well-sealed containers.
Protect from humidity and keep away from water.
Store in a locked cabinet or with access restricted to technical experts or their assistants.

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated
8. Exposure Control/ Personal Protection

8.1 Control parameters

Components with workplace control parameters
None

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment
Keep away from foodstuffs, beverages and food. Instantly remove any soiled and impregnated garments.

Eye/face protection
Tightly sealed safety glasses. Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with impervious gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls.
If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties
a) Appearance  White to Light Beige Powder
b) Odor  No data available
c) Odor Threshold  No data available
d) pH  N/A
e) Melting point/freezing point  No data available
f) Initial boiling point and boiling range  No data available
g) Flash point  No data available
h) Evaporation rate  No data available
i) Flammability (solid, gas)  No data available
j) Upper/lower flammability or explosive limits  No data available
k) Vapor pressure  No data available
l) Vapor density  No data available
m) Relative density  No data available
n) Water solubility  No data available
o) Partition coefficient: n-octanol/water  No data available
p) Auto-ignition temperature  No data available
q) Decomposition temperature  No data available
r) Viscosity  No data available
s) Explosive properties  No data available
t) Oxidizing properties  No data available

9.2 Other safety information
Ionic Conductivity: 1.6 x10^-3 S/cm at Room Temperature
Sintering Temperature: ~1000 °C

10. Stability and Reactivity

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts with strong oxidizing agents

10.4 Conditions to avoid
No data available

10.5 Incompatible materials
Air, Water/moisture, Oxidizing agents

10.6 Hazardous decomposition products
Lithium oxide, Zirconium oxide, Lanthanum oxide, Tantalum oxide
11. Toxicological Information

11.1 Information on toxicological effects
Swallowing will lead to a strong caustic effect on mouth and throat and to the danger of perforation of esophagus and stomach.

Acute toxicity
No data available

Skin corrosion/irritation
Causes severe skin burns.

Serious eye damage/eye irritation
Causes serious eye damage.

Respiratory or skin sensitization
No sensitizing effect known.

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

Specific target organ toxicity - single exposure
May cause respiratory irritation.

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

12. Ecological Information

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

Additional ecological information:
Water hazard class 1 (Self-assessment): slightly hazardous for water.
Do not allow undiluted product or large quantities to reach groundwater, water courses, or sewage systems.
Avoid transfer into the environment.
12.5 Results of PBT and vPvB assessment PBT/vPvB assessment
Not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects
No data available

13. Disposal Considerations

13.1 Waste treatment methods

Product
Hand over to disposers of hazardous waste.
Must be specially treated under adherence to official regulations.
Consult official regulations for proper disposal.

Contaminated packaging
Dispose of as unused product.

14. Transport Information

ADR
UN Number: 2924 Class: 8 (C6) Corrosive substances
Label : 8 Packing group : III
Proper shipping name: 3262 CORROSIVE SOLID, BASIC, INORGANIC, N.O.S. (Lithium lanthanum zirconium oxide )

IMDG
UN number: 2924 Class: 8 Corrosive substances
Label : 8 Packing group: III EMS-No: F-E, S-C
Proper shipping name: CORROSIVE SOLID, BASIC, INORGANIC, N.O.S. (Lithium lanthanum zirconium oxide )

IATA
UN number: 2924 Class: 8 Corrosive substances
Label : 8 Packing group: III
Proper shipping name: CORROSIVE SOLID, BASIC, INORGANIC, N.O.S. (Lithium lanthanum zirconium oxide )

Environmental hazards:
N/A

Special precautions for user
Warning: Corrosive substances.
Kemler Number: 80
EMS Number: F-A,S-B
Segregation groups
Alkalis

15. Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture
Australian Inventory of Chemical Substances
Substance is not listed.

Standard for the Uniform Scheduling of Drugs and Poisons
Substance is not listed.
National regulations

Information about limitation of use:
For use only by technically qualified individuals.
Employment restrictions concerning young persons must be observed.

Water hazard class:
Water hazard class 1 (Self-assessment): slightly hazardous for water.

Other regulations, limitations and prohibitive regulations

ELINCS (European List of Notified Chemical Substances)
Substance is not listed.
Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.
Substance is not listed.
The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.

Annex XIV of the REACH Regulations (requiring Authorisation for use)
Substance is not listed.

Chemical safety assessment:
A Chemical Safety Assessment has not been carried out.

16. Other Information

Acute Tox.  Acute toxicity
Eye Dam.  Serious eye damage
Eye Irrit.  Eye irritation
H314  Causes severe skin burns and eye damage
H335  May cause respiratory irritation
Skin Corr.  Skin corrosion

The information above is believed to be accurate and represents the best information currently available to us. However, it does not represent any guarantee of the properties of the product. We make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we shall not be held liable for any damage resulting from handling or from contact with the above product. Users should make their own investigations to determine the suitability of the information for their particular purposes.