

1. PRODUCT AND COMPANY IDENTIFICATION

Trade Name: Lead Lanthanum Zirconium Titanate

Chemical Formula: $Pb_{1-x}La_x(Zr_yTi_{1-y})_{(1-x)/4}O_3$

Manufacturer: Stanford Advanced Materials
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2. HAZARD IDENTIFICATION

Signal Word: Danger

Pictograms:



Hazard Statements: H302 Harmful if swallowed.
H332 Harmful if inhaled.
H360 May damage fertility or the unborn child.
H373 May cause damage to organs through prolonged or repeated exposure.
H410 Very toxic to aquatic life with long lasting effects.

Precautionary Statements: H201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust / fumes / gas / mist / vapors / spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink, or smoke when using this product.
P272 Contaminated work clothing should not be allowed out of the workplace.
P273 Avoid release to the environment.
P280 Wear protective gloves / protective clothing / eye protection / face protection.
P301+315 IF SWALLOWED: Get immediate medical advice / attention.
P302+352 IF ON SKIN: Wash with plenty of soap and water.
P305+351+338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing for at least 15 minutes.
P308+313 IF EXPOSED OR CONCERNED: Get medical advice / attention.
P333+313 IF SKIN IRRITATION OR RASH OCCURS: Get medical advice / attention.
P363 Wash contaminated clothing before reuse.
P391 Collect spillage.
P405 Store locked up.
P501 Dispose of contents / container in accordance with local / regional / national / international regulations.

HMIS Health Ratings (0-4)

- Health: 2
- Flammability: 0
- Physical: 1

3. COMPOSITION

Additional Names: PLZT; Lead Lanthanum Zirconium Titanium Oxide; Lead Lanthanum Zirconate Titanate
Percentage: 100 wt%
CAS #: 12676-60-7
EC #: No Data Available.

4. FIRST AID PROCEDURES

General Treatment Consult a physician. Show this SDS to the doctor in attendance. Move out of dangerous area.
Special Treatment: No Data Available.
Important Symptoms: The most important known symptoms and effects are described in the labeling in Section 2 and / or Section 11.
Inhalation: If breathed in, move person to fresh air. If not breathing, give artificial respiration. Consult a physician.
Ingestion: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.
Skin: For skin contact, flush with large amounts of soap and water while removing contaminated clothing. Consult a physician.
Eyes: Immediately flush eyes with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. Consult a physician.

5. FIREFIGHTING MEASURES

Flammability: Non-flammable
Special Hazards from Substance: Lead oxide vapor, metal oxide, carbon monoxide, carbon dioxide
Extinguishing Media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Special Fire Fighting Procedures: Wear self-contained breathing apparatus for firefighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

If Material is Released / Spilled: Wear personal protective equipment. Avoid breathing vapors, mist, or gas. Evacuate personnel to safe areas. Isolate spill area and provide ventilation. Vacuum up spill using high efficiency particulate absolute (HEPA) air filter and place in a closed container for disposal. Take care not to raise dust.
Environmental Precautions: Prevent further leakage or spills if safe to do so. Do not allow to enter drains, sewers, or watercourses. Discharge into the environment must be avoided.

7. HANDLING AND STORAGE

Handling Conditions: Handle under dry protective gas. Keep containers tightly sealed. Open and handle container with care.

Storage Conditions:	Keep container tightly closed in a dry and well ventilated place.
Work / Hygienic Maintenance:	Do not eat, drink, or smoke when working with this product. Wear protective gloves, protective mask, protective eyewear, and protective clothing and wash skin thoroughly with soap after handling. Keep formation of airborne dusts to a minimum. Guard against dust accumulation. In case of insufficient ventilation, wear suitable respiratory equipment. For additional precautions see Section 2.
Ventilation:	Keep in well ventilated area.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Permissible Exposure Limits:	0.05 mg/m ³ as Pb (OSHA) 5 mg/m ³ as Zr (OSHA) 15.0 mg/m ³ as Ti (OSHA) (respirable dust) 15.0 mg/m ³ as La (OSHA) (respirable dust)
Threshold Limit Value:	0.05 mg/m ³ as Pb (ACGIH) (confirmed animal carcinogen) 5.0 mg/m ³ as Zr (ACGIH) (not classified as human carcinogen) 10.0 mg/m ³ as Ti (ACGIH) 10.0 mg/m ³ as La (ACGIH)
Special Equipment:	No Data Available.
Respiratory Protection:	Where risk assessment shows air-purifying respirators are appropriate (such as when high concentrations are present) use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineered 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)).
Protective Gloves:	Handle with 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.
Eye Protection:	Safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
Body Protection:	Protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

9. PHYSICAL AND CHEMICAL CHARACTERISTICS

Color:	Yellow / Tan / Orange
Forms:	powder
Odor:	Odorless
Water Solubility:	0.05 g/L
Boiling Point:	No Data Available.
Melting Point:	1,310°C to 1,350°C (2,390°F to 2,462°F)
Flash Point:	No Data Available.
Autoignition Temperature:	No Data Available.
Density:	No Data Available.

Molecular Weight: 318.1 g/mol to 337.3 g/mol

10. REACTIVITY

Stability: Stable under recommended storage conditions. Stable up to 500°C.

Reacts with: High temperatures or fire may produce lead oxide fumes, vapor, or dust.

Incompatible Conditions: Strong oxidizers

Hazardous Decomposition Products: Lead monoxide, Zirconium dioxide, Titanium dioxide, Lanthanum oxide

11. TOXICOLOGICAL INFORMATION

Potential Health Effects:

- **Eyes** May cause irritation.
- **Skin** May cause irritation.
- **Ingestion** Dust trapped in the upper respiratory tract or introduced into the the mouth on food, tobacco, fingers, or other objects, both acute and chronic effects can result, described below.

- **Inhalation** May cause irritation.
- **Chronic** Chronic effects described below.

Signs and Symptoms:

Acute Overexposure: Lead intoxication will occur with accompanying symptoms of constipation, sleep disturbance, fatigue, headache, loss of appetite. Where inhalation is severe from heavy dusting or large quantity is ingested and left untreated, colic, anemia, vomiting and neuritis will follow as evidence by intense periodic cramps, aching bones and muscles, uncoordinated body movements. Worse-case situations could result in convulsions, stupor, coma and encephalopathy.

Zirconium dioxide is an eye irritant.

Lanthanons can cause delayed blood clotting leading to hemorrhages. Exposure may also lead to sensitivity to heat, itching, increased awareness of odor and taste, and liver damage.

Chronic Overexposure: Early effect of chronic overexposure to lead are difficult to detect, but symptoms include persistent fatigue, sleep disturbance, headache, aching bones and muscles, constipation, abdominal pains and loss of appetite. Prolonged ingestion may be associated with intense periodic cramps and constipation, nausea and vomiting. Excessive exposure may affect blood, nervous, and digestive systems. Synthesis of hemoglobin is inhibited and can result in anemia. If left untreated, neuromuscular dysfunction, possible paralysis, and encephalopathy can result. Unusual occurrence of symptoms should prompt immediate contract of a physician. For industrial exposure, a worker's lead accumulation can be detected by an increase in blood lead above the base level established upon the employee's entry to the workplace.

Lung granulomas may result due to excess inhalation of zirconium dioxide. Inhalation of titanium dioxide dusts may cause pneumoconiosis.

Aggravate Medical Conditions: No Data Available.

Median Lethal Dose: No Data Available.

Carcinogen: EPA: Probable human carcinogen, sufficient evidence from animal studies, inadequate evidence or no data from epidemiological studies.

IARC: Possibly carcinogenic to human: limited evidence in humans in the absence of sufficient evidence in experimental animals.

ACGIH: Animal carcinogen: agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s) or by mechanism(s) not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed human. Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

12. ECOLOGICAL INFORMATION

Aquatic Toxicity: Very toxic to fish, plankton, and other aquatic organisms.

Persistence and degradability: Long lasting effect.

Bioaccumulative potential: Dangerous to drinking water if even small quantities leak into soil.

Notes: Avoid transfer to the environment.

13. DISPOSAL CONSIDERATIONS

Disposal: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Empty containers should be taken to an appropriated waste handling site for recycling or disposal. Dispose of in accordance with local, state, or national regulations.

14. TRANSPORTATION DATA

Hazardous: Hazardous for Transportation

Pictogram:



Hazard Class: 6.1 Poison

Packing Group: III

UN Number: UN2291

Proper Shipping Name: **DoT:** Lead Compound, soluble, n.o.s. (Lead Lanthanum Zirconium Titanate)
IMDG: LEAD COMPOUND, SOLUBLE, N.O.S. (Lead Lanthanum Zirconium Titanate)
IATA: LEAD COMPOUND, SOLUBLE, N.O.S. (Lead Lanthanum Zirconium Titanate)

15. REGULATORY INFORMATION

SARA 302 Components No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components The following components are subject to the reporting levels established by SARA Title III, Section 313:
 Lead Monoxide (PbO) (60-70% by weight) (Cas No. 1317-36-8) (TLV: 0.15 mg/m³ as Pb)

SARA 311/312 Hazards	Acute Health Hazard, Chronic Health Hazard
Massachusetts Right to Know Components	Lead Lanthanum Zirconium Titanate (Cas No. 12676-60-7)
Pennsylvania Right to Know Components	Lead Lanthanum Zirconium Titanate (Cas No. 12676-60-7)
New Jersey Right to Know Components	Lead Lanthanum Zirconium Titanate (Cas No. 12676-60-7)
California Prop. 65 Components	WARNING! This product contains a chemical known to the State of California to cause cancer. (lead and lead compounds: Cas No. 12676-60-7)

16. OTHER INFORMATION

This material safety data sheet is offered solely for your information, consideration, and investigation. Stanford Advanced Materials provides no warranties, either express or implied, and assumes no responsibility for the accuracy or completeness of the data contained herein.