

# Material Safety Data Sheet

Date prepared: July 4, 2001

Date revised: May 14, 2007

PZT(110/52/48) SOLUTION, (0.4mol/L)

## 1. Identification of the Substance/Preparation and the Company/Undertaking

Substance or preparation trade name: PZT INOSTEK Solution  
Sol-Gel  
Chemical/Material Mixture with Ethanol  
and Acetyl acetone

Unique reference numbers(s):  
Company/undertaking name & address: INOSTEK Inc.  
Gyeonggi Technopark, 1271-11 Sa1-dong  
Sangnok-gu, Ansan-si, Gyeonggi-do 425-791, Korea

Telephone: 82-31-500-4110~1  
Fax : 82-31-500-4112  
Emergency telephone number: 82-31-500-4110~1, 82-31-500-4115, 4119  
Web Site: www.inostek.com

## 2. Composition / Information on ingredients

MF : Chemical Mixture of :

Chemical Name	Chemical Formula	Composite (wt %)	CAS Resistry Number	United Class	Nation Number	TSCA Inventory
Lead(II) oxide	PbO	9.15	1317-36-8			listed
Titanium(IV) oxide	TiO <sub>2</sub>	1.43	1317-80-2			listed
Zirconium(IV) oxide	ZrO <sub>2</sub>	2.39	1314-23-4			listed
Ethanol	C <sub>2</sub> H <sub>5</sub> OH	70.27	64-17-5	3	1170	listed
Acetyl acetone	CH <sub>3</sub> COCH <sub>2</sub> COCH <sub>3</sub>	11.77	123-54-6	3	2310	listed

Sol-Gel Mixture : United Nation Class : 3 Flammable Liquid

## 3. Hazards Identification

Chemical Name	Mode of entry			Carcinogenicity		OSHA
	Inhalation	Skin	Ingestion	NIP	IARC	
Lead(II) oxide	No data	No data	No data	No	No	No
Titanium(IV) oxide	No data	Yes	No data	No	No	No
Zirconium(IV) oxide	No data	Yes	No data	No	No	No

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Ethanol	No data	No data	No data	No	No	No
Acetylacetone	No data	No data	No	No	No	No

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- **Information pertaining to particular dangers for man and environment**

R 10 Flammable.

R 20/21/22 Harmful by inhalation, and if swallowed.

- Absorption through the skin is possible. Chronic exposure may cause liver and eye injury. Ethyl alcohol is rapidly oxidized in the body and is less toxic than 2-Methoxyethanol. Exposure to high vapor concentrations may cause upper respiratory tract irritation and eye irritation.

## 4. First aid measures

Skin contact: Immediately wash with water and soap and rinse thoroughly. Seek immediate medical advice.

Eye contact: Rinse opened eye for several minutes under running water. Then consult a doctor.

Ingestion: Seek immediate medical advice.

## 5. Fire fighting measures

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Chemical Name	Vapour Pressure mHg/20	Vapour Density (air=1)	Flash Point ( )	Autoignition Temperature ( )	Explosion Level Lower ~ Upper (%) (%)
Lead(II) oxide	Not determined	-	Not applicable	-	Not determined
Titanium(IV) oxide	Not determined	-	Not applicable	-	Not determined
Zirconium(IV) oxide	Not determined	-	Not applicable	-	Not determined
Ethanol	43.9	0.79	8	362	~ 19.0 vol
Acetylacetone	8.5	-	36	340	Not determined

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- **Product is not explosive. However, formations of explosive air/vapor mixtures are possible.**
- **Suitable extinguishing agents**  
Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards caused by the material, its products of combustion or resulting gases:**  
In case of fire, the following can be released: Carbon monoxide (CO)
- **Protective equipment:**  
Wear self-contained respirator.  
Wear fully protective impervious suit.

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- **Additional information about design of technical systems:**  
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute

## 6. Accidental release measures

Personal precautions:	Wear protective equipment. Keep unprotected persons away. Ensure adequate ventilation Keep away from ignition sources.
Environmental precautions:	Do not allow material to be released to the environment without proper governmental permits.
Methods for cleaning:	Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust). Dispose contaminated material as waste according to item 13. Ensure adequate ventilation. Keep away from ignition sources.

## 7. Handling and storage

- **Handling**  
Handle the material in a ventilated area. Prevent any chemical from coming into contact with the skin or eyes and from contaminating personal clothing.  
Electrically ground all equipment when handling this material and use only non-sparking tools.  
Keep container or bottle tightly closed when not in use. Keep away from any kind of heat source and moisture, when in use.
- **Information for safe handling:**  
Keep container tightly sealed.  
Store in cool, dry place in tightly closed containers.  
Ensure good ventilation at the workplace.  
Open and handle container with care.
- **Information about protection against explosions and fires:**  
Keep ignition sources away.  
Protect against electrostatic charges.
- **Storage**
- **Requirements to be met by storerooms and receptacles:**  
No special requirements.
- **Information about storage in one common storage facility:**  
Store away from oxidizing agents.

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- **Further information about storage conditions:**  
Avoid contact with air/oxygen (formation of peroxide).  
Store under dry inert gas.  
Keep container tightly sealed.  
Store in cool, dry conditions in well sealed containers.

## 8. Exposure Controls

- **Additional information about design of technical systems:**  
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.
- **Additional information:** No data
- **Personal protective equipment**
- **General protective and hygienic measures**  
The usual precautionary measures for handling chemicals should be followed.  
Keep away from foodstuffs, beverages and feed.  
Remove all soiled and contaminated clothing immediately.  
Wash hands before breaks and at the end of work.  
Store protective clothing separately.
- **Breathing equipment:**  
Use suitable respirator when high concentrations are present.
- **Protection of hands:** Impervious gloves
- **Eye protection:** Safety glasses
- **Body protection:** Protective work clothing.

## 9. Physical and chemical properties

Chemical Name	Molecular Weight	Melting Point( )	Boiling Point( )	Density (g/cm <sup>3</sup> )	Solubility in water	Soluble in
Lead(II) oxide	223.19	886	No data	9.530	Insoluble	HNO <sub>3</sub>
Titanium(IV) oxide	79.90	1830-1850	2500-3000	4.23	Insoluble	
Zirconium(IV) oxide	123.22	≈2700	≈5000	5.89	Insoluble	
Ethanol	46.07	-114	78	0.785	Miscible	alcohol, etc.
Acetylacetone	100.12	-23	140	0.975	Miscible	Water, etc.

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Sol-Gel Mixture  
Appearance and Odor : Yellow liquid with Characteristic odor.  
Vapour density : Ethanol will vapour mainly.  
Melting Point : < -50

## 10. Stability and reactivity

- **Thermal decomposition / conditions to be avoided:**  
Decomposition will not occur if used and stored according to specifications.
- **Materials to be avoided:**  
Oxidizing agents  
Acid chlorides  
Acid anhydrides  
Oxygen
- **Dangerous reactions**  
Possible formation of peroxides.  
Reacts with oxidizing agents
- **Dangerous products of decomposition:** Carbon monoxide and carbon dioxide

## 11. Toxicological information

Chemical Name	Lethal dose			
	Inhalation	Oral	Dermal	Others
UNITS	LC <sub>50</sub> : ppm	LD <sub>50</sub> :mg/kg	LD <sub>50</sub> :mg/kg	LD :mg/kg
Lead(II) oxide	-	-	-	-
Titanium(IV) oxide	-	-	-	-
Zirconium(IV) oxide	-	-	-	-
Ethanol	20000/10H	-	-	-
Acetylacetone	1000/4H	951	-	-

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- **Primary irritant effect:**
- **on the skin:** Irritant to skin and mucous membranes.
- **on the eye:** Irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Other information (about experimental toxicology):**  
Reproductive effects have been observed on tests with laboratory animals.

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## 12. Ecological information

Do not allow material to be released to the environment without proper governmental permits.

## 13. Disposal Considerations

- **Product:**
- **Recommendation**  
Consult state, local or national regulations for proper disposal.
- **Uncleaned packagings:**
- **Recommendation:**  
Disposal must be made according to official regulations.

## 14. Transport information

- **UN ID Number :** 1993
- **IATA class:** 3
- **IATA Shipping name:** Flammable liquid n.o.s.
- **IATA Packing group:**
- **Proper shipping name (technical name):**

## 15. Regulatory information

- **Product related hazard informations:**
- **Hazard symbols:**  
F Highly flammable
- **Risk phrases:**  
10 Highly flammable.  
20/21/22 harmful by inhalation and if swallowed.
- **Safety phrases:**  
7/9 Keep container tightly closed and in a well-ventilated place.  
16 Keep away from sources of ignition - No smoking.  
24 Avoid contact with skin.  
28 After contact with skin, wash immediately with plenty of water  
36/37/39 Wear suitable protective clothing, gloves and eye/face protection.  
45 In case of accident or if you feel unwell, seek medical advice immediately.

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- **Information about limitation of use:**  
For use only by technically qualified individuals.

## 16. Other Information

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgment of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.