

# ZIRCONIUM TETRACHLORIDE

ZCT

## CAUTIONARY RESPONSE INFORMATION

<b>Common Synonyms</b> Tetrachlorozirconium Zirconium chloride Zirconium tetrachloride solid (DOT)		Solid crystals      White  Sinks and decomposes in water. Irritating vapor is produced.
<p style="color: red;">Keep people away. AVOID CONTACT WITH SOLID AND SOLUTION. Wear chemical protective suit with self-contained breathing apparatus. Notify local health and pollution control agencies. Protect water intakes.</p>		
<b>Fire</b>	Not flammable. <b>POISONOUS GAS PRODUCED ON CONTACT WITH WATER</b> Wear chemical protective suit with self-contained breathing apparatus. <b>DO NOT USE WATER ON ADJACENT FIRES.</b> Extinguish adjacent fires with carbon dioxide or dry chemical.	
<b>Exposure</b>	CALL FOR MEDICAL AID.  <b>VAPOR</b> Irritating to eyes, nose, and throat. Harmful if inhaled. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.  <b>SOLID</b> Irritation to skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. <b>DO NOT INDUCE VOMITING.</b>	
<b>Water Pollution</b>	Dangerous to aquatic life in high concentrations. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.	

<b>1. CORRECTIVE RESPONSE ACTIONS</b> Dilute and disperse Stop discharge Chemical and Physical Treatment: Neutralize	<b>2. CHEMICAL DESIGNATIONS</b> 2.1 CG Compatibility Group: Not listed. 2.2 Formula: ZrCl <sub>4</sub> 2.3 IMO/UN Designation: Not listed 2.4 DOT ID No.: 2503 2.5 CAS Registry No.: 10026-11-6 2.6 NAERG Guide No.: 137 2.7 Standard Industrial Trade Classification: 52329
<b>3. HEALTH HAZARDS</b> 3.1 <b>Personal Protective Equipment:</b> Helmet, self-contained breathing apparatus, rubber boots, gloves, bands around legs, arms and waist. Facemask as well as covering rest of head. 3.2 <b>Symptoms Following Exposure:</b> INHALATION: Irritating to upper respiratory tract; presumably caused by liberated HCl. EYES: Irritating. SKIN: Irritating. INGESTION: Burning pain in the mouth and throat, vomiting, watery or bloody diarrhea, retching, collapse, and convulsions. 3.3 <b>Treatment of Exposure:</b> Call a physician. INHALATION: Remove from exposure. EYES: Flush with water. SKIN: Wash with soap and plenty of water. INGESTION: Dilute with water or milk. Give milk of magnesia. 3.4 TLV-TWA: 5 mg/m <sup>3</sup> (as zirconium) 3.5 TLV-STEL: 10 mg/m <sup>3</sup> (as zirconium) 3.6 TLV-Ceiling: Not listed. 3.7 Toxicity by Ingestion: Grade 2; LD <sub>50</sub> = 0.5 to 5.0 g/kg. 3.8 Toxicity by Inhalation: Currently not available. 3.9 Chronic Toxicity: May cause granuloma in skin. A mild lung irritant. 3.10 Vapor (Gas) Irritant Characteristics: Vapors of HCl given off cause severe irritation of eyes and throat and can cause lung injury. They cannot be tolerated even at low concentrations. 3.11 Liquid or Solid Characteristics: Fairly severe skin irritant, may cause pain and second-degree burns after a few minutes contact. 3.12 Odor Threshold: Currently not available 3.13 IDLH Value: 50 mg/m <sup>3</sup> (as zirconium) 3.14 OSHA PEL-TWA: 5 mg/m <sup>3</sup> (as zirconium) 3.15 OSHA PEL-STEL: Not listed. 3.16 OSHA PEL-Ceiling: Not listed. 3.17 EPA AEGL: Not listed	

<b>4. FIRE HAZARDS</b> 4.1 Flash Point: Not flammable 4.2 Flammable Limits in Air: Not flammable 4.3 Fire Extinguishing Agents: Not pertinent 4.4 Fire Extinguishing Agents Not to Be Used: Water 4.5 Special Hazards of Combustion Products: Not pertinent 4.6 Behavior in Fire: Will not burn - sublimates above 626°F (331°C). May give off HCl fumes. 4.7 Auto Ignition Temperature: Not flammable 4.8 Electrical Hazards: Currently not available 4.9 Burning Rate: Not flammable 4.10 Adiabatic Flame Temperature: Currently not available 4.11 Stoichiometric Air to Fuel Ratio: Not pertinent. 4.12 Flame Temperature: Currently not available 4.13 Combustion Molar Ratio (Reactant to Product): Not pertinent. 4.14 Minimum Oxygen Concentration for Combustion (MOCC): Not listed	<b>7. SHIPPING INFORMATION</b> 7.1 Grades of Purity: Currently not available 7.2 Storage Temperature: Cool 7.3 Inert Atmosphere: Currently not available 7.4 Venting: Currently not available 7.5 IMO Pollution Category: Currently not available 7.6 Ship Type: Currently not available 7.7 Barge Hull Type: Currently not available  <b>8. HAZARD CLASSIFICATIONS</b> 8.1 49 CFR Category: Corrosive material 8.2 49 CFR Class: 8 8.3 49 CFR Package Group: III 8.4 Marine Pollutant: No 8.5 NFPA Hazard Classification: <table border="0"> <tr> <td>Category</td> <td>Classification</td> </tr> <tr> <td>Health Hazard (Blue).....</td> <td>3</td> </tr> <tr> <td>Flammability (Red).....</td> <td>0</td> </tr> <tr> <td>Instability (Yellow).....</td> <td>2</td> </tr> <tr> <td>Special (White).....</td> <td>W</td> </tr> </table> 8.6 EPA Reportable Quantity: 5,000 pounds 8.7 EPA Pollution Category: D 8.8 RCRA Waste Number: Not listed 8.9 EPA FWPCA List: Yes	Category	Classification	Health Hazard (Blue).....	3	Flammability (Red).....	0	Instability (Yellow).....	2	Special (White).....	W
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<b>5. CHEMICAL REACTIVITY</b> 5.1 Reactivity with Water: Reacts vigorously forming HCl. 5.2 Reactivity with Common Materials: If moist will form hydrochloric acid which is corrosive to many metals. 5.3 Stability During Transport: Stable 5.4 Neutralizing Agents for Acids and Caustics: Sodium bicarbonate and ammonia. 5.5 Polymerization: Currently not available 5.6 Inhibitor of Polymerization: Currently not available	<b>9. PHYSICAL &amp; CHEMICAL PROPERTIES</b> 9.1 Physical State at 15° C and 1 atm: Solid 9.2 Molecular Weight: 233.05 9.3 Boiling Point at 1 atm: Sublimes 627.8°F = 331°C = 604.2°K 9.4 Freezing Point: None, except under pressure, since it sublimates. 9.5 Critical Temperature: Currently not available 9.6 Critical Pressure: Currently not available 9.7 Specific Gravity: 2.083 at 15°C 9.8 Liquid Surface Tension: Not pertinent 9.9 Liquid Water Interfacial Tension: Not pertinent 9.10 Vapor (Gas) Specific Gravity: Not pertinent 9.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 9.12 Latent Heat of Vaporization: (sublimation) 195.3 btu/lb = 108.5 cal/g at 311°C = 4.54 X 10 <sup>5</sup> J/kg 9.13 Heat of Combustion: Currently not available 9.14 Heat of Decomposition: Currently not available 9.15 Heat of Solution: Currently not available 9.16 Heat of Polymerization: Currently not available 9.17 Heat of Fusion: Currently not available 9.18 Limiting Value: Currently not available 9.19 Reid Vapor Pressure: Currently not available										
<b>6. WATER POLLUTION</b> 6.1 Aquatic Toxicity: In water ZrCl <sub>4</sub> decomposes forming ZrOCl <sub>2</sub> and HCl. Using Fathead minnows the 96-hour TL <sub>m</sub> for ZrOCl <sub>2</sub> as Zr in soft water is 18 mg/l, and in hard water 240 mg/l. The 96-hour TL <sub>m</sub> for Mosquito fish in fresh water is 282 mg/l HCl. 6.2 Waterfowl Toxicity: Currently not available 6.3 Biological Oxygen Demand (BOD): Currently not available 6.4 Food Chain Concentration Potential: Currently not available 6.5 GESAMP Hazard Profile: Bioaccumulation: 0 Damage to living resources: 1 Human Oral hazard: 1 Human Contact hazard: I Reduction of amenities: XX	NOTES										

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9.20 SATURATED LIQUID DENSITY		9.21 LIQUID HEAT CAPACITY		9.22 LIQUID THERMAL CONDUCTIVITY		9.23 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit inch per hour-square foot-F	Temperature (degrees F)	Centipoise
	N O T  P E R T I N E N T		N O T  P E R T I N E N T		N O T  P E R T I N E N T		N O T  P E R T I N E N T

9.24 SOLUBILITY IN WATER		9.25 SATURATED VAPOR PRESSURE		9.26 SATURATED VAPOR DENSITY		9.27 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	R E A C T S	374	0.019		C U R R E N T L Y  N O T  A V A I L A B L E		C U R R E N T L Y  N O T  A V A I L A B L E