MATERIAL SAFETY DATA SHEET

TYZOR® 9000

Revised 12-OCT-2008

1. Product and company identification

Material Identification

"Tyzor" is a registered trademark of Dorf Ketal Specialty Catalysts.

Tradenames and Synonyms

Tetra t-Butyl Titanate, Tetra tert-Butyl Titanate, Tetra (2-Methyl-2-Propyl) Titanate
Titanium t-Butoxide
Titanium tert-Butoxide
TLF-9000

PHONE NUMBERS
Product Information : 1-800-441-7515 (outside the U.S. 302-774-1000)
Transport Emergency : CHEMTREC 1-800-424-9300(outside U.S. 703-527-3887)
Medical Emergency : 1-800-441-3637 (outside the U.S. 302-774-1000)

2. Hazards identification

Potential Health Effects

Skin contact may cause skin irritation with discomfort or rash. Data to evaluate the skin permeation hazard of t-Butyl Alcohol are insufficient. There are inconclusive or unverified reports of human sensitization to t-Butyl Alcohol.

Eye contact with Tetraisopropyl Titanate may cause severe irritation with discomfort, tearing, or blurring of vision. Prolonged contact may cause permanent ocular damage. Tetraisopropyl Titanate rapidly hydrolyzes with water. On contact with the eye a precipitate may be formed.

Inhalation may cause irritation of the upper respiratory passages, temporary nervous system depression with anaesthetic effects such as dizziness, headache, confusion, incoordination and loss of consciousness, or nonspecific discomfort such as nausea, headache, or weakness.

Ingestion may cause irritation of mucosal surfaces or nonspecific discomfort such as nausea, headache, or weakness.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

3. Composition/information on ingredients

Components

Material	CAS Number	%
t-Butyl Titanate	3087-39-6	85-95
Impurities:		
Tetraisopropyl Titanate	546-68-9	5-15
*t-Butyl Alcohol	75-65-0	0-1
Isopropyl Alcohol	67-63-0	0-0.25

* Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

Components (Remarks)

Various titanate impurities collectively expressed as tetraisopropyl titanate values.

4. First aid measures

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

In case of contact, immediately wash skin with soap and water. Wash contaminated clothing before reuse.

EYE CONTACT

	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician. INGESTION If swallowed, do not induce vomiting. Immediately give 2 glasses of water. Never give anything by mouth to an unconscious person. Call a physician. Notes to Physicians The product hydrolyzes rapidly with water and may form a precipitate on contact with the eyes. Mechanical removal may be advisable.

5. Fire-fighting measures	
	Flammable Properties The flash point (PMCC) of freshly made "Tyzor" 9000 is 48 deg C. If this material is exposed to water or to moist air it will react, producing the alcohol associated with the titanium. This will cause the flash point to decrease. The flash point (PMCC) of a mixture of 80% (wt.) "Tyzor" 9000 and 20% (wt.) water, after 20 minutes exposure, is 23 degC. This water-exposed product should then be considered as DOT flammable. Flammable liquid. Use explosion-proof exhaust systems to vent fumes resulting from hydrolysis or pyrolysis during use. Extinguishing Media Foam, Dry Chemical, CO2. Avoid using water on large spills. Water may be used to flush away residue. Fire Fighting Instructions Wear self-contained breathing apparatus. Wear full protective equipment.

6. Accidental release measures	
	Safeguards (Personnel) NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up. Evacuate personnel, thoroughly ventilate area, use self-contained breathing apparatus. Spill Clean Up Place in container for disposal. Do not apply water to a large spill. Sweep up or use a non-sparking shovel for cleanup.

7. Handling and storage	
	Handling (Personnel) Do not breathe vapor or mist. Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. Wash clothing after use. Do not store or consume food, drink or tobacco in areas where they may become contaminated with this material. Handling (Physical Aspects) Close container after each use. Keep away from heat, sparks and flames. Storage Store in a well ventilated place. Keep container tightly closed. Keep in dry container. Use only dry, clean utensils when handling. Freezing will affect physical condition but will not damage. Thaw and mix before using. Keep away from heat and flames.

8. Exposure controls/personal protection	
	Engineering Controls Use only with adequate ventilation. Keep container tightly closed. Personal Protective Equipment

EYE/FACE PROTECTION

Wear coverall chemical splash goggles.

RESPIRATOR

Where there is potential for airborne exposure, wear appropriate NIOSH approved respiratory protection.

PROTECTIVE CLOTHING

Where there is potential for skin contact have available and wear as appropriate impervious gloves, apron, pants, and jacket.

Exposure Guidelines

Applicable Exposure Limits

Tetraisopropyl Titanate

PEL (OSHA):	None Established
TLV (ACGIH):	None Established
AEL * (Dorf Ketal):	10 mg/m3, 8 & 12 Hr. TWA, total dust 5 mg/m3, 8 & 12 Hr. TWA, respirable dust

t-Butyl Alcohol

PEL (OSHA):	100 ppm, 300 mg/m3, 8 Hr. TWA
TLV (ACGIH):	100 ppm, 303 mg/m3, 8 Hr. TWA, A4
AEL * (Dorf Ketal):	100 ppm, 15 minute TWA

Isopropyl Alcohol

PEL (OSHA):	400 ppm, 980 mg/m3, 8 Hr. TWA
TLV (ACGIH):	200 ppm, 8 Hr. TWA, A4 STEL 400 ppm
AEL * (Dorf Ketal):	200 ppm, 8 & 12 Hr. TWA

* AEL is Dorf Ketal's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

9. Physical and chemical properties

Physical Data

Boiling Point:	114 C (237 F) @ 11 mm Hg
Vapor Pressure:	0.3 mm Hg @ 60 C (140 F)
% Volatiles:	0 % 100 % At reduced pressure

	Solubility in Water: Reacts to give insoluble components pH: Neutral Odor: Mild. Form: Liquid. Color: Colorless to Light Yellow. Specific Gravity: 0.89 g/cc @ 20 degC Density: 0.903 g/cc @ 22 degC

10. Stability and reactivity	
	Chemical Stability Reacts with water and moisture. Incompatibility with Other Materials Incompatible with water. Decomposition Prolonged heating at above 100 degC may lead to rapid onset of decomposition with evolution of gaseous by-products. Polymerization Polymerization will not occur.

11. Toxicological information	
	Animal Data Tetraisopropyl Titanate: Oral ALD: 11,000 mg/kg in rats Inhalation 4 Hr. LC50: 7.78 mg/L in rats Skin Absorption LD50: >16 mL/kg in rabbits t-Butyl Alcohol: Oral LD50: 3,500 mg/kg in rats Tetraisopropyl Titanate is a moderate skin irritant, a severe eye irritant, but is not a skin sensitizer in animals. The effects of a single inhalation exposure include labored respiration and moderate weight loss. Single exposures by ingestion to high doses or repeated exposure at lower doses include labored respiration, weakness, or nonspecific effects such as weight loss. Tests

	for carcinogenic activity, developmental and reproductive effects in animals have not been performed. Tetraisopropyl Titanate does not produce genetic damage in bacterial cell cultures, but has not been tested in animals. t-Butyl Alcohol is untested for skin irritancy, is untested for eye irritancy, and is untested for animal sensitization. Inhalation or ingestion caused central nervous system effects and behavorial and developmental effets. Ingestion exposure caused nonspecific effects such as weight loss and loss of appetite, and nonspecific preterminal effects. No animal test reports are available to define carcinogenic or reproductive hazards. Tests in bacterial or mammalian cell cultures demonstrate no mutagenic activity. Tests in animals demonstrate no embryotoxic activity.

12. Ecological information	
	Ecotoxicological Information t-Butyl Alcohol: 24 Hr. LC50, Creek Chub: >6,000 ppm 96 Hr. TLm: >1,000 ppm

13. Disposal considerations	

14. Transport information	
	Shipping Information DOT/IMO/IATA Proper Shipping Name: Flammable Liquid, N.O.S. (Tetraisopropyl Titanate) Hazard Class: 3 (IMO-3.3) UN No. : 1993 Packing Group: III Label(s): Flammable Liquid

15. Regulatory information	
	U.S. Federal Regulations TSCA Inventory Status: Listed. TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

	Acute: Yes Chronic: Yes Fire: Yes Reactivity: Yes Pressure: No

16. Other information	
	NFPA, NPCA-HMIS NPCA-HMIS Rating Health: 3 Flammability: 3 Reactivity: 1 Personal Protection rating to be supplied by user depending on use conditions. The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.