

## Praxair Material Safety Data Sheet

### 1. Chemical Product and Company Identification

<b>Product Name:</b> Tetrapropoxysilane (MSDS No. P-6302)		<b>Trade Name:</b> Tetra Normal Propyl Silicate
<b>Chemical Name:</b> Tetrapropoxysilane		<b>Synonyms:</b> Silicon tetra-n-propoxide, tetra-n-propyl silicate, tetra-n-propylorthosilicate, TNPS
<b>Formula:</b> C <sub>12</sub> H <sub>28</sub> O <sub>4</sub> Si		<b>Chemical Family:</b> Silicate ester
<b>Telephone:</b>	<b>Emergencies:</b> 1-800-645-4633* <b>CHEMTREC:</b> 1-800-424-9300* <b>Routine:</b> 1-800-PRAXAIR	<b>Company Name:</b> Praxair, Inc. 39 Old Ridgebury Road Danbury, CT 06810-5113

\* Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier, Praxair sales representative, or call 1-800-PRAXAIR (1-800-772-9247).

### 2. Composition/Information on Ingredients

See section 16 for important information about mixtures.

INGREDIENT	CAS NUMBER	CONCENTRATION	OSHA PEL	ACGIH TLV-TWA (2004)**
Tetrapropoxysilane	682-01-9	>99%*	None currently established	None currently established

\*The symbol > means "greater than"; the symbol <, "less than."

\*\* See section 3.

### 3. Hazards Identification

#### EMERGENCY OVERVIEW

**WARNING! Combustible liquid and vapor.**

**May catch fire.**

**May cause severe eye irritation.**

**May irritate the skin, mucous membranes, and respiratory system.**

**Reacts with water and moisture.**

**Self-contained breathing apparatus and protective clothing may be required by rescue workers.**

**Odor: Unknown**

**THRESHOLD LIMIT VALUE:** TLV-TWA, none currently established (ACGIH, 2004). Praxair recommends the 200 ppm TLV-TWA (400 ppm, 15 min STEL) for n-propanol formed by the hydrolysis of TNPS. TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

**EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:**

**INHALATION**–Vapor may irritate the respiratory tract and depress the central nervous system, causing dizziness, drowsiness, headache, and confusion.

**SKIN CONTACT**–May irritate the skin and cause contact dermatitis. Slow reaction with moisture in the skin produces n-propanol, an irritant that is mildly toxic and may be absorbed through the skin.

**SWALLOWING**–Effects of ingesting TNPS are expected to be mild or nonexistent, but products of slow hydrolysis may cause nausea, vomiting, drowsiness, gastrointestinal pain, cramps, and diarrhea.

**EYE CONTACT**–Vapor may irritate the eyes; liquid may cause severe eye irritation due to formation of n-propanol.

**EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE:** Repeated or prolonged exposure of the skin may cause cracking and drying.

**OTHER EFFECTS OF OVEREXPOSURE:** None known.

**MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:** Overexposure may aggravate preexisting skin problems or respiratory difficulties.

**SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH**

**HAZARD EVALUATION:** None known. N-propanol, formed by hydrolysis, is classified by the ACGIH as A3, a confirmed animal carcinogen with unknown relevance to humans.

**CARCINOGENICITY:** TNPS is not listed by NTP, OSHA, or IARC.

**4. First Aid Measures**

**INHALATION:** Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician.

**SKIN CONTACT:** Flush exposed area with water; then wash with soap and water. Remove contaminated clothing and shoes. Wash clothing prior to reuse. Seek medical attention if irritation persists.

**SWALLOWING:** If victim is conscious, give water to dilute ingested material. Never give anything to an unconscious person. Call a physician.

**EYE CONTACT:** Immediately flush eyes thoroughly with warm for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. See a physician, preferably an ophthalmologist, immediately.

**NOTES TO PHYSICIAN:** *There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

**5. Fire Fighting Measures**

<b>FLASH POINT:</b>	203°F (95°C)	
<b>AUTOIGNITION TEMPERATURE:</b>	Not available	
<b>FLAMMABLE LIMITS IN AIR, % by volume:</b>	<b>LOWER:</b> Not available	<b>UPPER:</b> Not available
<b>EXTINGUISHING MEDIA:</b> The flammability of TNPS has not been determined. Use media appropriate for surrounding fire.		

**SPECIAL FIRE FIGHTING PROCEDURES: WARNING! Combustible liquid and vapor.**

Evacuate all personnel from danger area. Immediately deluge containers with water from maximum distance until cool; then move them away from fire area if without risk. Avoid water contact with TNPS. Self-contained breathing apparatus and protective clothing may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** Heat or combustion may release irritating, toxic, and/or flammable by-products. Flammable vapors may travel some distance, then flash back.

**HAZARDOUS COMBUSTION PRODUCTS:** None known. (See section 10 for products of decomposition.)

## 6. Accidental Release Measures

**STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: WARNING! Combustible liquid and vapor.** Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus and protective clothing where needed. Remove all sources of ignition if without risk. Reduce vapors with fog or fine water spray, taking care not to spread liquid with water. Shut off flow if without risk. Vapors may spread from spill. Ventilate area or move container to a well-ventilated area.

**WASTE DISPOSAL METHOD:** Prevent waste from contaminating the surrounding environment. Keep personnel away. Small spills can be mixed with vermiculite, sodium carbonate, sand, or other compatible, noncombustible absorption material, swept up, and placed into containers for later disposal. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations. If necessary, call your local supplier for assistance. Ensure adequate ventilation.

## 7. Handling and Storage

**PRECAUTIONS TO BE TAKEN IN STORAGE:** Store and use with adequate ventilation. Store in a cool, dry area away from direct sunlight. Store only in the container in which product was received. Never store in open containers. Keep containers closed. Store only where temperature will not exceed 125°F (52°C). Store full and empty containers separately, and store away from oxidizing agents. Use a first-in, first-out inventory system to prevent storing full containers for long periods.

**PRECAUTIONS TO BE TAKEN IN HANDLING:** Protect containers from damage. For other precautions in using this product, see section 16.

## 8. Exposure Controls/Personal Protection

### VENTILATION/ENGINEERING CONTROLS:

**LOCAL EXHAUST**—Use a local exhaust system with sufficient air flow velocity to prevent the accumulation of hazardous vapors in the worker's breathing zone.

**MECHANICAL (general)**—Under certain conditions, general exhaust ventilation may be acceptable to keep hazardous vapors below the TLV in the worker's breathing zone.

**SPECIAL**—None

**OTHER**—None

**RESPIRATORY PROTECTION:** Use suitable respirator when high concentrations are present. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134. Select per OSHA 29 CFR 1910.134 and ANSI Z88.2.

**SKIN PROTECTION:** Wear work gloves when handling containers; rubber, neoprene, or nitrile where contact with product may occur.

**EYE PROTECTION:** Wear safety glasses when handling containers; chemical protective goggles where contact with product may occur. Select eye protection in accordance with OSHA 29 CFR 1910.133.

**OTHER PROTECTIVE EQUIPMENT:** Protective clothing where needed. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133.

## 9. Physical and Chemical Properties

<b>MOLECULAR WEIGHT:</b>	266.44
<b>SPECIFIC GRAVITY (H<sub>2</sub>O = 1):</b>	0.92
<b>SPECIFIC GRAVITY (Air = 1)</b>	<1
<b>VAPOR PRESSURE at 212°F (100°C):</b>	<4 psi (<26.7 kPa, <200 mm Hg)
<b>SOLUBILITY IN WATER:</b>	Reacts slowly
<b>PERCENT VOLATILES BY VOLUME:</b>	100
<b>BOILING POINT at 1 atm:</b>	Approximately 437°F (225°C)
<b>MELTING POINT at 1 atm:</b>	<-112°F (<-80°C)
<b>APPEARANCE, ODOR, AND STATE:</b> Colorless, clear liquid of unknown odor.	

## 10. Stability and Reactivity

<b>STABILITY:</b>	<input type="checkbox"/> Unstable	<input checked="" type="checkbox"/> Stable
<b>INCOMPATIBILITY (materials to avoid):</b> Water, moisture, air, oxidizing agents, hypochlorites		
<b>HAZARDOUS DECOMPOSITION PRODUCTS:</b> Thermal decomposition produces oxides of carbon and silicon. Reaction with water or moisture, which under ambient conditions is slow and nonviolent, produces silicon dioxide and n-propanol. Propanol may form explosive concentrations. Reaction with oxidizing agents produces amorphous silica. With long-term exposure, TNPS may attack certain plastics.		
<b>HAZARDOUS POLYMERIZATION:</b>	<input type="checkbox"/> May Occur	<input checked="" type="checkbox"/> Will Not Occur
<b>CONDITIONS TO AVOID:</b> High temperatures; exposure to incompatible materials.		

## 11. Toxicological Information

See section 3.

## 12. Ecological Information

No adverse ecological effects expected. This product does not contain any Class I or Class II ozone-depleting chemicals. This product is not listed as a marine pollutant by DOT.

**13. Disposal Considerations**

**WASTE DISPOSAL METHOD:** Do not attempt to dispose of residual or unused quantities. Return container to supplier.

**14. Transport Information**

**DOT/IMO SHIPPING NAME:** Not applicable (nonhazardous material)

<b>HAZARD</b>	<b>IDENTIFICATION</b>	<b>PRODUCT</b>
<b>CLASS:</b> Not applicable	<b>NUMBER:</b> Not applicable	<b>RQ:</b> None
<b>SHIPPING LABEL(s):</b>	Not applicable	
<b>PLACARD (when required):</b>	Not applicable	

**15. Regulatory Information**

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, state, and local regulations.

**U.S. FEDERAL REGULATIONS:****EPA (ENVIRONMENTAL PROTECTION AGENCY)**

**CERCLA:** COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (40 CFR Parts 117 and 302):

**Reportable Quantity (RQ):** None

**SARA: SUPERFUND AMENDMENT AND REAUTHORIZATION ACT:**

**SECTIONS 302/304:** Require emergency planning based on Threshold Planning Quantity (TPQ) and release reporting based on Reportable Quantities (RQ) of Extremely Hazardous Substances (EHS) (40 CFR Part 355):

**TPQ:** None

**EHS RQ:** None

**SECTIONS 311/312:** Require submission of MSDSs and reporting of chemical inventories with identification of EPA hazard categories. The hazard categories for this product are as follows:

**IMMEDIATE:** Yes

**PRESSURE:** No

**DELAYED:** No

**REACTIVITY:** Yes

**FIRE:** Yes

**SECTION 313:** Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

TNPS does not require reporting under Section 313.

**40 CFR 68: RISK MANAGEMENT PROGRAM FOR CHEMICAL ACCIDENTAL RELEASE PREVENTION:** Requires development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

TNPS is not listed as a regulated substance.

**TSCA: TOXIC SUBSTANCES CONTROL ACT:** TNPS is listed on the TSCA inventory.

**OSHA: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:**

**29 CFR 1910.119: PROCESS SAFETY MANAGEMENT OF HIGHLY HAZARDOUS CHEMICALS:** Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

TNPS is not listed in Appendix A as a highly hazardous chemical.

**STATE REGULATIONS:**

**CALIFORNIA:** TNPS is not listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

**PENNSYLVANIA:** TNPS is subject to the PENNSYLVANIA WORKER AND COMMUNITY RIGHT-TO-KNOW ACT (35 P.S. Sections 7301-7320).

**16. Other Information**

Be sure to read and understand all labels and instructions supplied with all containers of this product.

**OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:** **Combustible liquid and vapor. May irritate skin, eyes, and respiratory tract.** Use only with adequate ventilation or respiratory protection. (See section 8.) Do not breathe vapor. Do not get liquid or vapor in eyes, on skin, or on clothing. (See section 3.) Have safety showers and eyewash fountains immediately available. *Use only with compatible materials and equipment.* Storage containers should be kept tightly sealed in a cool, dry atmosphere to prevent contact with air/oxygen. **Ground containers prior to use.** Use spark-proof tools and equipment. **Keep away from oxidizing agents, air, heat, sparks, flame, and direct sunlight.** Keep ignition sources away and protect against electrostatic charges. **Do not eat, drink, or smoke** in areas where this material is used or stored. Wash hands and face thoroughly to clean them of any residual material before eating, drinking, smoking, using the toilet, or applying cosmetics.

**NOTE:** Prior to using any plastics, confirm their compatibility with TNPS.

**MIXTURES:** When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Remember, gases and liquids have properties that can cause serious injury or death.

**HAZARD RATING SYSTEMS:****NFPA RATINGS:**

HEALTH	= 2
FLAMMABILITY	= 2
INSTABILITY	= 1
SPECIAL	= None

**HMIS RATINGS:**

HEALTH	= 2
FLAMMABILITY	= 2
PHYSICAL HAZARD	= 0

**NOTE:** The hazards of this product have not been fully investigated.

Praxair asks users of this product to study this MSDS and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this MSDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

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The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product.

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