Praxair Material Safety Data Sheets

1. Chemical Product and Company Identification

Product Name: Water-reactive liquid, corrosive, n.o.s. [tetrakis(dimethylamino)silane] (MSDS No. P-6273-C)

Chemical Name: Synonyms: 4-DMAS, octamethylsilanetetramine, silicon tetrakis(dimethylamino)silane tetra(dimethylamide), tetrakis(dimethylamido)silane

Formula: C₈H₂₄N₄Si Chemical Family: Silicon amide complex

Telephone: Emergencies: 1-800-645-4633* Company Name: Praxair, Inc.

 CHEMTREC:
 1-800-424-9300*
 39 Old Ridgebury Road

 Routine:
 1-800-PRAXAIR
 Danbury, CT 06810-5113

2. Composition/Information on Ingredients

See section 16 for important information about mixtures.

| INGREDIENT | CAS NUMBER | | OSHA PEL | ACGIH TLV-TWA (2004) |
|-------------------------------|---------------|-------|------------------------------|------------------------------|
| Tetrakis(dimethylamino)silane | 1624-01-7 | >99%* | None currently established** | None currently established** |

^{*} The symbol > means "greater than."

3. Hazards Identification

EMERGENCY OVERVIEW

DANGER! Toxic, corrosive, flammable liquid and vapor.

May form explosive mixtures with air.

May be fatal if inhaled.

May be harmful if swallowed or absorbed through the skin. Causes severe eye irritation; effects may be delayed.

May irritate the skin, respiratory tract, and mucous membranes.

Reacts with water and moisture in air.

Odor: Acrid amine

THRESHOLD LIMIT VALUE: TLV-TWA, none currently established (ACGIH, 2004).

^{*} 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).

^{**} Values for dimethylamine, 124-40-3, a product of decomposition: OSHA PEL, 10 ppm; ACGIH TLV-TWA, 5 ppm, 15 ppm, 15 min STEL (ACGIH 2004)

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION—Vapors may cause irritation and may be highly toxic.

SKIN CONTACT—May irritate the skin several hours after exposure. With prolonged or repeated exposure, harmful amounts may be absorbed through the skin.

SWALLOWING–May be highly toxic.

EYE CONTACT—Will cause immediate or delayed severe eye irritation.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: Repeated or prolonged exposure of the skin may cause dermatitis (inflammation of the skin). Repeated or prolonged inhalation may cause coughing, headache, and nausea.

OTHER EFFECTS OF OVEREXPOSURE: None known.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: The skin irritating properties of tetrakis(dimethylamino)silane may aggravate an existing dermatitis. Respiratory irritation may aggravate an existing asthma or other upper respiratory or pulmonary disease.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: None known.

CARCINOGENICITY: Tetrakis(dimethylamino)silane 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: Remove contaminated clothing and shoes, and wash exposed areas with soap and plenty of water. Wash contaminated clothing and shoes prior to reuse or discard them. Seek medical attention if discomfort persists.

SWALLOWING: Keep the victim calm, and get immediate medical aid. Do not give liquids or induce vomiting unless directed to do so by medical personnel.

EYE CONTACT: Immediately flush eyes thoroughly with water 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 | | | | | | |
|---|--------------------------------|------------------------|--|--|--|--|
| FLASH POINT (COC): | Not available | | | | | |
| AUTOIGNITION TEMPERATURE: | Not available | | | | | |
| FLAMMABLE LIMITS IN AIR, % by volume: Not determined | LOWER: Not available | UPPER: Not available | | | | |
| EXTINGUISHING MEDIA: CO ₂ , dry chemical or water-based foams | als, dry sand, or limestone po | wder. DO NOT use water | | | | |

SPECIAL FIRE FIGHTING PROCEDURES: DANGER! Toxic, corrosive, flammable liquid and vapor. Reacts with water and atmospheric moisture. Burning material may release toxic and corrosive fumes. Evacuate all personnel from danger area. Use self-contained breathing apparatus and protective clothing including a face mask. Remove ignition sources if without risk. Move containers away from fire area if without risk. If this material is on fire, extinguish flames with the recommended media. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Heat of fire may cause violent rupture of package. Vapors may form explosive mixtures with air. The material may decompose into flammable, toxic, and corrosive fumes and vapors when exposed to water, moisture, or open flame. Fumes and vapors may spread from leak. Vapors are heavier than air and may collect in low spots.

HAZARDOUS COMBUSTION PRODUCTS: Dimethylamine, carbon monoxide, carbon dioxide, nitrogen oxides, silicon dioxide, and organic acid vapors.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: DANGER! Toxic, corrosive, flammable liquid and vapor. Reacts with water and atmospheric moisture. 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. Vapors are heavier than air and may collect in low spots. Cover spill with absorbent material. Transfer to a suitable container for disposal. Ventilate area or move container to a well-ventilated area, and wash spill site after material pick-up is complete. May be hazardous to aquatic life if released to open waters.

WASTE DISPOSAL METHOD: Prevent waste from contaminating the surrounding environment. Keep personnel away. Small spills should be hydrolized by mixing with water in a hood. Aqueous layer contains dimethylamine, which should be neutralized with hydrochloric acid. Organic layer may be incinerated or absorbed onto clay or vermiculite and then disposed as solid waste. 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.

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN STORAGE: Store in a cool, dry place away from direct sunlight. Keep storage containers tightly closed. Store away from oxygen, chlorine, and other oxidizers. Firmly secure containers upright to keep them from falling or being knocked over. Keep valves tightly closed. Store only where temperature will not exceed 125°F (52°C). Store full and empty containers separately. 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.

For further information on storage, handling, and use, see NFPA 30, *Flammable and Combustible Liquids Code*, published by the National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101; 1-800-344-3555; www.nfpa.org.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST—Use a local exhaust system with sufficient air flow velocity to prevent the build-up of vapors and dust in the worker's breathing zone.

MECHANICAL (**general**)—Under certain conditions, general exhaust ventilation may be acceptable if it can prevent build-up of vapors in the worker's breathing zone.

SPECIAL-None

OTHER-None

RESPIRATORY PROTECTION: If exposure exceeds the recommended TLV, an air-supplied or combination organic vapor/amine gas respirator should be worn. 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; heavy rubber, neoprene, or nitrile gloves where contact with product may occur.

EYE PROTECTION: Wear safety glasses when handling containers; safety goggles or a full face shield where contact with product may occur. Select eye protection in accordance with OSHA 29 CFR 1910.133. Do not wear contact lenses.

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

9 Physical and Chemical Properties

| 7. Thysical and Chemical Properties | | | | | |
|--|---|--|--|--|--|
| MOLECULAR WEIGHT: | 204.39 g/mol | | | | |
| DENSITY: | 54.9 lb/ft ³ (0.88 g/cm ³) | | | | |
| SOLUBILITY IN WATER: | Reacts | | | | |
| VAPOR PRESSURE @ 122°F (50°C): | 0.075 psia (3.9 torr) | | | | |
| BOILING POINT: | 385°F (196°C) | | | | |
| MELTING POINT: | 59-61°F (15-16°C) | | | | |
| APPEARANCE, ODOR, AND STATE: Clear, colorless liquid with an acrid amine odor. | | | | | |
| | | | | | |
| 10. Stability and Reactivity | | | | | |
| STABILITY: | ☐ Unstable | | | | |
| NOTE: Tetrakis(dimethylamino)silane is stable as shipped under a blanket of dry, inert gas. | | | | | |
| INCOMPATIBILITY (materials to avoid): Alcohol, acids, oxidizers, halogens, water or moisture | | | | | |
| INCOMPATIBILITY (materials to avoid): Alco | | | | | |
| | | | | | |
| | shol, acids, oxidizers, halogens, water or moisture S: Thermal decomposition or burning may produce | | | | |
| HAZARDOUS DECOMPOSITION PRODUCT | shol, acids, oxidizers, halogens, water or moisture S: Thermal decomposition or burning may produce | | | | |
| HAZARDOUS DECOMPOSITION PRODUCT dimethylamine, carbon monoxide, carbon dioxide, r | shol, acids, oxidizers, halogens, water or moisture S: Thermal decomposition or burning may produce | | | | |
| HAZARDOUS DECOMPOSITION PRODUCT dimethylamine, carbon monoxide, carbon dioxide, vapors. | shol, acids, oxidizers, halogens, water or moisture S: Thermal decomposition or burning may produce nitrogen oxides, silicon dioxide, and organic acid May Occur Will Not Occur | | | | |

11. Toxicological Information

See section 3.

12. Ecological Information

May be hazardous to aquatic life if released to open waters. Tetrakis(dimethylamino)silane does not contain any Class I or Class II ozone-depleting chemicals. Tetrakis(dimethylamino)silane 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: Water-reactive liquid, corrosive, n.o.s.

[tetrakis(dimethylamino)silane]

IDENTIFICATION HAZARD PACKING PRODUCT CLASS: 4.3 **GROUP:** II **NUMBER:** UN3129 None RQ:

SHIPPING LABEL(s): DANGEROUS WHEN WET, CORROSIVE

DANGEROUS WHEN WET PLACARD (when required):

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 (TPO) and release reporting based on Reportable Quantities (RQ) of Extremely Hazardous Substances (EHS) (40 CFR Part 355):

TPQ: None

EHS RQ (40 CFR 355): 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:** Yes **REACTIVITY:** Yes

FIRE: Yes

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

Tetrakis(dimethylamino)silane is not subject to the reporting requirements of this section.

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.

Tetrakis(dimethylamino)silane is not listed as a regulated substance.

TSCA: TOXIC SUBSTANCES CONTROL ACT: Tetrakis(dimethylamino)silane 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.

Tetrakis(dimethylamino)silane is not listed in Appendix A as a highly hazardous chemical. However, any process that involves a flammable liquid on site in one location in quantities of 10,000 lb (4536 kg) or greater is covered under this regulation unless the liquid is used as a fuel.

STATE REGULATIONS:

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

PENNSYLVANIA: This product 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: Toxic, flammable liquid and vapor. Reacts with water and atmospheric moisture. Do not breathe vapor. Store and use only with adequate ventilation or respiratory protection. (See section 8.) Do not get liquid or vapor in eyes, on skin, or on clothing. (See section 3.) Have safety showers and eyewash fountains immediately available. May form explosive mixtures with air. Keep away from heat, sparks, and open flame. Use only spark-proof tools and explosion-proof equipment. Ground all equipment. Use only with compatible materials and equipment. Keep away from alcohol, acids, and oxidizing agents. Do not eat, drink, or smoke in areas where this material is stored or used. After working with this product, wash face and hands thoroughly with soap and water before eating drinking, smoking, applying cosmetics, or using the toilet.

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, liquids, and solids have properties that can cause serious injury or death.

HAZARD RATING SYSTEMS

| NFPA RATINGS: | | HMIS RATINGS: | |
|---------------|------------------|-----------------|-----|
| HEALTH | = 4 | HEALTH | = 4 |
| FLAMMABILITY | = 3 | FLAMMABILITY | = 3 |
| INSTABILITY | = 1 | PHYSICAL HAZARD | = 1 |
| SPECIAL | $=$ \mathbf{W} | | |

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.

Product: Tetrakis(dimethylamino)silane P-6273-C

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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Praxair, Inc. 39 Old Ridgebury Road Danbury, CT 06810-5113

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