

## Praxair Material Safety Data Sheet

### 1. Chemical Product and Company Identification

<b>Product Name:</b> Compressed gas, n.o.s. (Nitrogen, Silane)	<b>Trade Names:</b> Not available.
<b>Chemical Name:</b> Mixture of Nitrogen & Silane	<b>Synonyms:</b> Not available.
<b>Chemical Family:</b> Permanent gas	<b>Product Grades:</b> Not assigned.
<b>Telephone:</b>	<b>Company Name:</b> Praxair, Inc.
<b>Emergencies:</b> 1-800-645-4633*	39 Old Ridgebury Road
<b>CHEMTREC:</b> 1-800-424-9300*	Danbury, CT 06810-5113
<b>Routine:</b> 1-800-PRAXAIR	

*\*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. Hazards Identification

#### EMERGENCY OVERVIEW

**CAUTION! High-pressure gas.  
Can cause rapid suffocation.  
May cause respiratory system damage.  
May cause dizziness and drowsiness.  
Self-contained breathing apparatus may be required by rescue workers.  
Under ambient conditions, this is a colorless, odorless, inert gas.**

**OSHA REGULATORY STATUS:** This material is considered hazardous by the OSHA Hazard Communications Standard (29 CFR 1910.1200).

#### POTENTIAL HEALTH EFFECTS:

##### Effects of a Single (Acute) Overexposure

**Inhalation.** Asphyxiant. Effects are due to lack of oxygen. Moderate concentrations may cause headache, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness. May cause respiratory system damage. Lack of oxygen can kill.

**Skin Contact.** No harm expected.

**Swallowing.** An unlikely route of exposure. This product is a gas at normal temperature and pressure.

**Eye Contact.** No harm expected.

**Effects of Repeated (Chronic) Overexposure.** No harm expected.

**Other Effects of Overexposure.** Asphyxiant. Lack of oxygen can kill.

**Medical Conditions Aggravated by Overexposure.** The toxicology and the physical and chemical properties of nitrogen suggest that overexposure is unlikely to aggravate existing medical conditions.

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

**POTENTIAL ENVIRONMENTAL EFFECTS:** None known. For further information, see section 12, Ecological Information.

### 3. Composition/Information on Ingredients

See section 16 for important information about mixtures.

COMPONENT	CAS NUMBER	CONCENTRATION
Silane	7803-62-5	0.01%
Nitrogen	7727-37-9	99.99%

### 4. First Aid Measures

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

**SKIN CONTACT:** An unlikely route of exposure. This product is a gas at normal temperature and pressure.

**SWALLOWING:** An unlikely route of exposure. This product is a gas at normal temperature and pressure.

**EYE CONTACT:** An unlikely route of exposure. This product is a gas at normal temperature and pressure.

**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

**FLAMMABLE PROPERTIES:** Mixture cannot catch fire.

**SUITABLE EXTINGUISHING MEDIA:** Mixture cannot catch fire. Use media appropriate for surrounding fire.

**PRODUCTS OF COMBUSTION:** Not applicable.

**PROTECTION OF FIREFIGHTERS: CAUTION! High-pressure gas.** Asphyxiant. Lack of oxygen can kill. Evacuate all personnel from danger area. Immediately deluge cylinders with water from maximum distance until cool; and then move them away from fire area if without risk. Shut off flow if you can do so without risk. Self-contained breathing apparatus may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

**Specific Physical and Chemical Hazards.** Heat of fire can build pressure in cylinder and cause it to rupture. No part of cylinder should be subjected to a temperature higher than 125°F (52°C). Mixture cylinders are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.)

**Protective Equipment and Precautions for Firefighters.** Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

## 6. Accidental Release Measures

### STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

#### **CAUTION! High-pressure gas.**

**Personal Precautions.** Asphyxiant. Lack of oxygen can kill. Evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Shut off flow if you can do so without risk. Ventilate area or move cylinder to a well-ventilated area. Test for sufficient oxygen, especially in confined spaces, before allowing re-entry.

**Environmental Precautions.** Prevent waste from contaminating the surrounding environment. Keep personnel away. 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 HANDLING:** Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. Close valve after each use; keep closed even when empty. If valve is hard to open, discontinue use and contact your supplier. For other precautions in using nitrogen, see section 16.

**PRECAUTIONS TO BE TAKEN IN STORAGE:** Store and use with adequate ventilation. Always secure cylinders upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand. Store only where temperature will not exceed 125°F (52°C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

**RECOMMENDED PUBLICATIONS:** For further information on storage, handling, and use, see Praxair publication P-14-153, *Guidelines for Handling Gas Cylinders and Containers*. Obtain from your local supplier.

## 8. Exposure Controls/Personal Protection

COMPONENT	OSHA PEL	ACGIH TLV-TWA (2009)
Silane	N.E.*	5 ppm
Nitrogen	N.E.*	Simple asphyxiant

\*N.E.—Not Established.

IDLH = Not available.

### **ENGINEERING CONTROLS:**

**Local Exhaust.** Use a local exhaust system, if necessary, to prevent oxygen deficiency.

**Mechanical (General).** General exhaust ventilation may be acceptable if it can maintain an adequate supply of air.

**Special.** None

**Other.** None

**PERSONAL PROTECTIVE EQUIPMENT:**

**Skin Protection.** Wear work gloves when handling cylinders and metatarsal shoes for cylinder handling. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

**Eye/Face Protection.** Wear safety glasses when handling cylinders. Select in accordance with OSHA 29 CFR 1910.133.

**Respiratory Protection.** A respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable) requirements must be followed whenever workplace conditions warrant respirator use. Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure (e.g., an organic vapor cartridge). For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus.

<b>9. Physical and Chemical Properties</b>
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<b>APPEARANCE:</b>	Colorless gas	
<b>ODOR:</b>	Odorless	
<b>ODOR THRESHOLD:</b>	Not available.	
<b>PHYSICAL STATE:</b>	Gas at normal temperature and pressure	
<b>pH:</b>	Not applicable.	
<b>MELTING POINT</b> at 1 atm:	-346°F (-210°C)*	
<b>BOILING POINT</b> at 1 atm:	-320.44°F (-195.80°C)*	
<b>FLASH POINT</b> (test method):	Not applicable.	
<b>EVAPORATION RATE</b> (Butyl Acetate = 1):	Not applicable.	
<b>FLAMMABILITY:</b>	Nonflammable	
<b>FLAMMABLE LIMITS IN AIR</b> , % by volume:	<b>LOWER:</b> Not applicable.	<b>UPPER:</b> Not applicable.
<b>LIQUID DENSITY</b> at boiling point and 1 atm:	50.7 lb/ft <sup>3</sup> (808.5 kg/m <sup>3</sup> )*	
<b>VAPOR PRESSURE</b> at 68°F (20°C):	Not applicable.	
<b>VAPOR DENSITY</b> at 70°F (21.1°C) and 1 atm:	0.0724 lb/ft <sup>3</sup> (1.160 kg/m <sup>3</sup> )*	
<b>SPECIFIC GRAVITY</b> (H <sub>2</sub> O = 1) at 19.4°F (-7°C):	Not available.	
<b>SPECIFIC GRAVITY</b> (Air = 1) at 70°F (21.1°C) and 1 atm:	0.967*	
<b>SOLUBILITY IN WATER</b> , vol/vol at 32°F (0°C)	0.023*	
<b>PARTITION COEFFICIENT: n-octanol/water:</b>	Not available.	
<b>AUTOIGNITION TEMPERATURE:</b>	Not applicable.	
<b>DECOMPOSITION TEMPERATURE:</b>	Not available.	
<b>PERCENT VOLATILES BY VOLUME:</b>	100	
<b>MOLECULAR WEIGHT:</b>	28.01*	
<b>MOLECULAR FORMULA:</b>	Mixture of N <sub>2</sub> and SiH <sub>4</sub>	

\*For Nitrogen

**10. Stability and Reactivity**

**CHEMICAL STABILITY:**  Unstable  Stable

**CONDITIONS TO AVOID:** High temperatures, exposure to lithium, neodymium, titanium, and magnesium

**INCOMPATIBLE MATERIALS:** None known.

**HAZARDOUS DECOMPOSITION PRODUCTS:** None known.

**POSSIBILITY OF HAZARDOUS REACTIONS:**  May Occur  Will Not Occur

Under certain conditions, nitrogen can react violently with lithium, neodymium, titanium [above 1472°F (800°C)], and magnesium to form nitrides. At high temperature it can also combine with oxygen and hydrogen.

**11. Toxicological Information**

**ACUTE DOSE EFFECTS:** Nitrogen is a simple asphyxiant.

**STUDY RESULTS:** None known.

**12. Ecological Information**

**ECOTOXICITY:** No adverse ecological effects expected.

**OTHER ADVERSE EFFECTS:** Nitrogen does not contain any Class I or Class II ozone-depleting chemicals.

**13. Disposal Considerations**

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

**14. Transport Information**

**DOT/IMO SHIPPING NAME:** Compressed gas, n.o.s. (Nitrogen, Silane)

HAZARD CLASS:	PACKING GROUP/Zone:	IDENTIFICATION NUMBER:	PRODUCT RQ:
2.2	NA*	UN1956	None

**SHIPPING LABEL(s):** NONFLAMMABLE GAS

**PLACARD (when required):** NONFLAMMABLE GAS

\* Not applicable.

**SPECIAL SHIPPING INFORMATION:** Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of a vehicle can present serious safety hazards.

Shipment of compressed gas cylinders that have been filled without the owner's consent is a violation of federal law [49 CFR 173.301(b)].

**MARINE POLLUTANTS:** The components of this mixture are not listed as marine pollutants by DOT.

## 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 (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:** No

**PRESSURE:** Yes

**DELAYED:** No

**REACTIVITY:** No

**FIRE:** No

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

The components of this mixture are not subject to 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.

Nitrogen is not listed as a regulated substance. Silane is listed as a regulated substance in quantities of 10,000 lb (4545 kg) or greater.

**TSCA: TOXIC SUBSTANCES CONTROL ACT:** The components of this mixture are 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.

The components of this mixture are not listed in Appendix A as highly hazardous chemicals.

### STATE REGULATIONS:

**CALIFORNIA:** The components of this mixture are not listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

**PENNSYLVANIA:** The components of this mixture are subject to the PENNSYLVANIA WORKER AND COMMUNITY RIGHT-TO-KNOW ACT (35 P.S. Sections 7301-7320).

## 16. Other Information

Read and understand all labels and instructions supplied with all containers of this product.

**OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE:** High-pressure gas. Use piping and equipment adequately designed to withstand pressures to be encountered. Use a backflow prevention device in any piping. Gas can cause rapid suffocation because of oxygen deficiency. Store and use with adequate ventilation. Never work on a pressurized system. If there is a leak, close the cylinder valve. Blow the system down in a safe and environmentally sound manner in compliance with all federal, state, and local laws; then repair the leak. Never place a compressed gas cylinder where it may become part of an electrical circuit.

**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. Gases and liquids have properties that can cause serious injury or death.

### HAZARD RATING SYSTEMS:

#### NFPA RATINGS:

HEALTH = 1  
FLAMMABILITY = 0  
INSTABILITY = 0  
SPECIAL = SA (CGA recommends this to designate Simple Asphyxiant.)

#### HMIS RATINGS:

HEALTH = 1  
FLAMMABILITY = 0  
PHYSICAL HAZARD = 3

### STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

#### THREADED:

CGA-350

#### PIN-INDEXED YOKE:

Not applicable.

#### ULTRA-HIGH-INTEGRITY CONNECTION:

Not applicable.

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlet V-1 listed below.

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information can be found in the following materials published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5<sup>th</sup> Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, <http://www.cganet.com/Publication.asp>.

- AV-1 *Safe Handling and Storage of Compressed Gases*
- G-10.1 *Commodity Specification for Nitrogen*
- P-1 *Safe Handling of Compressed Gases in Containers*
- P-9 *Inert Gases – Argon, Nitrogen, and Helium*
- SB-2 *Oxygen-Deficient Atmospheres*
- V-1 *Compressed Gas Cylinder Valve Inlet and Outlet Connections*
- *Handbook of Compressed Gases, Fourth Edition*

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