



MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS Standards and EU Standards

SECTION 1. PRODUCT IDENTIFICATION

PRODUCT NAME: 1-2000 ppm TRICHLOROMETHYLSILANE IN ARGON (0-99%), HELIUM (0-99%), KRYPTON (0-995%), NEON (0-99%), NITROGEN (0-99%), or XENON (0-99%)

PRODUCT USE: Various Uses

MANUFACTURER: SPECTRA GASES, INC.

ADDRESS: 3434 Route 22 West
Branchburg, NJ 08876, U.S.A.

PHONE: 908/252-9300

FAX: 908/252-0811

WEB SITE: www.spectra-gases.com

SPECTRA GASES EMERGENCY CONTACT: 800/932-0624 8:30 AM - 7:00 PM (EST)

24 HOUR EMERGENCY CONTACT, CHEMTREC: 800/424-9300, 703/527-3887

SECTION 2. COMPOSITION and INFORMATION ON INGREDIENTS

EU LABELING/CLASSIFICATION: This gas mixture is classified per the European Union Council Directives. The following is a self-classification.

EU Classification: Xi [Irritant]

EU Risk Phrases: R: 36 [Irritating to eyes.]

Chemical Name	Chemical Synonyms	Chemical Formula	CAS #	EINECS #	% Composition	EU Classification For Components
Trichloromethylsilane	Methyltrichlorosilane; Methylsilicochloroform; Methylsilyl trichloride; Methyl-trichlorosilan; KA 13; LS 40 (silane); Methylsilicon trichloride; Trichloromethylsilane; Trichloromethylsilicon; Silane, trichloromethyl-	CH ₃ Cl ₃ Si	75-79-6	200-902-6	0.2%	HAZARD CLASSIFICATION: F [Highly Flammable] RISK PHRASES: R: 11 [Highly Flammable]; R: 14 [Reacts Violently With Water]; R: 36/37/38 [Irritating to eyes, respiratory system and skin.]
Argon	None	Ar	7440-37-1	231-147-0	0-99%	HAZARD CLASSIFICATION: Not Applicable RISK PHRASES: Not Applicable
Helium	None	He	7440-59-7	231-168-5	0-99%	HAZARD CLASSIFICATION: Not Applicable RISK PHRASES: Not Applicable
Krypton	None	Kr	7439-90-9	231-098-5	0-99%	HAZARD CLASSIFICATION: Not Applicable RISK PHRASES: Not Applicable
Nitrogen	None	N ₂	7727-37-9	231-783-9	0-99%	HAZARD CLASSIFICATION: Not Applicable RISK PHRASES: Not Applicable
Neon	None	Ne	7440-01-9	231-110-9	0-99%	HAZARD CLASSIFICATION: Not Applicable RISK PHRASES: Not Applicable
Xenon	None	Xn	7440-63-3	231-172-7	0-99%	HAZARD CLASSIFICATION: Not Applicable RISK PHRASES: Not Applicable

SECTION 3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Product Description: This is a colorless, odorless, non-flammable gas mixture, shipped under pressure. **Health Hazards:** Although highly corrosive to tissues in its pure form, the low concentration of trichloromethylsilane in the gas mix (<0.2%) significantly reduces the associated health hazard to irritation of the respiratory system if inhaled. Eye contact will cause irritation. Upon release, this gas may cause the displacement of oxygen and create an asphyxiation hazard. **Flammability Hazards:** This gas mixture is not flammable. **Reactivity Hazards:** The trichloromethylsilane component of this mix can react with water to create hydrochloric acid. **Environmental Hazards:** There are no data on the effects of this gas mixture to the environment. **Emergency Response Considerations:** Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding. **WARNING** - If rescue personnel need to enter an area suspected of having toxic levels of Trichloromethylsilane or a low level of Oxygen, they should be equipped with Self-Contained Breathing Apparatus (SCBA).

HMIS RATINGS: HEALTH HAZARD: = 1; FLAMMABILITY HAZARD: = 0; PHYSICAL HAZARD: = 0

ROUTES OF ENTRY, SYMPTOMS OF ACUTE EXPOSURE: WARNING - If rescue personnel need to enter an area in which a release of this gas mixture has occurred, they should be equipped with Self-Contained Breathing Apparatus (SCBA). High concentration of this gas will create an oxygen-deficient atmosphere, creating the risk of asphyxiation. Acute overexposure to this gas may cause the following health effects:

EYE CONTACT: Eye contact with this gas may cause irritation due to formation of hydrochloric acid from trace Trichloromethylsilane. Release of a high-pressure gas may result in airborne objects.

SECTION 3. HAZARD IDENTIFICATION (Continued)

INGESTION: Ingestion of this gas mixture is not a likely route of industrial exposure.

INHALATION: High concentrations of this gas mixture can cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. The following effects associated with various levels of oxygen are described below:

<u>CONCENTRATION of OXYGEN</u>	<u>EXPOSURE SYMPTOM</u>
20.9% Oxygen:	Normal oxygen concentration in air.
15-19% Oxygen:	Decreased ability to perform tasks. May impair coordination and may induce early symptoms in persons with heart, lung, or circulatory problems.
12-15% Oxygen:	Breathing increases, especially in exertion. Pulse up. Impaired coordination, perception, and judgment.
10-12% Oxygen:	Breathing further increases in rate and depth, poor coordination and judgment, lips slightly blue.
Less than 10% Oxygen:	Mental failure, inability to perform various movements,, loss of consciousness without warning, convulsions, death.

WARNING: Exposure to atmospheres containing 8-10% or less oxygen will bring about unconsciousness without warning and so quickly that individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death.

SKIN CONTACT: In presence of water or moisture, skin contact may be irritating due to formation of hydrochloric acid from trace Trichloromethylsilane. Contact with rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain caused by frostbite can quickly subside, masking the injury. In addition, the sudden release of a pressurized gas (such as may occur in the event of a valve failure), presents a severe hazard of mechanical injury.

ROUTES OF ENTRY, SYMPTOMS OF CHRONIC EXPOSURE:

ROUTE OF ENTRY: Inhalation, skin contact.

TARGET ORGANS: Respiratory system, skin.

SYMPTOMS: Persistent irritation may result from repeated exposure.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Pre-existing dermatitis and respiratory disorders may be aggravated by over-exposure to this gas mixture.

CARCINOGENICITY: The components of this gas mixture are not listed on the EPA, NIOSH, GERMAN MAK, OSHA, NTP, or CAL/OSHA Carcinogenicity lists.

SECTION 4. FIRST AID MEASURES

EYE CONTACT: In the event of mechanical injury, cover eye with bandage and seek appropriate medical attention.

INGESTION: Ingestion is an unlikely route of exposure for this material.

INHALATION: Remove victim(s) to fresh air, as quickly as possible. Trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. In the event of severe, immediate effects or delayed symptoms which develop after exposure, victim must seek appropriate medical attention.

SKIN CONTACT: In case of frostbite, place the frostbitten part in warm water. DO NOT USE HOT WATER. If warm water is not available, or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area in the armpit. Encourage victim to gently exercise the affected part while being warmed. Seek immediate medical attention.

NOTES TO PHYSICIANS: Administer oxygen, if necessary and treat symptoms.

SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT: Not Applicable

AUTOIGNITION: Not Applicable

FLAMMABLE RANGE: Not Applicable

NFPA RATINGS:

HEALTH: = 1	FLAMMABILITY: = 0
INSTABILITY: = 0	SPECIAL: None.

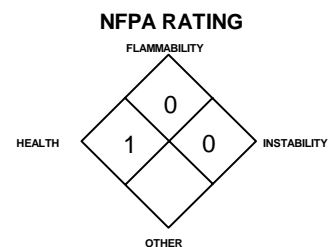
EXTINGUISHING MEDIA: This is a non-flammable gas mixture; use fire-extinguishing media appropriate for the surrounding materials.

SPECIAL FIRE-FIGHTING PROCEDURES: Non-flammable. Use extinguishing media appropriate for surrounding fire. In the event of fire, cool containers of this product with water spray to prevent failure.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This gas does not burn; however, containers, when involved in fire, may rupture or burst in the heat of the fire. Contact with water may cause the trace Trichloromethylsilane to react and form corrosive hydrochloric acid. Most cylinders have a pressure release device, which will vent contents if the cylinder is exposed to high temperatures.

EXPLOSION SENSITIVITY TO MECHANICAL IMPACT: Not sensitive.

EXPLOSION SENSITIVITY TO STATIC DISCHARGE: Not sensitive.



SECTION 5. FIRE FIGHTING MEASURES (Continued)

HAZARDOUS COMBUSTION PRODUCTS: If involved in a fire, the Trichloromethylsilane component will decompose to form carbon dioxide, carbon monoxide, oxides of sulfur, Hydrogen chloride gas.

SECTION 6. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: In the event of a release of this product, operator should close the material source if possible to do so safely. Evacuate area in the event of a significant release. Only trained personnel, wearing Self-Contained Breathing Apparatus (SCBA) should re-enter a contaminated area if oxygen levels are below 19.5% or unknown. If leak is in user's gas handling equipment or system, close cylinder valve, and safely vent high pressure before attempting repairs. If leak is from the cylinder, cylinder valve or the valve pressure relief device (PRD), contact your supplier. The level of oxygen should be above 19.5% before personnel can be allowed in the area without SCBA. Detection systems should be available to monitor for level of oxygen.

SECTION 7. HANDLING AND STORAGE

STORAGE: Cylinders should be stored upright (with valve protection caps or plugs in place) and firmly secured to prevent falling or being knocked over. Cylinders should be stored in dry, well-ventilated areas. Protect from salt or other corrosive materials. Storage should be away from heavily traveled areas, walkways, elevators, platform edges or other objects or situations that could damage the cylinder wall. Do not store in a manner that will block emergency exits, fire extinguishers or other safety equipment. Do not allow storage temperature to exceed 125°F (52°C). Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. Store empty cylinders away from full cylinders. Consideration should be taken to install leak detection and alarm equipment for storage areas. **NOTE:** Use only DOT or ASME code cylinders designed for compressed gas storage. Cylinders must not be recharged except by or with the consent of owner.

HANDLING: Releases of this gas mixture can create an oxygen-deficient atmosphere. Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to oxygen-deficiency. Wearing contact lenses is not recommended when handling this gas.

Cylinder valves should be inspected regularly for physical damage or corrosion (apparent by discoloration or rust). Care should be taken to inspect the following valve locations for corrosion: neck (where valve inserts into cylinder); bonnet nut (where handle attaches to valve body). Close valve after each use and when empty. The failure of a valve can result in violent release of the pressurized gas, creating a severe mechanical injury hazard.

Do not drag, roll, slide or drop cylinder. Use a suitable hand truck designed for cylinder movement. Never attempt to lift a cylinder by its cap. Secure cylinders at all times while in use. Use a pressure regulator to safely discharge product from cylinder. Use a check valve to prevent reverse flow into cylinder. Once cylinder has been connected to properly purged process, open cylinder valve slowly and carefully. If user experiences any difficulty operating cylinder valve, discontinue use and contact supplier. Never insert an object (e.g., wrench, screwdriver, etc.) into valve cap openings; doing so may damage valve, causing a leak to occur. Use an adjustable strap-wrench to remove over-tight or rusted caps.

Do not heat cylinders by any means to increase the discharge rate of product from the cylinder. Never apply flame or localized heat directly to any part of the cylinder. Cylinders should not be artificially cooled as certain types of steel undergo property changes when cryogenically cooled, thus making the cylinder unstable.

Do not drag, roll, slide or drop cylinder. Use a suitable hand truck designed for cylinder movement. Never attempt to lift a cylinder by its cap. Secure cylinders at all times while in use. Use a pressure regulator to safely discharge product from cylinder. Use a check valve to prevent reverse flow into cylinder. Once cylinder has been connected to properly purged process, open cylinder valve slowly and carefully. If user experiences any difficulty operating cylinder valve, discontinue use and contact supplier. Never insert an object (e.g., wrench, screwdriver, etc.) into valve cap openings; doing so may damage valve, causing a leak to occur. Use an adjustable strap-wrench to remove over-tight or rusted caps.

Do not heat cylinders by any means to increase the discharge rate of product from the cylinder. Never apply flame or localized heat directly to any part of the cylinder. Cylinders should not be artificially cooled as certain types of steel undergo property changes when cryogenically cooled, thus making the cylinder unstable.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Relieve pressure before attempting repairs.

SPECIAL PRECAUTIONS: Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of this material could occur without any significant warning symptoms. All work operations should be monitored in such a way that emergency personnel can be immediately contacted in the event of a release. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, Inc. (telephone 703-412-0900) pamphlet CGA P-1, *Safe Handling of Compressed Gases in Containers*. Local regulations may require specific equipment for storage and use.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Forced ventilation systems for the general work area should be provided. If appropriate, install automatic monitoring equipment to detect the level of oxygen.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION (Continued)

EXPOSURE LIMITS:

Chemical Name	CAS #	OSHA PELs ppm	ACGIH TLVs ppm	NIOSH RELs ppm	NIOSH IDLH ppm	DFG MAKs ppm	AIHA WEELs ppm
Trichloromethylsilane	75-79-6	NE	NE	NE	NE	NE	1 (ceiling)
Argon	7440-37-1	Simple Asphyxiant					
Helium	7440-59-7	Simple Asphyxiant					
Krypton	7439-90-9	Simple Asphyxiant					
Neon	7440-01-9	Simple Asphyxiant					
Nitrogen	7727-37-9	Simple Asphyxiant					
Xenon	7440-63-3	Simple Asphyxiant					

NE = Not Established

INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS: Currently there are no international exposure limits in place for the components of this gas mixture.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132, equivalent standard of Canada, or standards of EU member states. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen level is below 19.5%, or during emergency response to a release of this product. If respiratory protection is required, follow the requirements of the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent U.S. State standards, standards of Canadian CSA Standard Z94.4-93, the European Standard EN 529:2005. Maintain exposure levels of components below the levels listed above.

EYE PROTECTION: Use approved safety goggles or safety glasses, when cylinders are not closed and capped. Be aware that particles or objects propelled by high pressure gas can fly significant distances. Eyewear should be as described in U.S. OSHA 29 CFR 1910.133, the European Standard CR 13464:1999 and the Canadian CSA Standard Z94.3-M1982, *Industrial Eye and Face Protectors*.

SKIN PROTECTION: Work (such as leather) gloves are recommended when handling cylinders of this material. Wear gloves appropriate to the specific operation for which this gas mixture is used. Use triple gloves for spill response. If necessary, refer to U.S. OSHA 29 CFR 1910.138, and the European Standard CEN/TR 15419:2006, or appropriate Standards of Canada.

OTHER PROTECTIVE EQUIPMENT: Use body protection appropriate for task. Safety shoes are recommended when handling cylinders. Transfer of large quantities under pressure may require use of chemically impervious clothing. Information on general protective measures can be found in U.S. OSHA 29 CFR 1910.136, or the European Standard CEN/TR 15419:2006. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136 and the Canadian CSA Standard Z195-M1984, *Protective Footwear*.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

The following information is for the Trichloromethylsilane component of this gas mixture.

FREEZING/MELTING POINT: -90°C (-130°F)

BOILING POINT @ 1 atm: 66.4°C (151.5°F)

SPECIFIC GRAVITY: 5.16

MOLECULAR WEIGHT: 149.5

SOLUBILITY IN WATER: Reacts.

EXPANSION RATIO: Not applicable.

EVAPORATION RATE (nBuAc = 1): Not applicable.

SPECIFIC VOLUME (ft³/lb): 8.76

ODOR THRESHOLD: Not determined.

VAPOR PRESSURE @ 20°C: 50 mmHg

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable. **pH:** Not available.

The following information is for inert components that may be part of this mixture:

	Argon	Helium	Krypton	Neon	Xenon
Molecular Weight	39.95	4.00	83.80	20.183	131.3
Gas Density @ 21.1°C (70°F)	0.103 lb/ft ³ (1.650 kg/m ³)	0.0103 lb/ft ³ (0.165 kg/m ³)	0.2172 lb/ft ³ (3.479 kg/m ³)	0.05215 lb/ft ³ (1.83536 kg/m ³)	0.3416 lbs ft ³ (5.472 kg/m ³)
Boiling Point @ 1 atm	-185.9°C (-302.6°F)	-268.9°C (-452.1°F)	-153.4°C (-244.0°F)	-246.0°C (-410.9°F)	-108.2°C (-162.6°F)
Freezing/Melting Point @ 1 atm	-189.2°C (-308.6°F)	None	-157°C (-251°F)	-248.7°C (-415.6°F)	-168°F (-111°C)
Specific Gravity (air = 1) @ 21.1°C (70°F)	1.38	1.38	2.899	0.696	4.560
Solubility in Water vol/vol at 0°C (32°F) and 1 atm	0.056	0.0094	0.0594	0.0105	0.108
Specific Volume @ 21.1°C (70°F)	9.71 ft ³ /lb (0.606 m ³ /kg)	97.09 ft ³ /lb (6.061 m ³ /kg)	4.604 ft ³ /lb (0.287 m ³ /kg)	19.18 ft ³ /lb (1.197 m ³ /kg)	2.927 ft ³ /lb (0.183 m ³ /kg)
Critical Pressure	711.5 psia (4905 kPa abs)	33.0 psia (227 kPa abs)	798.0 psia (5502 kPa abs)	384.9 psia (2654 kPa abs)	847.0 psia (5840 kPa abs)
Odor Threshold	odorless	odorless	odorless	odorless	odorless

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES (Continued)

The following information is for this gas mixture.

APPEARANCE, ODOR AND STATE: This gas mixture is a colorless, odorless gas.

WARNING PROPERTIES FOR THIS MATERIAL: There are no distinct warning properties. Monitoring for levels of Trichloromethylsilane and oxygen deficiency are recommended.

SECTION 10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: This gas mixture is stable at normal temperature and pressure.

CONDITIONS TO AVOID: Cylinders should not be exposed to temperatures in excess of 125°F (52°C); avoid exposure to incompatible materials.

MATERIALS WITH WHICH MATERIAL IS INCOMPATIBLE: The Trichloromethylsilane component is incompatible with water, strong oxidizers and alcohols.

REACTIVITY:

A) HAZARDOUS DECOMPOSITION PRODUCTS: Hydrolysis: The Trichloromethylsilane component reacts with water to form hydrochloric acid. Thermal Decomposition: Carbon dioxide, carbon monoxide, hydrogen chlorides and silicon oxides.

B) HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Due to the low concentration of the Trichloromethylsilane component of this mix (<0.2%), the associated health hazard due to trichloromethylsilane is limited to irritation and toxicity data is not included. The remaining components are inert and have no toxicity data.

IRRITANCY OF PRODUCT: This gas mixture may be moderately to severely irritating to contaminated tissue, depending on the duration and concentration of exposure.

SENSITIZATION OF PRODUCT: The components of this gas mixture are not known to be a human skin or respiratory sensitizers.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of the components of this gas mixture on the human reproductive system.

Mutagenicity: No human mutagenic effects have been described for the components of this gas mixture.

Embryotoxicity: No human embryotoxic effects have been described for the components of this gas mixture.

Teratogenicity: No human teratogenic effects have been described for the components of this gas mixture.

Reproductive Toxicity: No human reproductive effects have been described for the components of this gas mixture.

A mutagen is a chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical that causes damage to a developing embryo (i.e., within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical that causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance that interferes in any way with the reproductive process.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, there are no Biological Exposure Indices (BEIs) determined for the components of this gas mixture.

SECTION 12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas mixture will be dissipated rapidly in well-ventilated areas.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This gas mixture may cause harm to contaminated plants and animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: This gas mixture may have adverse effects on aquatic life due to formation of hydrochloric acid upon contact with the trace Trichloromethylsilane component and water.

MOBILITY: The components of this gas mixture should volatilize rapidly and so should not present a significant hazard of mobility.

PERSISTENCE AND BIODEGRADABILITY: Persistence: Argon, Helium, Krypton, Neon and Xenon are natural elements and present no hazard of persistence. Trichloromethylsilane will react to form hydrochloric acid that will dissipate by natural alkalinity. Biodegradation: Trichloromethylsilane is expected to undergo hydrolysis with the water vapor in the air, soil and water.

POTENTIAL TO BIOACCUMULATE: The components of this gas mixture do not have bioaccumulation or food chain contamination potential.

OZONE-DEPLETION POTENTIAL: The components of this gas mixture are not Class I or Class II ozone depleting chemicals (40 CFR Part 82).

SECTION 13. DISPOSAL CONSIDERATIONS

UNUSED PRODUCT / EMPTY CONTAINER: Do not dispose of unused product. Return used product in cylinders to: Spectra Gases, Inc., 80 Industrial Drive, Alpha, NJ 08865 or Spectra Gases, Inc., 1261 Activity Drive, Vista, CA 92083.

SECTION 13. DISPOSAL CONSIDERATIONS (Continued)

DISPOSAL INFORMATION: Residual product may be safely released in a well-ventilated area. This shall be done in accordance with U.S. Federal, State and local regulations, regulations of the provinces of Canada or EU member states.

SECTION 14. TRANSPORT INFORMATION**U.S. SHIPPING INFORMATION:**

U.S. DOT PROPER SHIPPING NAME: Compressed gases, n.o.s. (trichloromethylsilane, argon) **or**, (trichloromethylsilane, helium) **or**, (trichloromethylsilane, neon) **or**, (trichloromethylsilane, nitrogen) **or**, (trichloromethylsilane, xenon)

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1956

U.S. DOT SHIPPING LABEL(S) REQUIRED: Class 2.2 (Non-Flammable Gas)

PLACARD (When required): Class 2.2 (Non-Flammable Gas)

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position in a well-ventilated truck (never transport in passenger compartment of a vehicle). Ensure cylinder valve is properly closed, valve outlet cap has been reinstalled, and valve protection cap is secured before shipping cylinder.

CAUTION: Compressed gas cylinders shall not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with the owner's written consent is a violation of Federal law (49 CFR 173.301).

NAERG (NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK) #: 126

CANADIAN SHIPPING INFORMATION:

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This gas mixture is classified as Dangerous Goods, per regulations of Transport Canada. The use of the above U.S. DOT information from the U.S. 49 CFR regulations is allowed for shipments that originate in the U.S. For shipments via ground vehicle or rail that originate in Canada, the following information is applicable.

PROPER SHIPPING NAME: Compressed gases, n.o.s. (trichloromethylsilane, argon) **or**, (trichloromethylsilane, helium) **or**, (trichloromethylsilane, neon) **or**, (trichloromethylsilane, nitrogen) **or**, (trichloromethylsilane, xenon)

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1956

PACKING GROUP: Not Applicable

HAZARD SHIPPING LABEL(S) REQUIRED: Class 2.2 (Non-Flammable Gas)

SPECIAL PROVISIONS: None

EXPLOSIVE LIMIT & LIMITED QUANTITY INDEX: 0.125

ERAP INDEX: None

PASSENGER CARRYING SHIP INDEX: None

PASSENGER CARRYING ROAD OR RAIL VEHICLE INDEX: 75

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA):

IATA DESIGNATION: This gas is classified as dangerous goods, per the International Air Transport Association.

UN IDENTIFICATION NUMBER: UN 1956

PROPER SHIPPING NAME/DESCRIPTION: Compressed gases, n.o.s. (trichloromethylsilane, argon) **or**, (trichloromethylsilane, helium) **or**, (trichloromethylsilane, neon) **or**, (trichloromethylsilane, nitrogen) **or**, (trichloromethylsilane, xenon)

HAZARD CLASS or DIVISION: 2.2 (Non-Flammable Gas)

HAZARD LABEL(S) REQUIRED: Class 2.2 (Non-Flammable Gas)

PACKING GROUP: None

PASSENGER and CARGO AIRCRAFT PACKING INSTRUCTION: 200

PASSENGER and CARGO AIRCRAFT MAXIMUM NET QUANTITY PER PKG: 75 kg

PASSENGER and CARGO AIRCRAFT LIMITED QUANTITY PACKING INSTRUCTION: None

PASSENGER and CARGO AIRCRAFT LIMITED QUANTITY MAXIMUM NET QUANTITY PER PKG: None

CARGO AIRCRAFT ONLY PACKING INSTRUCTION: 200

CARGO AIRCRAFT ONLY MAXIMUM NET QUANTITY PER PKG: 150 kg

SPECIAL PROVISIONS: None

ERG CODE: 2L

SECTION 14. TRANSPORT INFORMATION (Continued)
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INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO):

IMO DESIGNATION: This gas is classified as dangerous goods, per the International Maritime Organization.

UN No.: 1956

PROPER SHIPPING NAME: Compressed gases, n.o.s. (trichloromethylsilane, argon) **or**,
(trichloromethylsilane, helium) **or**, (trichloromethylsilane, neon) **or**, (trichloromethylsilane, nitrogen) **or**,
(trichloromethylsilane, xenon)

HAZARD CLASS NUMBER: 2.2

PACKING GROUP: None

SPECIAL PROVISIONS: None

LIMITED QUANTITIES: 120 mL

PACKING INSTRUCTIONS: P200

EmS: F-C, S-V

STOWAGE CATEGORY: Category A

MARINE POLLUTANT: The components of this gas mixture are not designated by the IMO to be a Marine Pollutant.

EUROPEAN SHIPPING INFORMATION:**EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS**

BY ROAD (ADR): This gas is classified by the Economic Commission for Europe to be dangerous goods. Additional information is as follows:

UN NO.: 1956

NAME and DESCRIPTION: Compressed gases, n.o.s. (trichloromethylsilane, argon) **or**,
(trichloromethylsilane, helium) **or**, (trichloromethylsilane, neon) **or**, (trichloromethylsilane, nitrogen) **or**,
(trichloromethylsilane, xenon)

CLASS: 2

CLASSIFICATION CODE: 2A

PACKING GROUP: Not Applicable

LABELS: 2.2

SPECIAL PROVISIONS: None

LIMITED QUANTITIES: LQ1

PACKING INSTRUCTIONS: P200

MIXED PACKING PROVISIONS: MP9

HAZARD IDENTIFICATION No.: 20

SECTION 15. REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS:**EPA - ENVIRONMENTAL PROTECTION AGENCY:**

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1990
(40 CFR Parts 117 and 302)

Reportable Quantity (RQ): Not Applicable

SARA TITLE III: Superfund Amendment and Reauthorization Act

SECTIONS 302/304: Emergency Planning and Notification (40 CFR Part 355)

Extremely Hazardous Substances: Trichloromethylsilane

Threshold Planning Quantity (TPQ): Trichloromethylsilane = 500 lb (227 kg)

Reportable Quantity (RQ): Trichloromethylsilane = 500 lb (227 kg)

SECTIONS 311/312: Hazardous Chemical Reporting (40 CFR Part 370)

IMMEDIATE HEALTH: Yes PRESSURE: Yes

DELAYED HEALTH: No REACTIVITY: No

FIRE: No

SECTION 313: Toxic Chemical Release Reporting (40 CFR 372)

Releases of this gas mixture do not require reporting under Section 313.

CLEAN AIR ACT:

SECTION 112 (r): Risk Management Programs for Chemical Accidental Release

(40 CFR Part 68)

Threshold Planning Quantity (TPQ): Trichloromethylsilane = 5000 lb (2270 kg)

TSCA: Toxic Substances Control Act: On TSCA Inventory

OSHA - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:

29 CFR Part 1910.119: Process Safety Management of Highly Hazardous Chemicals.

Threshold Planning Quantity (TPQ): Trichloromethylsilane = 500 lb (227 kg)

U.S. STATE REGULATORY INFORMATION:

CALIFORNIA PROPOSITION 65: The components of this gas mixture are not listed substances which the State of California requires warning under this statute.

CANADIAN FEDERAL REGULATIONS:

CANADIAN DSL INVENTORY STATUS: Components of this gas mixture are listed on the Canadian DSL Inventory.

SECTION 15. REGULATORY INFORMATION (Continued)**CANADIAN FEDERAL REGULATIONS (continued):**

OTHER CANADIAN REGULATIONS: This gas mixture is categorized as a Controlled Product, Hazard Classes A and D2B, as per the Controlled Product Regulations. Components of this gas mixture are not on the CEPA Priorities Substances Lists.

EUROPEAN UNION REGULATIONS:

EU LABELING AND CLASSIFICATION: This gas mixture is classified as hazardous, as per EU Commission Directives 93/72/EEC, 94/69 EC, or and 96/54/EC. The following is a self-classification.

EU CLASSIFICATION: Xi [Irritant]

EU RISK PHRASES: R: 36 [Irritating to eyes.]

EU SAFETY PHRASES: [S:(1/2)*]: Keep locked up and out of the reach of children.* **This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only.* [S: 26]: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. [S: 36/37/39]: Wear suitable protective clothing, gloves and eye/face protection. [S: 45]: In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).

EUROPEAN UNION ANNEX II HAZARD SYMBOL: Xi [Irritant]

SECTION 16. OTHER INFORMATION

Information contained in this Material Safety Data Sheet is provided to our customers so they may comply with 29 CFR 1910.1200, Hazard Communication Standard, the Canadian WHMIS Standard, and the requirements of the European Union Directives. The intent of this Material Safety Data Sheet is to provide end users of this product with the health and physical hazards associated with possible exposure to this product. All statements, technical data and recommendations are based on readily available texts and data that Spectra Gases, Inc., believes to be reliable and accurate. Spectra Gases, Inc., makes no warranties, guarantees or representations of any kind with respect to this product or this data. It is the responsibility of the user to obtain and use the most recent version of this MSDS.

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