1,7-Dichloro-octamethyltetrasiloxane

sc-229834

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

1,7-Dichloro-octamethyltetrasiloxane

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA

SUPPLIER

Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800

EMERGENCY

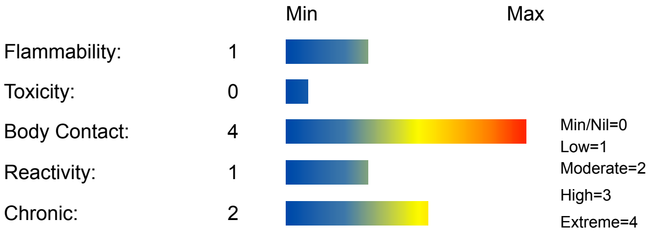
ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS

C8-H24-Cl2-O3-Si4, Cl[Si(CH3)2O]3Si(CH3)2Cl, "siloxane, 1, 7-dichlorooctamethyltetra-", "tetrasiloxane, 1, 7-dichloro-1, 1, 3, 3, 5, 5, 7, 7-octamethyl-", DM4320

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS



Flammability:	1
Toxicity:	0
Body Contact:	4
Reactivity:	1
Chronic:	2

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Causes severe burns.
Risk of serious damage to eyes.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ The material can produce severe chemical burns within the oral cavity and gastrointestinal tract following ingestion.

■ Ingestion of acidic corrosives may produce burns around and in the mouth. the throat and esophagus.

■ Ingestion of liquid chlorosilanes may cause severe internal injury or death. The chlorosilanes all react with moisture in the air or water to produce hydrogen chloride, the principal reaction product that can cause acute injury to any body tissue contacted.

Ingestion of liquid chlorosilane could cause severe corrosive burns of the mouth, esophagus and stomach, potentially resulting in perforated viscus with subsequent chemical pleuritis, mediastinitis and peritonitis.

■ The material has NOT been classified as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.

EYE

■ The material can produce severe chemical burns to the eye following direct contact. Vapors or mists may be extremely irritating.

■ If applied to the eyes, this material causes severe eye damage.

■ Direct eye contact with acid corrosives may produce pain, tears, sensitivity to light and burns. Mild burns of the epithelia generally recover rapidly and completely.

■ Direct contact of chlorosilane liquid with the eyes causes severe corrosive damage that may result in total loss of sight. Vapour exposure to the eyes may result in significant irritation up to severe chemical burns that may result in total loss of sight.

■ Irritation of the eyes may produce a heavy secretion of tears (lachrymation).

SKIN

■ The material can produce severe chemical burns following direct contactwith the skin.

■ Skin contact with acidic corrosives may result in pain and burns; these may be deep with distinct edges and may heal slowly with the formation of scar tissue.

■ Skin contact is not thought to have harmful health effects, however the material may still produce health damage following entry through wounds, lesions or abrasions.

■ Skin contact with either chlorosilane vapour or liquid can cause burns varying in severity from first to third degree, depending on concentration and length of exposure.

■ Open cuts, abraded or irritated skin should not be exposed to this material.

■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

■ Solution of material in moisture on the skin, or perspiration, may markedly increase skin corrosion and accelerate tissue destruction.

INHALED

■ The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

■ Corrosive acids can cause irritation of the respiratory tract, with coughing, choking and mucous membrane damage. There may be dizziness, headache, nausea and weakness.

■ Inhalation of chlorosilane vapours or hydrochloric acid vapours or mist may cause damage of the respiratory tract. Chlorosilane injury from inhalation primarily affects the upper respiratory tract, causing inflammation, oedema and corrosive burns of the oral, nasal and pharyngeal mucosa and the upper airways.

■ Inhalation hazard is increased at higher temperatures.

■ The material has NOT been classified as "harmful by inhalation". This is because of the lack of corroborating animal or human evidence.

■ Inhalation of quantities of liquid mist may be extremely hazardous, even lethal due to spasm, extreme irritation of larynx and bronchi, chemical pneumonitis and pulmonary edema.

■ Hydrogen chloride (HCl) vapour or fumes present a hazard from a single acute exposure. Exposures of 1300 to 2000 ppm have been lethal to humans in a few minutes.

Inhalation of HCl may cause choking, coughing, burning sensation and may cause ulceration of the nose, throat and larynx. Fluid on the lungs followed by generalised lung damage may follow.

Breathing of HCl vapour may aggravate asthma and inflammatory or fibrotic pulmonary disease.

High concentrations cause necrosis of the tracheal and bronchial epithelium, pulmonary oedema, atelectasis and emphysema and damage to the pulmonary blood vessels and liver.

CHRONIC HEALTH EFFECTS

■ Repeated or prolonged exposure to acids may result in the erosion of teeth, swelling and or ulceration of mouth lining. Irritation of airways to lung, with cough, and inflammation of lung tissue often occurs.

Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

Chronic minor exposure to hydrogen chloride (HCl) vapour or fume may cause discolouration or erosion of the teeth, bleeding of the nose and gums; and ulceration of the nasal mucous membranes.

Repeated exposures of animals to concentrations of about 34 ppm HCl produced no immediate toxic effects.

Workers exposed to hydrochloric acid suffered from gastritis and a number of cases of chronic bronchitis have also been reported.

Repeated or prolonged exposure to dilute solutions of HCl may cause dermatitis.

Repeated contact with dilute solutions of chlorosilanes or hydrochloric acid mists will cause irritant dermatitis. Repeated inhalation of the mist will cause an inflammation of the upper and lower respiratory tract.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
1,3-dichlorooctamethyltetrasiloxane	2474-02-4	>98
hydrolyses to produce		
hydrogen chloride	7647-01-0	

Section 4 - FIRST AID MEASURES

SWALLOWED

· For advice, contact a Poisons Information Center or a doctor at once. · Urgent hospital treatment is likely to be needed.

EYE

■ If this product comes in contact with the eyes: · Immediately hold eyelids apart and flush the eye continuously with running water. · Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

SKIN

■ If skin or hair contact occurs: · Immediately flush body and clothes with large amounts of water, using safety shower if available. · Quickly remove all contaminated clothing, including footwear.

INHALED

· If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested. Inhalation of vapors or aerosols (mists, fumes) may cause lung edema. Corrosive substances may cause lung damage (e.g.

NOTES TO PHYSICIAN

■ Treat symptomatically.
For acute or short term repeated exposures to strong acids:
· Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.
· Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not available
Upper Explosive Limit (%):	Not available
Specific Gravity (water=1):	1.011
Lower Explosive Limit (%):	Not available

EXTINGUISHING MEDIA

· DO NOT use water.
For chlorosilanes:
· Foam is the most effective agent overall for use on chlorosilane fires. However, a number of variables, most notably the chlorosilane involved, the foam concentrate, the concentration of the foam, the expansion ratio (final foam volume versus initial solution volume), the application equipment and the fire conditions, can have a significant impact on the effectiveness of foam on chlorosilane fires. Certain combinations of these variables can in fact produce less than satisfactory (and even adverse) results.
· In general, though, alcohol-(polar) compatible AFFF (Aqueous Film Forming Foam) has proven to be an extremely effective foam type, and medium-expansion foam has been found to be the most effective foam expansion. Other foam types and expansions, however, can produce satisfactory results, especially on fires involving dimethyldichlorosilane, trimethylchlorosilane and other heavily organic substituted chlorosilanes. For chlorosilanes containing Si-H (silicon-hydrogen) bonds, e.g., trichlorosilane and methyldichlorosilane, alcohol-compatible AFFF and medium-expansion foam are highly recommended for maximum effectiveness.
· Since foam solutions contain water, reaction with the chlorosilane will normally be observed when foam is applied. Be aware that application of foam will release significant amounts of corrosive vapours. In addition, hydrogen vapours can he released from hydrogen-containing chlorosilanes and may be trapped under the foam blanket. Extreme care should be taken not to disturb the foam blanket during and after foam application.
· Other extinguishing agents that may be effective on small fires include dry sand and carbon dioxide.
· (Caution: When using carbon dioxide in enclosed spaces without adequate ventilation, an asphyxiation hazard can be created.
· Due to its reactivity with chlorosilanes, water should NOT be used as an extinguishing agent for chlorosilane fires, except for very small fires. Water can also be used to protect exposures and personnel and on the vapour cloud to disperse and dilute the HCl vapour. (Care should be taken, however, to prevent any over-spray or runoff from contacting the chlorosilane.)
· Sodium- and potassium-bicarbonate-based dry chemical fire extinguishers have proven effective to extinguish small chlorosilane fires, except those involving hydrogen-containing chlorosilanes such as trichlorosilane and methyldichlorosilane, where success has been marginal at best. Expect to use much larger quantities of dry chemical than would be required to extinguish a similar hydrocarbon fire. Dry chemical is generally not effective on large fires because an adequate amount of agent cannot be delivered quickly enough. Use of dry chemical on hydrogen-containing chlorosilanes will release hydrogen, which may ignite explosively.
· Prevent extinguishing agents from entering a container or vessel that contains chlorosilane. The resulting release of hydrogen chloride vapours may over-pressurise the container or vessel, resulting in a sudden rupture of the container or vessel.

FIRE FIGHTING

■ Foam has proven to be the most effective extinguishing agent on chlorosilane fires. When using foam, the following guidelines should be followed.
· Apply foam as gently as possible. DO NOT 'PLUNGE' OR AIM FOAM STREAMS DIRECTLY INTO A CHLOROSILANE. This will result in severe reactions between the chlorosilane and the water contained in the foam solution.
· Wherever possible, aim foam streams in front of the chlorosilane or bounce off fixed objects (such as tanks or dike walls) to allow the foam to flow gently onto the liquid surface. Occasionally, however, it may he necessary to "lob" foam in order to deliver foam to the centre of a fire.

· Except in the case of very small fires, and where possible, use at least two nozzles to enhance distribution of the foam over the surface of the chlorosilane.

· Establish a relatively thick blanket of foam (e.g., 12 to 18 inches/30 - 50 cm minimum) over the entire liquid surface. Once this has been done, temporarily suspend foam application to allow extinguishing to take place. Reapply foam when the intensity of the fire and/or the evolution of smoke/vapours appear to stabilise or even increase. Repeat this process as often as necessary until extinguishing is effected or until other emergency measures can be initiated.

· It is theorised that the fire is extinguished through the gradual hydrolysis of the chlorosilane by the water draining from the foam. This hydrolysis reaction forms a layer of siloxanes (fluid or gel) on the surface of the chlorosilane, which inhibits vapour production and excludes oxygen, thereby extinguishing the fire.

· Exercise extreme caution when applying foam and when approaching the fire area. The hydrolysis layer formed in the extinguishing process can trap flammable vapours, and, if this layer is disturbed (e.g. by impinging foam-streams), subsurface ignitions and rapid flashovers may occur.

When any large container (including road and rail tankers) is involved in a fire,
consider evacuation by 800 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

· Combustible.

· Slight fire hazard when exposed to heat or flame.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO2), hydrogen chloride, phosgene, silicon dioxide (SiO2), other pyrolysis products typical of burning organic material.

The chlorosilanes (with the exception of trichlorosilane) burn in a manner similar to burning hydrocarbons, producing large amounts of grey or black smoke. However, the quantity of heat produced by burning chlorosilanes is typically lower than that of most flammable hydrocarbons. Generally speaking, the hydrocarbon-like character of chlorosilanes increases with the number of methyl groups present.

FIRE INCOMPATIBILITY

■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids,chlorine bleaches, pool chlorine etc. as ignition may result.

· Keep dry.

· NOTE: May develop pressure in containers; open carefully. Vent periodically.

PERSONAL PROTECTION

Glasses:
Safety Glasses.
Full face- shield.
Gloves:
Respirator:
Type AB-P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

· Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.

· Check regularly for spills and leaks.

An accidental spill or release of chlorosilane results in a hydrogen chloride vapour fog, which should be minimised or controlled as quickly as possible.

· Full protective equipment is needed for individuals who must work in a chlorosilane vapour cloud.

· In the case of spills up to 5 litres, absorb the spill with dry inert absorbent material like dry sand, diatomaceous earth. The resulting material should then be properly packaged and its disposal should be supervised.

· Note: this material will react with water and must carry an appropriate warning label.

· Clear the affected area thoroughly with water.

MAJOR SPILLS

· Provide diking or other appropriate containment.

· Cover spill with medium expansion foam (alcohol resistant).

· Pump uncontaminated pure material into appropriate portable tanks, pressure cylinders or drums.

· Neutralise residual material with alkali base. Caution! Hydrogen gas may be evolved during hydrolysis and neutralisation with some chlorosilanes (UN1183, UN1242, UN1295, UN2988). By-products of hydrolysis could be insoluble liquids or solids.

· Hydrogen chloride vapours resulting from a large spill can be reduced by means of a water spray into the acid plume, being careful not to spray water directly into the spilled liquid chlorosilane pool. The resulting acidic waste water requires neutralisation prior to discharge to sewer systems.

· In the event of accidental spillage of chlorosilanes to surface waters or to a municipal sewer system, promptly notify the appropriate pollution control agencies.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

· DO NOT allow clothing wet with material to stay in contact with skin.

For chlorosilanes:

· Static electricity discharges can ignite flammable chlorosilane vapour. It is important to "inert" the whole system, in which chlorosilanes are transferred, with dry nitrogen.

· Static electricity may be generated when any of these compounds flow through or are discharged from a pipe or fall freely through space. Splash filling is particularly hazardous and should be avoided.

· To drain off static charges and avoid spark discharges, a continuous path from the point of generation to ground must be provided. This is best accomplished by electrically interconnecting (bonding) all vessels and piping and grounding all vessels and piping.

· Equipment, such as lines, pumps, valves, vessels, etc., must be thoroughly dried with no trace of water remaining before introducing any

chlorosilane.
· Prior to operation, the system should be tested for leaks at or above operating pressure with dry nitrogen and each joint painted with soap solution and checked for bubbles.
· Totally enclosed systems should be used. Atmospheric openings or vents will allow moisture to enter the system causing the generation of hydrogen chloride, which will attack the equipment.
· Use only dry nitrogen, when any of the following is performed: pressurising vessels, priming pumps, blanketing tanks, and filling or withdrawing of tank contents. Operational vents from nitrogen blanketing systems should be directed to a vent recovery system, or a vent scrubber or both.
· Before withdrawing chlorosilanes from drums, the drum must be electrically grounded and bonded to the receiving container. Chlorosilanes can be withdrawn through a steel valve installed in the drum bung. Dry nitrogen (air or oxygen must not be used due to the flammability of chlorosilanes) should be introduced into the drum through the other bung to replace the volume of liquid. The nitrogen supply system should include a check valve, shut-off valve, pressure regulator and pressure relief valve. The system can be modified to withdraw chlorosilanes by gravity or to feed a pump. Application of pressure to a drum is not recommended.
Piping and Valves:
· Carbon steel piping is recommended.
· Welded and flanged piping connections are preferred in order to maintain a leak-tight system.
· Only flange gaskets which are stable to chlorosilanes (non-asbestos compressed materials, Teflon, graphite) must be used to provide a leak-tight joint. Spiral-wound metallic gaskets or metal/graphite gaskets are preferred when maximum fire resistance is desired.
· Valves of all sizes can be ductile iron, forged steel, or cast steel valves with stainless steel or steel trim.
· The interconnection of road / rail tank cars or portable tanks to permanent piping can be made with swing arm rotary joints (best solution) or seamless, braided flexible metal hose. Use flanged or union connections. Do not use quick disconnect couplings.
· Avoid all personal contact, including inhalation.
· Wear protective clothing when risk of exposure occurs.

RECOMMENDED STORAGE METHODS

■ Check regularly for spills and leaks.
For chlorosilanes:
· Non-ferrous metals and alloys such as aluminium, bronze, copper, zinc or magnesium should never be used. They are readily corroded and many, in case of fire, have low melting points.
· Cast iron, due to its brittleness, must not be used to contain chlorosilanes; cast steel and forged steel can be used.
· Plastics should not be used in chlorosilane service due to incompatibility and reactivity of this material.
· In the absence of water, carbon steel is satisfactory for piping and other equipment used to contain chlorosilanes.
Glass container.
For low viscosity materials
· Drums and jerricans must be of the non-removable head type.
· Where a can is to be used as an inner package, the can must have a screwed enclosure.

STORAGE REQUIREMENTS

· Despite the chlorosilanes reactivity with water, water sprinkler systems are the most effective means of protecting buildings, equipment and building contents from chlorosilane fires. Foam-water sprinkler systems can also be used to provide additional extinguishing capabilities (such systems, however, are likely to have only limited effectiveness on trichlorosilane and methyldichlorosilane fires).
· In tank farms and other areas where spilled chlorosilanes would be relatively confined, a permanently installed medium-expansion foam system can be provided to extinguish any chlorosilane fires.
· An adequate number of hydrants and, where appropriate, monitor nozzles should be provided wherever chlorosilanes are stored, handled or processed.
· Of critical importance is the provision of adequate spill control facilities to safely drain away burning chlorosilanes and prevent other important areas and property from being exposed to the fire. This may include such features as diking, curbs, sloped surfaces, drainage trenches and remote impounding areas. Spill control facilities should be designed to accommodate the largest anticipated release of chlorosilanes as well as the quantity of water expected from fire fighting operations (including sprinkler systems, hoses, monitor nozzles, etc.).
· In closed buildings CO2 may be an adequate extinguishing medium.
Vessels:
· Generally storage tanks should be completely vacuum resistant or should be equipped with automatic pressure controlled nitrogen supply and shut down systems which avoid dangerous under-pressure.
· Design pressure is dependent on the properties of the chlorosilanes stored.
· Generally vessels should have emergency vents. Rain hats" should be used over the ends of the vent pipe outlets
· Vessels equipped with pressure-relief valves, to relieve excess internal pressure due to fire or other causes, should employ a non-fragmenting-type rupture disk ahead of or after the relief valve, precautions must be taken to prevent the valve from being blocked with hydrolysis products due to chlorosilane contact with moisture in air. ".
· Store in original containers.
· Keep containers securely sealed.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
Canada - Alberta Occupational Exposure	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)					2	3		

Limits									
Canada - British Columbia Occupational Exposure Limits	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride Revised 2003)					2			
US - Minnesota Permissible Exposure Limits (PELs)	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)					5	7		
US ACGIH Threshold Limit Values (TLV)	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)					2			TLV Basis: upper respiratory tract irritation
US NIOSH Recommended Exposure Limits (RELs)	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)					5	7		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)					5	7		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)	(C)5	(C)7						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)					5	7		
US - California Permissible Exposure Limits for Chemical Contaminants	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride; muriatic acid)	5	7			C			
US - Idaho - Limits for Air Contaminants	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)					5	7		
US - Hawaii Air Contaminant Limits	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)					5	7		
US - Alaska Limits for Air Contaminants	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)					5	7		
US - Michigan Exposure Limits for Air Contaminants	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)					5	7		
Canada - Yukon Permissible Concentrations for Airborne	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)	5	7	-	-				

Contaminant Substances				
US - Washington Permissible exposure limits of air contaminants	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)	5.0		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)	2		
US - Oregon Permissible Exposure Limits (Z-1)	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)	5	7	
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)	5	7	
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)	5	7,5	
US OSHA Permissible Exposure Levels (PELs) - Table Z1	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)	5	7	
Canada - Northwest Territories Occupational Exposure Limits (English)	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)	5	7.5	
Canada - Nova Scotia Occupational Exposure Limits	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)	2		TLV Basis: upper respiratory tract irritation
Canada - Prince Edward Island Occupational Exposure Limits	1,3-dichlorooctamethyltetrasiloxane (Hydrogen chloride)	2		TLV Basis: upper respiratory tract irritation

ENDOELTABLE

PERSONAL PROTECTION

RESPIRATOR
Type AB-P Filter of sufficient capacity
Consult your EHS staff for recommendations

EYE
· Chemical goggles.
· Full face shield.

HANDS/FEET
■ Elbow length PVC gloves.
· When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
· frequency and duration of contact,
· chemical resistance of glove material,
· glove thickness and
· dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
· When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
· When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
· Contaminated gloves should be replaced.
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
· Neoprene gloves.

OTHER
■ For chlorosilanes:
· Viton and similar synthetic rubbers afford the best protection
· PVC and nitrile rubber may be used as a protective material (gloves, clothing and boots) for short term contacts in normal handling procedures to prevent skin burns.
· Latex rubber should not be used.
· The importance of water washing in the safety shower/eyewash for a minimum of 15 minutes after contact with chlorosilanes should be emphasised.
· Contaminated clothing and shoes must be removed before the person is washed under the safety shower. The assistance by another person to help remove clothing and, perhaps, to help hold eyes open in the eyewash may be necessary.

ENGINEERING CONTROLS
■ Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.
Corrosive.
Acid.

State	Liquid	Molecular Weight	351.53
Melting Range (°F)	-79.6	Viscosity	Not Available
Boiling Range (°F)	431.6	Solubility in water (g/L)	Reacts
Flash Point (°F)	190.004	pH (1% solution)	Not available
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Not available
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	1.011
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	>1
Volatile Component (%vol)	Not available	Evaporation Rate	Not available

APPEARANCE
Clear, colourless liquid with sharp acid odour; hydrolyses in water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY
· Presence of incompatible materials.
· Contact with alkaline material liberates heat.

STORAGE INCOMPATIBILITY
■ Chlorosilanes:
· react with water to produce heat and toxic, corrosive fumes of hydrogen chloride and possibly H2.
· react vigorously with both organic and inorganic acids and with bases to generate toxic or flammable gases.
· react with primary alcohols (almost as rapidly as water) forming hydrogen chloride; secondary and tertiary alcohols react less rapidly

- react rapidly with ammonia and aliphatic amines generating heat and ammonium and amine salts
- (hydrogen-containing) react violent with chlorine.

Reacts with mild steel, galvanized steel / zinc producing hydrogen gas which may form an explosive mixture with air.
Segregate from alkalis, oxidizing agents and chemicals readily decomposed by acids, i.e. cyanides, sulfides, carbonates.

- NOTE: May develop pressure in containers; open carefully. Vent periodically.

Hydrogen chloride:

- reacts strongly with strong oxidisers (releasing chlorine gas), acetic anhydride, caesium cyanotridecahydrodecaborate(2-), ethylidene difluoride, hexalithium disilicide, metal acetylide, sodium, silicon dioxide, tetraselenium tetranitride, and many organic materials
- is incompatible with aliphatic amines, alkanolamines, alkylene oxides, aluminium, aluminium-titanium alloys, aromatic amines, amides, 2-aminoethanol, ammonia, ammonium hydroxide, calcium phosphide, chlorosulfonic acid, ethylenediamine, ethyleneimine, epichlorohydrin, isocyanates, metal acetylides, metal carbides, oleum, organic anhydrides, perchloric acid, 3-propiolactone, sulfuric acid, uranium phosphide, vinyl acetate, vinylidene fluoride
- attacks most metals forming flammable hydrogen gas, and some plastics, rubbers and coatings.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

1,3-DICHLOROOCTAMETHYLTETRASILOXANE

TOXICITY AND IRRITATION

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

1,3-DICHLOROOCTAMETHYLTETRASILOXANE:

■ The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may produce respiratory tract irritation, and result in damage to the lung including reduced lung function.
The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.
No significant acute toxicological data identified in literature search.

HYDROGEN CHLORIDE:

TOXICITY	IRRITATION
Inhalation (human) LCLo: 1300 ppm/30m	Eye (rabbit): 5 mg/30s - Mild
Inhalation (human) LCLo: 3000 ppm/5m	
Inhalation (rat) LC50: 3124 ppm/60m	

■ The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

4701 ppm/30m

Section 12 - ECOLOGICAL INFORMATION

This material and its container must be disposed of as hazardous waste.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
hydrogen chloride	LOW		LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information
Corrosivity characteristic: use EPA hazardous waste number D002 (waste code C)

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.
¦ Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.
· Recycle wherever possible.
· Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: None Hazard class or Division: 8
Identification Numbers: UN2987 PG: II
Label Codes: 8 Special provisions: B2, T14,
TP2, TP7,
TP13, TP27
Packaging: Exceptions: None Packaging: Non- bulk: 206
Packaging: Exceptions: None Quantity limitations: 1 L
Passenger aircraft/rail:
Quantity Limitations: Cargo 30 L Vessel stowage: Location: C
aircraft only:
Vessel stowage: Other: 40
Hazardous materials descriptions and proper shipping names:
Chlorosilanes, corrosive, n.o.s.

Air Transport IATA:

ICAO/IATA Class: 8 ICAO/IATA Subrisk: None
UN/ID Number: 2987 Packing Group: II
Special provisions: None
Cargo Only
Packing Instructions: 812 Maximum Qty/Pack: 30 L
Passenger and Cargo Passenger and Cargo
Packing Instructions: 808 Maximum Qty/Pack: 1 L
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: - Maximum Qty/Pack: -
Shipping Name: CHLOROSILANES, CORROSIVE, N.O.S.(CONTAINS 1,
3-DICHLOROOCTAMETHYLTETRASILOXANE)

Maritime Transport IMDG:

IMDG Class: 8 IMDG Subrisk: None
UN Number: 2987 Packing Group: II
EMS Number: F-A , S-B Special provisions: None
Limited Quantities: 0
Shipping Name: CHLOROSILANES, CORROSIVE, N.O.S.

Section 15 - REGULATORY INFORMATION

1,3-dichlorooctamethyltetrasiloxane (CAS: 2474-02-4) is found on the following regulatory lists;

"Canada Non-Domestic Substances List (NDSL)","US Toxic Substances Control Act (TSCA) - Inventory"

Regulations for ingredients

hydrogen chloride (CAS: 7647-01-0) is found on the following regulatory lists;

"Canada - Alberta Ambient Air Quality Objectives","Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Industrial Hazardous Substances","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Controlled Drugs and Substances Act Schedule VI","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada National Pollutant Release Inventory (NPRI)","Canada Prohibited Toxic Substances, Schedule 2, Concentration Limits (English)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","CODEX General Standard for Food Additives (GSFA) - Additives Permitted for Use in Food in General, Unless Otherwise Specified, in Accordance with GMP","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk","International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs","International Council of Chemical Associations (ICCA) - High Production Volume List","International Maritime Dangerous Goods Requirements (IMDG Code) - Goods Forbidden for Transport","OECD Representative List of High Production Volume (HPV) Chemicals","United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances - Table II","United Nations List of Precursors and Chemicals Frequently used in the Illicit Manufacture of Narcotic Drugs and Psychotropic Substances Under International Control - Table II","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)","US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)","US - California Permissible Exposure Limits for Chemical Contaminants","US - California Toxic Air Contaminant List Category II","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US -

Idaho - Limits for Air Contaminants","US - Massachusetts Oil & Hazardous Material List","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances","US - Oregon Hazardous Materials","US - Oregon Permissible Exposure Limits (Z-1)","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Permissible exposure limits of air contaminants","US - Wyoming List of Highly Hazardous Chemicals, Toxics and Reactives","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US ACGIH Threshold Limit Values (TLV) - Carcinogens","US Clean Air Act - Hazardous Air Pollutants","US CWA (Clean Water Act) - List of Hazardous Substances","US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances","US Department of Homeland Security Chemical Facility Anti-Terrorism Standards - Chemicals of Interest","US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides","US DOE Temporary Emergency Exposure Limits (TEELs)","US Drug Enforcement Administration (DEA) List I and II Regulated Chemicals","US EPA Acute Exposure Guideline Levels (AEGLs) - Final","US EPA High Production Volume Chemicals Additional List","US EPA Master Testing List - Index I Chemicals Listed","US EPCRA Section 313 Chemical List","US Food Additive Database","US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act","US NFPA 45 Fire Protection for Laboratories Using Chemicals - Flammability Characteristics of Common Compressed and Liquefied Gases","US NIOSH Recommended Exposure Limits (RELs)","US OSHA List of Highly Hazardous Chemicals, Toxics and Reactives","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide","US SARA Section 302 Extremely Hazardous Substances","US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants","US Toxic Substances Control Act (TSCA) - Inventory"

Section 16 - OTHER INFORMATION

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■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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