

TRICHLOROSILANE

TCS

CAUTIONARY RESPONSE INFORMATION

Common Synonyms Silicochloroform Trichloromonosilane		Liquid	Colorless	Sharp choking odor
Reacts violently with water. Irritating gas is produced on contact with water. Boiling point is 90°F.				
<p>Evacuate. Keep people away. Avoid contact with liquid. Shut off ignition sources. Call fire department. Notify local health and pollution control agencies. Protect water intakes.</p>				
Fire	<p>FLAMMABLE. POISONOUS GASES MAY BE PRODUCED IN FIRE. Containers may explode in fire. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear goggles and self-contained breathing apparatus. Extinguish with dry chemicals or carbon dioxide. DO NOT USE WATER OR FOAM ON FIRE. DO NOT USE WATER ON ADJACENT FIRES. Cool exposed containers with water.</p>			
Exposure	<p>Call for medical aid.</p> <p>VAPOR Irritating to eyes, nose and throat. Harmful if inhaled. Move victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID Will burn skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.</p>			
Water Pollution	<p>Effect of low concentrations on aquatic life is unknown. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>			

1. CORRECTIVE RESPONSE ACTIONS

Dilute and disperse
Stop discharge
Chemical and Physical Treatment:
Neutralize

2. CHEMICAL DESIGNATIONS

2.1 **CG Compatibility Group:** Not listed.
2.2 **Formula:** SiHCl₃
2.3 **IMO/UN Designation:** 4.3/1295
2.4 **DOT ID No.:** 1295
2.5 **CAS Registry No.:** 10025-78-2
2.6 **NAERG Guide No.:** 139
2.7 **Standard Industrial Trade Classification:** 51550

3. HEALTH HAZARDS

- 3.1 **Personal Protective Equipment:** Acid-vapor-type respiratory protection; rubber gloves; chemical worker's goggles; other protective equipment as necessary to protect skin and eyes.
- 3.2 **Symptoms Following Exposure:** Inhalation causes severe irritation of respiratory system. Liquid causes severe burns of eyes and skin. Ingestion causes severe burns of mouth and stomach.
- 3.3 **Treatment of Exposure:** INHALATION: remove victim from exposure; if breathing is difficult or stopped, give artificial respiration; call physician. EYES or SKIN: flush with plenty of water immediately for at least 15 min. and get medical attention. INGESTION: do NOT induce vomiting; give large amount of water; get medical attention.
- 3.4 **TLV-TWA:** Not listed.
3.5 **TLV-STEL:** Not listed.
3.6 **TLV-Ceiling:** Not listed.
3.7 **Toxicity by Ingestion:** Grade 2; oral LD₅₀ = 1,000 mg/kg (rat)
3.8 **Toxicity by Inhalation:** Currently not available.
3.9 **Chronic Toxicity:** Currently not available
3.10 **Vapor (Gas) Irritant Characteristics:** Vapors cause severe irritation of eyes and throat and can cause eye and lung injury. They cannot be tolerated even at low concentrations.
3.11 **Liquid or Solid Characteristics:** Severe skin irritant. Causes second- and third-degree burns on short contact and is very injurious to the eyes.
3.12 **Odor Threshold:** Currently not available
3.13 **IDLH Value:** Not listed.
3.14 **OSHA PEL-TWA:** Not listed.
3.15 **OSHA PEL-STEL:** Not listed.
3.16 **OSHA PEL-Ceiling:** Not listed.
3.17 **EPA AEGL:** Not listed

4. FIRE HAZARDS

- 4.1 **Flash Point:** -18°F O.C., >=58°F C.C.
4.2 **Flammable Limits in Air:** 1.2%-90.5%
4.3 **Fire Extinguishing Agents:** Dry chemical, carbon dioxide
4.4 **Fire Extinguishing Agents Not to Be Used:** Water, foam
4.5 **Special Hazards of Combustion Products:** Toxic hydrogen chloride and phosgene gases may form in fires.
4.6 **Behavior in Fire:** Difficult to extinguish; re-ignition may occur. Vapor is heavier than air and may travel a considerable distance to a source of ignition and flash back.
4.7 **Auto Ignition Temperature:** 220°F
4.8 **Electrical Hazards:** Currently not available
4.9 **Burning Rate:** Currently not available
4.10 **Adiabatic Flame Temperature:** Currently not available
4.11 **Stoichiometric Air to Fuel Ratio:** 4.8 (calc.)
4.12 **Flame Temperature:** Currently not available
4.13 **Combustion Molar Ratio (Reactant to Product):** 3.0 (calc.)
4.14 **Minimum Oxygen Concentration for Combustion (MOCC):** Not listed

5. CHEMICAL REACTIVITY

- 5.1 **Reactivity with Water:** Reacts violently to form hydrogen chloride fumes (hydrochloric acid).
5.2 **Reactivity with Common Materials:** Reacts with surface moisture to form hydrochloric acid, which corrodes common metals and forms flammable hydrogen gas.
5.3 **Stability During Transport:** Stable
5.4 **Neutralizing Agents for Acids and Caustics:** Flush with water, rinse with sodium bicarbonate or lime solution.
5.5 **Polymerization:** Not pertinent
5.6 **Inhibitor of Polymerization:** Not pertinent

6. WATER POLLUTION

- 6.1 **Aquatic Toxicity:** Currently not available
6.2 **Waterfowl Toxicity:** Currently not available
6.3 **Biological Oxygen Demand (BOD):** None
6.4 **Food Chain Concentration Potential:** None
6.5 **GESAMP Hazard Profile:** Not listed

7. SHIPPING INFORMATION

- 7.1 **Grades of Purity:** 99+%
7.2 **Storage Temperature:** Ambient
7.3 **Inert Atmosphere:** No requirement
7.4 **Venting:** Pressure-vacuum
7.5 **IMO Pollution Category:** Currently not available
7.6 **Ship Type:** Currently not available
7.7 **Barge Hull Type:** Currently not available

8. HAZARD CLASSIFICATIONS

- 8.1 **49 CFR Category:** Dangerous When Wet
8.2 **49 CFR Class:** 4.3
8.3 **49 CFR Package Group:** I
8.4 **Marine Pollutant:** No
8.5 **NFPA Hazard Classification:**
- | Category | Classification |
|---------------------------|----------------|
| Health Hazard (Blue)..... | 3 |
| Flammability (Red)..... | 4 |
| Instability (Yellow)..... | 2 |
| Special (White)..... | W |
- 8.6 **EPA Reportable Quantity:** Not listed.
8.7 **EPA Pollution Category:** Not listed.
8.8 **RCRA Waste Number:** Not listed
8.9 **EPA FWPCA List:** Not listed

9. PHYSICAL & CHEMICAL PROPERTIES

- 9.1 **Physical State at 15° C and 1 atm:** Liquid
9.2 **Molecular Weight:** 135.5
9.3 **Boiling Point at 1 atm:** 90°F = 32°C = 305°K
9.4 **Freezing Point:** -197°F = -127°C = 146°K
9.5 **Critical Temperature:** Not pertinent
9.6 **Critical Pressure:** Not pertinent
9.7 **Specific Gravity:** 1.344 at 20°C (liquid)
9.8 **Liquid Surface Tension:** (est.) 18.3 dynes/cm = 0.0183 N/m at 20°C
9.9 **Liquid Water Interfacial Tension:** Not pertinent
9.10 **Vapor (Gas) Specific Gravity:** 4.9
9.11 **Ratio of Specific Heats of Vapor (Gas):** Currently not available
9.12 **Latent Heat of Vaporization:** 85 Btu/lb = 47 cal/g = 2.0 X 10⁵ J/kg
9.13 **Heat of Combustion:** Currently not available
9.14 **Heat of Decomposition:** Not pertinent
9.15 **Heat of Solution:** Currently not available
9.16 **Heat of Polymerization:** Not pertinent
9.17 **Heat of Fusion:** Currently not available
9.18 **Limiting Value:** Currently not available
9.19 **Reid Vapor Pressure:** Currently not available

NOTES

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9.20 SATURATED LIQUID DENSITY		9.21 LIQUID HEAT CAPACITY		9.22 LIQUID THERMAL CONDUCTIVITY		9.23 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit inch per hour-square foot-F	Temperature (degrees F)	Centipoise
28	86.610	51	0.230	51	0.887	28	0.406
30	86.469	52	0.230	52	0.887	30	0.401
32	86.330	53	0.230	53	0.887	32	0.397
34	86.190	54	0.230	54	0.887	34	0.393
36	86.040	55	0.230	55	0.887	36	0.388
38	85.900	56	0.230	56	0.887	38	0.384
40	85.759	57	0.230	57	0.887	40	0.380
42	85.620	58	0.230	58	0.887	42	0.376
44	85.469	59	0.230	59	0.887	44	0.372
46	85.330	60	0.230	60	0.887	46	0.368
48	85.190	61	0.230	61	0.887	48	0.364
50	85.040	62	0.230	62	0.887	50	0.361
52	84.900	63	0.230	63	0.887	52	0.357
54	84.759	64	0.230	64	0.887	54	0.353
56	84.610	65	0.230	65	0.887	56	0.350
58	84.469	66	0.230	66	0.887	58	0.346
60	84.330	67	0.230	67	0.887	60	0.343
62	84.179	68	0.230	68	0.887	62	0.339
64	84.040	69	0.230	69	0.887	64	0.336
66	83.900	70	0.230	70	0.887	66	0.333
68	83.750	71	0.230	71	0.887	68	0.330
70	83.610	72	0.230	72	0.887	70	0.327
72	83.459	73	0.230	73	0.887	72	0.323
74	83.320	74	0.230	74	0.887	74	0.320
76	83.169	75	0.230	75	0.887	76	0.317
78	83.030	76	0.230	76	0.887	78	0.314

9.24 SOLUBILITY IN WATER		9.25 SATURATED VAPOR PRESSURE		9.26 SATURATED VAPOR DENSITY		9.27 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	R	-70	0.160	-70	0.00519		N
	E	-60	0.236	-60	0.00746		O
	A	-50	0.342	-50	0.01054		T
	C	-40	0.487	-40	0.01464		
	T	-30	0.681	-30	0.02000		P
	S	-20	0.938	-20	0.02694		E
		-10	1.275	-10	0.03579		R
		0	1.709	0	0.04693		T
		10	2.263	10	0.06081		I
		20	2.961	20	0.07791		N
		30	3.832	30	0.09878		E
		40	4.908	40	0.12400		N
		50	6.227	50	0.15420		T
		60	7.827	60	0.19010		
		70	9.753	70	0.23240		
		80	12.060	80	0.28200		
		90	14.790	90	0.33960		