TRICHLOROETHYLENE

TCL

CAUTIONARY RESPONSE INFORMATION

Common Synonyms
Chlorylen
Gemalgene
Trethylene
Trichloran
Triclene; algylen
Trilene

Watery liquid Colorless Sweet odor

Sinks in water. Irritating vapor is produced.

Keep people away.
Avoid contact with liquid and vapor.
Call fire department.
Notify local health and pollution control agencies.
Protect water intakes.

Fire

Combustible.
POISONOUS GASES ARE PRODUCED IN FIRE.
Wear goggles and self-contained breathing apparatus.
Extinguish with dry chemical, carbon dioxide, or foam.

Exposure

CALL FOR MEDICAL AID.

VAPOR
Irritating to eyes, nose and throat.
If inhaled, will cause nausea, vomiting, difficult breathing, or loss of consciousness.
Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.

LIQUID
Irritating to skin and eyes.
If swallowed, will cause nausea, vomiting, difficult breathing, or loss of consciousness.
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 and have victim induce vomiting.
IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.

Water Pollution

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.

1. CORRECTIVE RESPONSE ACTIONS

Stop discharge
Contain
Collection Systems: Pump

2. CHEMICAL DESIGNATIONS

2.1 CG Compatibility Group: 36; Halogenated hydrocarbon
2.2 Formula: $CHCl{=}CCl_2$
2.3 IMO/UN Designation: 9.0/1710
2.4 DOT ID No.: 1710
2.5 CAS Registry No.: 79-01-6
2.6 NAERG Guide No.: 160
2.7 Standard Industrial Trade Classification: 51132

3. HEALTH HAZARDS

3.1 Personal Protective Equipment: Organic vapor-acid gas canister; self-contained breathing apparatus for emergencies; neoprene or vinyl gloves; chemical safety goggles; face-shield; neoprene safety shoes; neoprene suit or apron for splash protection.
3.2 Symptoms Following Exposure: INHALATION: symptoms range from irritation of the nose and throat to nausea, an attitude of irresponsibility, blurred vision, and finally disturbance of central nervous system resulting in cardiac failure. Chronic exposure may cause organic injury. INGESTION: symptoms similar to inhalation. SKIN: defatting action can cause dermatitis. EYES: slightly irritating sensation and lachrymation.
3.3 Treatment of Exposure: Do NOT administer adrenalin or epinephrine; get medical attention for all cases of overexposure. INHALATION: remove victim to fresh air; if necessary, apply artificial respiration and/or administer oxygen. INGESTION: have victim drink water and induce vomiting; repeat three times; then give 1 tablespoon epsom salts in water. EYES: flush thoroughly with water. SKIN: wash thoroughly with soap and warm water.
3.4 TLV-TWA: 50 ppm
3.5 TLV-STEL: Not listed.
3.6 TLV-Ceiling: 100 ppm
3.7 Toxicity by Ingestion: Grade 3; LD_{50} = 50 to 500 mg/kg
3.8 Toxicity by Inhalation: Currently not available.
3.9 Chronic Toxicity: Currently not available
3.10 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary.
3.11 Liquid or Solid Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin.
3.12 Odor Threshold: 50 ppm
3.13 IDLH Value: 1,000 ppm
3.14 OSHA PEL-TWA: 100 ppm
3.15 OSHA PEL-STEL: 300 ppm, 5 minute peak in any 2 hours.
3.16 OSHA PEL-Ceiling: 200 ppm
3.17 EPA AEGL: Not listed

4. FIRE HAZARDS

4.1 Flash Point: 90°F C.C. practically nonflammable
4.2 Flammable Limits in Air: 8.0%-10.5%
4.3 Fire Extinguishing Agents: Water fog
4.4 Fire Extinguishing Agents Not to Be Used: Not pertinent
4.5 Special Hazards of Combustion Products: Toxic and irritating gases are produced in fire situations.
4.6 Behavior in Fire: Not pertinent
4.7 Auto Ignition Temperature: 770°F
4.8 Electrical Hazards: Not pertinent
4.9 Burning Rate: Not pertinent
4.10 Adiabatic Flame Temperature: Currently not available
4.11 Stoichometric Air to Fuel Ratio: 9.5 (calc.)
4.12 Flame Temperature: Currently not available
4.13 Combustion Molar Ratio (Reactant to Product): 4.0 (calc.)
4.14 Minimum Oxygen Concentration for Combustion (MOCC): N_2 diluent: 9.0% at 100°C

5. CHEMICAL REACTIVITY

5.1 Reactivity with Water: No reaction
5.2 Reactivity with Common Materials: No reaction
5.3 Stability During Transport: Stable
5.4 Neutralizing Agents for Acids and Caustics: Not pertinent
5.5 Polymerization: Not pertinent
5.6 Inhibitor of Polymerization: Not pertinent

6. WATER POLLUTION

6.1 Aquatic Toxicity: 660 mg/l/40 hr/daphnia/kill/fresh water
6.2 Waterfowl Toxicity: Currently not available
6.3 Biological Oxygen Demand (BOD): Currently not available
6.4 Food Chain Concentration Potential: None
6.5 GESAMP Hazard Profile:
Bioaccumulation:
Damage to living resources:
Human Oral hazard:
Human Contact hazard:
Reduction of amenities:

7. SHIPPING INFORMATION

7.1 Grades of Purity: Technical; dry cleaning; degreasing; extraction
7.2 Storage Temperature: Ambient
7.3 Inert Atmosphere: No requirement
7.4 Venting: Pressure-vacuum
7.5 IMO Pollution Category: C
7.6 Ship Type: 3
7.7 Barge Hull Type: 3

8. HAZARD CLASSIFICATIONS

8.1 49 CFR Category: Keep Away From Food
8.2 49 CFR Class: 6.1
8.3 49 CFR Package Group: III
8.4 Marine Pollutant: No
8.5 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue).....	2
Flammability (Red).....	1
Instability (Yellow).....	0

8.6 EPA Reportable Quantity: 100 pounds
8.7 EPA Pollution Category: B
8.8 RCRA Waste Number: U228
8.9 EPA FWPCA List: Yes

9. PHYSICAL & CHEMICAL PROPERTIES

9.1 Physical State at 15° C and 1 atm: Liquid
9.2 Molecular Weight: 131.39
9.3 Boiling Point at 1 atm: 189°F = 87°C = 360°K
9.4 Freezing Point: –123.5°F = –86.4°C = 186.8°K
9.5 Critical Temperature: Not pertinent
9.6 Critical Pressure: Not pertinent
9.7 Specific Gravity: 1.46 at 20°C (liquid)
9.8 Liquid Surface Tension: 29.3 dynes/cm = 0.0293 N/m at 20°C
9.9 Liquid Water Interfacial Tension: 34.5 dynes/cm = 0.0345 N/m at 24°C
9.10 Vapor (Gas) Specific Gravity: 4.5
9.11 Ratio of Specific Heats of Vapor (Gas): 1.116
9.12 Latent Heat of Vaporization: 103 Btu/lb = 57.2 cal/g = 2.4 X 10^5 J/kg
9.13 Heat of Combustion: Not pertinent
9.14 Heat of Decomposition: Not pertinent
9.15 Heat of Solution: Not pertinent
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: 2.5 psia

NOTES

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9.20 SATURATED LIQUID DENSITY	
Temperature (degrees F)	Pounds per cubic foot
0	94.669
5	94.410
10	94.150
15	93.889
20	93.629
25	93.370
30	93.110
35	92.849
40	92.589
45	92.330
50	92.070
55	91.809
60	91.549
65	91.290
70	91.030
75	90.770
80	90.509
85	90.250
90	89.990
95	89.730
100	89.469
105	89.209
110	88.950
115	88.690
120	88.429
125	88.169

9.21 LIQUID HEAT CAPACITY	
Temperature (degrees F)	British thermal unit per pound-F
0	0.220
10	0.221
20	0.223
30	0.225
40	0.226
50	0.228
60	0.230
70	0.231
80	0.233
90	0.235
100	0.236
110	0.238
120	0.240
130	0.241
140	0.243
150	0.245
160	0.246
170	0.248

9.22 LIQUID THERMAL CONDUCTIVITY	
Temperature (degrees F)	British thermal unit inch per hour-square foot-F
	NOT PERTINENT

9.23 LIQUID VISCOSITY	
Temperature (degrees F)	Centipoise
15	0.800
20	0.775
25	0.750
30	0.727
35	0.705
40	0.684
45	0.664
50	0.645
55	0.627
60	0.610
65	0.593
70	0.577
75	0.562
80	0.548
85	0.534
90	0.521
95	0.508
100	0.496
105	0.485
110	0.474
115	0.463
120	0.453

9.24 SOLUBILITY IN WATER	
Temperature (degrees F)	Pounds per 100 pounds of water
77	0.110

9.25 SATURATED VAPOR PRESSURE	
Temperature (degrees F)	Pounds per square inch
40	0.508
50	0.678
60	0.894
70	1.166
80	1.507
90	1.929
100	2.448
110	3.081
120	3.846
130	4.765
140	5.862
150	7.163
160	8.695
170	10.490
180	12.580
190	15.010
200	17.810
210	21.020

9.26 SATURATED VAPOR DENSITY	
Temperature (degrees F)	Pounds per cubic foot
40	0.01245
50	0.01628
60	0.02105
70	0.02695
80	0.03418
90	0.04296
100	0.05354
110	0.06619
120	0.08120
130	0.09891
140	0.11960
150	0.14380
160	0.17180
170	0.20390
180	0.24080
190	0.28280
200	0.33040
210	0.38420

9.27 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	British thermal unit per pound-F
0	0.136
25	0.139
50	0.143
75	0.146
100	0.149
125	0.152
150	0.155
175	0.157
200	0.160
225	0.162
250	0.165
275	0.167
300	0.169
325	0.172
350	0.174
375	0.176
400	0.177
425	0.179
450	0.181
475	0.182
500	0.184
525	0.185
550	0.186
575	0.187
600	0.188