Material Safety Data Sheet
1,1,1-Trichloroethane

ACC# 14370

Section 1 - Chemical Product and Company Identification

MSDS Name: 1,1,1-Trichloroethane
Catalog Numbers: AC294930000, AC294930250, AC294932500, AC327940000, AC327940010, AC327942500, S80231, T391-20, T391-4, T398-4
Synonyms: Methyl chloroform; Methyltrichloromethane; Trichloroethane; Trichloromethylmethane; 1,1,1-TCE.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
71-55-6	1,1,1-Trichloroethane	>96	200-756-3
123-91-1	1,4-Dioxane	2.5	204-661-8
106-88-7	1,2-Butylene oxide	0.47	203-438-2
75-52-5	Nitromethane	0.34	200-876-6

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless liquid.
Warning! Causes eye, skin, and respiratory tract irritation. May be harmful if inhaled. May cause central nervous system depression. This is a CFC substance which destroys ozone in the upper atmosphere. Destruction of the ozone layer can lead to increased ultraviolet radiation which, with excess exposure to sunlight, can lead to an increase in skin cancer and eye cataracts.
Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes mild eye irritation. Vapors may cause eye irritation.
Skin: Causes skin irritation. Prolonged or repeated contact may dry/defat the skin and cause irritation. 1,4-Dioxane may cause an allergic skin reaction, and absorption of this substance may cause systemic

toxicty. Methyl chloroform is an acknowledged skin irritant in guinea pigs, where a single topical application of 1 ml or repeated contact over 3 days causes edema, erythema, inflammation, and cellular degeneration. There is one case report of allergic contact dermatitis in a worker exposed to 1,1,1-trichloroethane. It is not possible to draw any conclusions from this single report.
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Low hazard for usual industrial handling. Although there are no case reports of aspiration, it was induced in rats in one study. In addition, based on its physical properties (viscosity and surface tension), it seems likely that 1,1,1-trichloroethane can be aspirated.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. May cause narcotic effects in high concentration. Causes irritation of the mucous membrane and upper respiratory tract. Numerous deaths due to depression of CNS control of respiration and fatal cardiac arrhythmia have been reported from methyl chloroform inhalation (accidental or intentional) in poorly ventilated rooms, pits, tanks, and other small areas (Documentation of the TLV). Cases of intentional abuse of 1,1,1-trichloroethane in substances such as typewriter correction fluid for euphoric symptoms have been documented.
Chronic: Prolonged or repeated skin contact may cause defatting and dermatitis. Exposure to high concentrations may cause central nervous system depression. Studies with solvent abusers have established that severe cardiac arrhythmias may result from cardiac sensitization, where the heart has an increased response to circulating epinephrine. In these cases, exposures by far exceeded occupational relevant levels. Liver effects have been observed in some animal studies at high

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Alcoholic beverage consumption may enhance the toxic effects of this substance.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is nonflammable. Vapors may accumulate in confined spaces Methyl chloroform burns only in excess oxygen or in air if a strong source of ignition is present. No flash point in conventional closed tester; however, vapors in containers can explode if subjected to high energy source.
Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire.
Flash Point: Not applicable.
Autoignition Temperature: 500 deg C (932.00 deg F)
Explosion Limits, Lower:7.0 vol %
Upper: 16 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation. Approach spill from upwind.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid breathing vapor.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store in aluminum containers.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,1,1-Trichloroethane	350 ppm TWA; 450 ppm STEL	700 ppm IDLH	350 ppm TWA; 1900 mg/m3 TWA
1,4-Dioxane	20 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	500 ppm IDLH	100 ppm TWA; 360 mg/m3 TWA
1,2-Butylene oxide	none listed	none listed	none listed
Nitromethane	20 ppm TWA	750 ppm IDLH	100 ppm TWA; 250 mg/m3 TWA

OSHA Vacated PELs: 1,1,1-Trichloroethane: 350 ppm TWA; 1900 mg/m3 TWA 1,4-Dioxane: 25 ppm TWA; 90 mg/m3 TWA 1,2-Butylene oxide: No OSHA Vacated PELs are listed for this chemical. Nitromethane: 100 ppm TWA; 250 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to minimize contact with skin.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: colorless
Odor: Sweet, mild chloroform-like.
pH: Not applicable.
Vapor Pressure: 100 mm Hg @ 20 deg C
Vapor Density: 4.55 (air=1)
Evaporation Rate:1.0 (carbon tetrachloride=1)
Viscosity: 0.86 cP @ 20 deg C
Boiling Point: 74 deg C
Freezing/Melting Point:-33 deg C
Decomposition Temperature:> 260 deg C
Solubility: Insoluble.
Specific Gravity/Density:1.338 (water=1)
Molecular Formula:C2H3Cl3
Molecular Weight:133.38

Section 10 - Stability and Reactivity

Chemical Stability: Because of 1,1,1-TCE's reactivity with magnesium, aluminum, & their alloys, inhibitors (like 1,4-dioxane, 1,3-dioxolane, isobutyl alcohol, or nitroethane) are often added to increase the stability of the solvent & prevent corrosion of metal parts. 1,1,1-Trichloroethane reacts slowly with water to produce hydrochloric acid.
Conditions to Avoid: High temperatures, ignition sources, moisture, confined spaces.
Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, aluminum, magnesium, chemically active metals.
Hazardous Decomposition Products: Hydrogen chloride, chlorine, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 71-55-6: KJ2975000
CAS# 123-91-1: JG8225000
CAS# 106-88-7: EK3675000
CAS# 75-52-5: PA9800000
LD50/LC50:
CAS# 71-55-6:
Draize test, rabbit, eye: 100 mg Mild;
Draize test, rabbit, eye: 2 mg/24H Severe;
Draize test, rabbit, skin: 5 gm/12D (Intermittent) Mild;
Draize test, rabbit, skin: 20 mg/24H Moderate;
Inhalation, mouse: LC50 = 3911 ppm/2H;
Inhalation, mouse: LC50 = 29492 ppm/10M;

Inhalation, rat: LC50 = 17000 ppm/4H;
Inhalation, rat: LC50 = 14250 ppm/7H;
Inhalation, rat: LC50 = 20000 ppm/2H;
Oral, mouse: LD50 = 6 gm/kg;
Oral, rabbit: LD50 = 5660 mg/kg;
Oral, rat: LD50 = 9600
CAS# 123-91-1:
Draize test, rabbit, eye: 100 mg Severe;
Draize test, rabbit, eye: 100 mg/24H Moderate;
Inhalation, mouse: LC50 = 37 gm/m3/2H;
Inhalation, rat: LC50 = 46 gm/m3/2H;
Oral, mouse: LD50 = 5300 mg/kg;
Oral, rabbit: LD50 = 2 gm/kg;
Oral, rat: LD50 = 4200 mg/kg;
Skin, rabbit: LD50 = 7600 uL/kg;
.

CAS# 106-88-7:
Draize test, rabbit, eye: 100 mg/24H Moderate;
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, rat: LC50 = 6300 mg/m3/4H;
Oral, rat: LD50 = 500 mg/kg;
Skin, rabbit: LD50 = 2100 uL/kg;
.

CAS# 75-52-5:
Oral, mouse: LD50 = 950 mg/kg;
Oral, rat: LD50 = 940 mg/kg;
.

Carcinogenicity:
CAS# 71-55-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 123-91-1:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 1/1/88
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 106-88-7:

- **ACGIH:** Not listed.
- **California:** Not listed.
- **NTP:** Not listed.
- **IARC:** Group 2B carcinogen

CAS# 75-52-5:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 5/1/97
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

Epidemiology: No information found
Teratogenicity: Animal evidence suggests that 1,1,1-TCE is not teratogenic at exposures which are not maternally toxic. Slight fetotoxicity (for example, reduced fetal weight) has been reported at doses which were not maternally toxic.
Reproductive Effects: Animal evidence suggests that 1,1,1-TCE does not cause reproductive effects.
Mutagenicity: Evidence from studies using live animals suggests that 1,1,1-trichloroethane is not mutagenic.
Neurotoxicity: Some studies using sensitive neurobehavioural tests have shown altered scores for exposed workers. However, whether or not these results indicate nervous system damage is not clear. Other studies with 1,1,1-TCE have not shown any changes.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: EC50 = 52.9 mg/L; 96 Hr; Flow-through at 25.5°CFish: Bluegill/Sunfish: LC50 = 72 mg/L; 96 Hr; Static bioassayFish: Fathead Minnow: LC50 = 52.9 mg/L; 96 Hr; Flow-through at 25.5°CFish: Sheepshead minnow: LC50 = 53-72 mg/L; 96 Hr; UnspecifiedWater flea Daphnia: EC50 > 530 mg/L; 48 Hr; Unspecified Releases to surface water will decrease in concn almost entirely due to evaporation. Spills on land will decrease in concentration almost entirely due to volatilization and leaching.
Environmental: Releases to air may be transported long distances and partially return to earth in rain. In the troposphere, 1,1,1-trichloroethane will degrade very slowly by photooxidation and also slowly diffuse to the stratosphere where photodegradation will be rapid. This substance has a high potential for oxone depletion.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 71-55-6: waste number U226.
CAS# 123-91-1: waste number U108.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	1,1,1-TRICHLOROETHANE	1,1,1-TRICHLOROETHANE
Hazard Class:	6.1	6.1
UN Number:	UN2831	UN2831
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 71-55-6 is listed on the TSCA inventory.
CAS# 123-91-1 is listed on the TSCA inventory.
CAS# 106-88-7 is listed on the TSCA inventory.
CAS# 75-52-5 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 71-55-6: Effective 10/4/82, Sunset 10/4/92 CAS# 106-88-7: Effective 10/4/82, Sunset 10/4/92 CAS# 75-52-5: Effective 4/13/89, Sunset 12/19/95

Chemical Test Rules

CAS# 71-55-6: 40 CFR 799.5000

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 71-55-6: 1000 lb final RQ; 454 kg final RQ CAS# 123-91-1: 100 lb final RQ; 45.4 kg final RQ
CAS# 106-88-7: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 71-55-6: immediate.
CAS # 123-91-1: delayed, fire.
CAS # 106-88-7: immediate.
CAS # 75-52-5: immediate, delayed, fire, reactive.

Section 313

This material contains 1,1,1-Trichloroethane (CAS# 71-55-6, >96%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains 1,4-Dioxane (CAS# 123-91-1, 2.5%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains 1,2-Butylene oxide (CAS# 106-88-7, 0.47%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 71-55-6 is listed as a hazardous air pollutant (HAP).
CAS# 123-91-1 is listed as a hazardous air pollutant (HAP).
CAS# 106-88-7 is listed as a hazardous air pollutant (HAP).
CAS# 71-55-6 is listed as a Class 1 ozone depletor with an 0.1 ODP; 110 GWP

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA. CAS# 71-55-6 is listed as a Priority Pollutant under the Clean Water Act. CAS# 71-55-6 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

CAS# 75-52-5 is considered highly hazardous by OSHA.

STATE

CAS# 71-55-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 123-91-1 can be found on the following state right to know lists: California, New Jersey,

Pennsylvania, Minnesota, Massachusetts.
CAS# 106-88-7 can be found on the following state right to know lists: New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 75-52-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
WARNING: This product contains 1,4-Dioxane, a chemical known to the state of California to cause cancer.
WARNING: This product contains Nitromethane, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: CAS# 123-91-1: 30 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XN N
Risk Phrases:
R 20 Harmful by inhalation.
R 59 Dangerous for the ozone layer.

Safety Phrases:
S 24/25 Avoid contact with skin and eyes.
S 59 Refer to manufacturer/supplier for information on recovery/recycling.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)
CAS# 71-55-6: 3
CAS# 123-91-1: 2
CAS# 106-88-7: 3
CAS# 75-52-5: 2
Canada - DSL/NDSL
CAS# 71-55-6 is listed on Canada's DSL List.
CAS# 123-91-1 is listed on Canada's DSL List.
CAS# 106-88-7 is listed on Canada's DSL List.
CAS# 75-52-5 is listed on Canada's DSL List.
Canada - WHMIS
This product has a WHMIS classification of D1B, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
Canadian Ingredient Disclosure List
CAS# 71-55-6 is listed on the Canadian Ingredient Disclosure List.
CAS# 123-91-1 is listed on the Canadian Ingredient Disclosure List.
CAS# 75-52-5 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/11/1999
Revision #5 Date: 3/16/2007

The information above is believed to be accurate and represents the best information currently available to us. However, we make no

warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.