

MATERIAL SAFETY DATA SHEET

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Version 1.5

Section 1 - Product and Company Information

Product Name CHLOROFORM, BIOTECH GRADE, >=99.8%,
CONTAINS 0.5-1.0% ETHANOL AS STABILIZER
Product Number 496189
Brand ALDRICH
Company Sigma-Aldrich
Address 3050 Spruce Street
SAINT LOUIS MO 63103 US
Technical Phone: 800-325-5832
Fax: 800-325-5052
Emergency Phone: 314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313	
CHLOROFORM, STABILIZED WITH ETHANOL	67-66-3	Yes	
Ingredient Name	CAS #	Percent	SARA 313
ETHYL ALCOHOL, NON-DENATURED, 200 PROOF	64-17-5	>= 0.5 <= 1	No

Formula CHCl3
Synonyms Chloroform (ACGIH:OSHA) * Chloroforme (French) *
Cloroformio (Italian) * Formyl trichloride *
Methane trichloride * Methane, trichloro- *
Methenyl trichloride * Methyl trichloride *
NCI-C02686 * R 20 (Refrigerant) * RCRA waste
number U044 * Trichloormethaan (Dutch) *
Trichlormethan (Czech) * Trichloroform *
Trichloromethane (OSHA) * Triclorometano (Italian)
RTECS Number: FS9100000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Harmful.

Harmful if swallowed. Limited evidence of a carcinogenic effect.
Harmful: danger of serious damage to health by prolonged exposure
through inhalation and if swallowed. Irritating to eyes,
respiratory system and skin.

Probable Carcinogen (US). Target organ(s): Liver. Cardiovascular
system. Calif. Prop. 65 carcinogen.

HMIS RATING

HEALTH: 2*

FLAMMABILITY: 0

REACTIVITY: 1

NFPA RATING

HEALTH: 2

FLAMMABILITY: 0

REACTIVITY: 1

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.

DERMAL EXPOSURE

In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE

In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

INFORMATION FOR PHYSICIAN

Contamination of the eyes should be treated by immediate and prolonged irrigation with copious amounts of water.

Section 5 - Fire Fighting Measures

FLASH POINT

> 230 °F

AUTOIGNITION TEMP

N/A

FLAMMABILITY

N/A

EXTINGUISHING MEDIA

Suitable: Noncombustible. Use extinguishing media appropriate to surrounding fire conditions.

FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves. Wear disposable coveralls and discard them after use.

METHODS FOR CLEANING UP

Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material

pickup is complete.

Section 7 - Handling and Storage

HANDLING

User Exposure: Do not breathe vapor. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE

Suitable: Keep tightly closed.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS

Use only in a chemical fume hood. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.

Hand: Compatible chemical-resistant gloves.

Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES

Wash contaminated clothing before reuse. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	10 PPM
USA	MSHA Standard	Ceiling co	50 PPM (240 MG/M3)
USA	OSHA.	PEL	CL 50 PPM (240 MG/M3)
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	STEL	2 PPM/60M

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	8
Poland		NDSCh	-
Poland		NDSP	-
Poland		NDS	1900 MG/M3
Poland		NDSCh	-
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance	Physical State: Liquid	
	Color: Colorless	
	Form: Clear liquid	
Property	Value	At Temperature or Pressure
Molecular Weight	119.38 AMU	
pH	N/A	
BP/BP Range	61 °C	
MP/MP Range	- 63.0 °C	
Freezing Point	N/A	

Vapor Pressure	160 mmHg	20 °C
Vapor Density	4.1 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	1.492 g/cm3	
Bulk Density	N/A	
Odor Threshold	205.0 - 307.0 ppm	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	0.56 Pas	
Surface Tension	27.1 mN/m	20 °C
Partition Coefficient	Log Kow: 1.97	
Decomposition Temp.	N/A	
Flash Point	> 230 °F	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	1.445	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	Other Solvents: SOLUBLE IN CARBON DISULFIDE BENZENE, CARBON TETRACHLORIDE MISCIBLE WITH ALCOHOL, ET	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY

Stable: Stable.

Conditions of Instability: May decompose on exposure to light.

Materials to Avoid: Strong oxidizing agents, Strong bases, Magnesium, Sodium, Lithium.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Phosgene gas, Chlorine.

HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE

Skin Contact: Causes skin irritation.

Skin Absorption: May be harmful if absorbed through the skin.

Skin absorption may occur.

Eye Contact: Causes eye irritation.

Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.

Ingestion: Harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)

Kidneys. Liver. Blood. Central nervous system. Cardiovascular system. Nerves. Heart.

SIGNS AND SYMPTOMS OF EXPOSURE

Exposure can cause: Vomiting. Gastrointestinal disturbances.

Exposure to and/or consumption of alcohol may increase toxic effects. To the best of our knowledge, the chemical, physical,

and toxicological properties have not been thoroughly investigated.

CONDITIONS AGGRAVATED BY EXPOSURE

May cause nervous system disturbances.

TOXICITY DATA

Oral

Man

2514 mg/kg

LDLO

Remarks: Kidney, Ureter, Bladder:Changes in tubules (including acute renal failure, acute tubular necrosis). Cardiac:Other changes. Behavioral:Muscle contraction or spasticity.

Inhalation

Human

25,000 ppm

LCLO

Oral

Rat

695 mg/kg

LD50

Remarks: Behavioral:Change in motor activity (specific assay). Lungs, Thorax, or Respiration:Respiratory stimulation. Behavioral:Ataxia.

Inhalation

Rat

47,702 mg/m³

LC50

Intraperitoneal

Rat

894 MG/KG

LD50

Oral

Mouse

36 mg/kg

LD50

Intraperitoneal

Mouse

623 MG/KG

LD50

Subcutaneous

Mouse

704 MG/KG

LD50

Intraperitoneal

Dog

1 GM/KG

LD50

Remarks: Liver:Liver function tests impaired.

Skin

Rabbit

> 20000 mg/kg
LD50

Oral
Guinea pig
820 mg/kg
LD50

IRRITATION DATA

Skin
Rabbit
10 mg
24H
Remarks: Open irritation test

Skin
Rabbit
500 mg
24H
Remarks: Mild irritation effect

Eyes
Rabbit
148 mg

Eyes
Rabbit
20 mg
24H
Remarks: Moderate irritation effect

CHRONIC EXPOSURE - CARCINOGEN

Result: This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification. The National Cancer Institute (NCI) has found clear evidence for carcinogenicity.

Species: Rat
Route of Application: Oral
Dose: 13832 MG/KG
Exposure Time: 2Y
Frequency: C
Result: Blood:Leukemia Tumorigenic:Carcinogenic by RTECS criteria.

Species: Mouse
Route of Application: Oral
Dose: 127 GM/KG
Exposure Time: 92W
Frequency: I
Result: Liver:Tumors. Tumorigenic:Carcinogenic by RTECS criteria.

Species: Rat
Route of Application: Oral
Dose: 98 GM/KG
Exposure Time: 78W
Frequency: I
Result: Kidney, Ureter, Bladder:Kidney tumors. Endocrine:Thyroid tumors. Tumorigenic:Neoplastic by RTECS criteria.

Species: Mouse

Route of Application: Oral
Dose: 18 GM/KG
Exposure Time: 17W
Frequency: I
Result: Tumorigenic:Neoplastic by RTECS criteria. Liver:Tumors.

Species: Rat
Route of Application: Oral
Dose: 7020 MG/KG
Exposure Time: 78W
Frequency: I
Result: Kidney, Ureter, Bladder:Kidney tumors. Liver:Tumors.
Tumorigenic:Carcinogenic by RTECS criteria.

Species: Rat
Route of Application: Oral
Dose: 70 GM/KG
Exposure Time: 78W
Frequency: I
Result: Tumorigenic:Neoplastic by RTECS criteria. Kidney,
Ureter, Bladder:Kidney tumors. Endocrine:Thyroid tumors.

Species: Mouse
Route of Application: Oral
Dose: 24752 MG/KG
Exposure Time: 2Y
Frequency: C
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS
criteria. Liver:Tumors.

Species: Rat
Route of Application: Oral
Dose: 58968 MG/KG
Exposure Time: 2Y
Frequency: C
Result: Blood:Tumors. Endocrine:Thyroid tumors.
Tumorigenic:Neoplastic by RTECS criteria.

Species: Mouse
Route of Application: Oral
Dose: 130 GM/KG
Exposure Time: 2Y
Frequency: I
Result: Tumorigenic:Neoplastic by RTECS criteria. Kidney,
Ureter, Bladder:Tumors. Liver:Tumors.

IARC CARCINOGEN LIST

Rating: Group 2B

NTP CARCINOGEN LIST

Rating: Clear evidence.
Species: Mouse/rat
Route: Gavage

IRIS/EPA CARCINOGEN LIST

Rating: Group B2
Species: Rat, mouse
Route: Gavage

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 1260 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat
Dose: 4 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat
Dose: 100 PPM/7H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Gastrointestinal system. Specific Developmental Abnormalities: Homeostasis

Species: Rat
Dose: 20100 UG/M3/1H
Route of Application: Inhalation
Exposure Time: (7-14D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Species: Mouse
Dose: 100 PPM/7H
Route of Application: Inhalation
Exposure Time: (8-15D PREG)
Result: Specific Developmental Abnormalities: Craniofacial (including nose and tongue).

Species: Rabbit
Dose: 260 MG/KG
Route of Application: Oral
Exposure Time: (6-18D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

CHRONIC EXPOSURE - MUTAGEN

Result: Laboratory experiments have shown mutagenic effects.

Species: Human
Dose: 19 MMOL/L
Cell Type: HeLa cell
Mutation test: DNA inhibition

Species: Human
Dose: 10 MMOL/L
Cell Type: lymphocyte
Mutation test: Sister chromatid exchange

Species: Rat
Route: Oral
Dose: 4 MMOL/KG
Mutation test: Micronucleus test

Species: Rat
Route: Oral
Dose: 1 GM/KG
Mutation test: Unscheduled DNA synthesis

Species: Rat
Route: Intraperitoneal
Dose: 1200 UG/KG
Mutation test: Cytogenetic analysis

Species: Rat
Route: Oral
Dose: 597 MG/KG
Exposure Time: 5D
Mutation test: Cytogenetic analysis

Species: Rat
Dose: 1 MMOL/L
Cell Type: leukocyte
Mutation test: Sister chromatid exchange

Species: Mouse
Dose: 12 MG/L (+S9)
Cell Type: lymphocyte
Mutation test: Mutation in microorganisms

Species: Mouse
Route: Intraperitoneal
Dose: 50 MG/KG
Mutation test: Unscheduled DNA synthesis

Species: Mouse
Route: Inhalation
Dose: 300 PPM
Exposure Time: 6H
Mutation test: Sister chromatid exchange

Species: Mouse
Route: Oral
Dose: 200 MG/KG
Exposure Time: 4D
Mutation test: Sister chromatid exchange

Species: Mouse
Route: Inhalation
Dose: 400 PPM
Exposure Time: 4H/5D
Mutation test: sperm

Species: Hamster
Dose: 4430 MG/L
Cell Type: kidney
Mutation test: Morphological transformation.

Species: Hamster
Dose: 1 PPH
Cell Type: fibroblast
Mutation test: Other mutation test systems

Species: Hamster
Dose: 100 UMOL/L

Cell Type: Embryo
Mutation test: Sister chromatid exchange

Species: Hamster
Dose: 60 MMOL/L
Cell Type: lung
Mutation test: SLN

Species: Hamster
Dose: 1 MG/L
Cell Type: lung
Mutation test: Mutation in mammalian somatic cells.

Species: Mammal
Dose: 1 MMOL/L
Cell Type: lymphocyte
Mutation test: DNA

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 30 PPM/7H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Other measures of fertility
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g.,
stunted fetus). Specific Developmental Abnormalities:
Musculoskeletal system.

Species: Rat
Dose: 300 PPM/7H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Female fertility index (e.g., #
females pregnant per # sperm positive females; # females
pregnant per # females mated). Effects on Fertility:
Post-implantation mortality (e.g., dead and/or resorbed implants
per total number of implants).

Species: Mouse
Dose: 2177 MG/KG
Route of Application: Oral
Exposure Time: (3W MALE/3W PRE-7D POST)
Result: Effects on Newborn: Biochemical and metabolic. Effects
on Newborn: Growth statistics (e.g., reduced weight gain).

Species: Mouse
Dose: 2115 MG/KG
Route of Application: Oral
Exposure Time: (3W MALE/3W PRE-5D POST)
Result: Effects on Newborn: Other postnatal measures or effects.

Species: Mouse
Dose: 100 PPM/7H
Route of Application: Inhalation
Exposure Time: (1-7D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g.,
dead and/or resorbed implants per total number of implants).
Effects on Embryo or Fetus: Fetotoxicity (except death, e.g.,
stunted fetus). Effects on Fertility: Female fertility index
(e.g., # females pregnant per # sperm positive females; #
females pregnant per # females mated).

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: EC50 Algae
Time: 24 h
Value: 500 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 24 h
Value: 79 mg/l

Test Type: LC50 Fish
Species: Leuciscus idus
Time: 48 h
Value: 162 mg/l

Test Type: LC100 Fish
Species: Leuciscus idus
Time: 48 h
Value: 220 mg/l

Test Type: LC50 Fish
Time: 4 days
Value: 97 mg/l

Test Type: LC50 Fish
Species: Brachydanio rerio
Time: 96 h
Value: 121 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Observe all federal, state, and local environmental regulations. (DN)Requires special label: "Contains a substance which is regulated by Dannish work environmental law due to the risk of carcinogenic properties."

Section 14 - Transport Information

DOT

Proper Shipping Name: Chloroform
UN#: 1888
Class: 6.1
Packing Group: Packing Group III
Hazard Label: Toxic Substance
PIH: Not PIH

IATA

Proper Shipping Name: Chloroform
IATA UN Number: 1888
Hazard Class: 6.1
Packing Group: III

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION

Symbol of Danger: Xn

Indication of Danger: Harmful.

R: 22-38-40-48/20/22

Risk Statements: Harmful if swallowed. Irritating to skin.
Limited evidence of a carcinogenic effect. Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.

S: 36/37

Safety Statements: Wear suitable protective clothing and gloves.

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Harmful.

Risk Statements: Harmful if swallowed. Limited evidence of a carcinogenic effect. Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.

Irritating to eyes, respiratory system and skin.

Safety Statements: Wear suitable protective clothing and gloves.

US Statements: Probable Carcinogen (US). Target organ(s): Liver. Cardiovascular system. Calif. Prop. 65 carcinogen.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes

DEMINIMIS: 0.1 %

NOTES: This product is subject to SARA section 313 reporting requirements.

TSCA INVENTORY ITEM: Yes

UNITED STATES - STATE REGULATORY INFORMATION

CALIFORNIA PROP - 65

California Prop - 65: This product is or contains chemical(s) known to the state of California to cause cancer. This product is or contains chemical(s) known to the state of California to cause cancer.

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes

NDSL: No

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2007 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.