MATERIAL SAFETY DATA SHEET

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Section 1 - Product and Company Information

Product Name	CARBON TETRACHLORIDE, CHROMASOLV®, FOR HPLC, >=99.9%
Product Number	270652
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
CARBON TETRACHLORIDE	56-23-5	Yes

Formula	CCl4
Synonyms	Benzinoform * Carbona * Carbon chloride (CCl4) * Carbon TET * Carbon tetrachloride (ACGIH:OSHA) * Chlorid uhlicity (Czech) * Czterochlorek wegla (Polish) * ENT 4,705 * ENT 27164 * Flukoids * Halon 1040 * Methane tetrachloride * Methane, tetrachloro- * Necatorina * Perchloromethane * R 10 * RCRA waste number U211 * R 10 (Refrigerant) * Tetrachloorkoolstof (Dutch) * Tetrachloormetaan * Tetrachlorkohlenstoff, tetra (German) * Tetrachlormethan (German) * Tetrachlorocarbon * Tetrachloromethane (OSHA) * Tetrachlorure de carbone (French) * Tetraclorometano (Italian) * Tetracloruro di carbonio (Italian) * Tetrafinol * Tetraform * Tetrasol * Univerm * Vermoestricid
RTECS Number:	FG4900000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Toxic. Dangerous for the environment.
May cause cancer. Toxic by inhalation, in contact with skin and if swallowed. Toxic: danger of serious damage to health by prolonged exposure through inhalation. Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Dangerous for the ozone layer.
Probable Carcinogen (US). Calif. Prop. 65 carcinogen. Readily absorbed through skin. Target organ(s): Liver. Kidneys.

HMIS RATING

HEALTH: 3*
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING
HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 0

*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.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

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	5 PPM
		STEL	10 PPM
Remarks: Skin			
Remarks: Skin			
USA	MSHA Standard-air	TWA	10 PPM (65 MG/M3) (SKIN)
USA	OSHA.	PEL	8H TWA 10 PPM;CL 25 PPM;PK 200
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	STEL	2 PPM/60M

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	20 MG/M3
Poland		NDSCh	100 MG/M3
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance — Physical State: Liquid

Property	Value	At Temperature or Pressure
Molecular Weight	153.82 AMU	
pH	N/A	
BP/BP Range	77 °C	
MP/MP Range	- 23.0 °C	
Freezing Point	N/A	
Vapor Pressure	143 mmHg	30 °C
Vapor Density	5.32 g/l	
Saturated Vapor Conc.	N/A	

SG/Density	1.59 g/cm3
Bulk Density	N/A
Odor Threshold	21.4 ppm
Volatile%	N/A
VOC Content	N/A
Water Content	N/A
Solvent Content	N/A
Evaporation Rate	N/A
Viscosity	2.03 Pas
Surface Tension	32.3 mN/m
Partition Coefficient	Log Kow: 2.83
Decomposition Temp.	N/A
Flash Point	N/A
Explosion Limits	N/A
Flammability	N/A
Autoignition Temp	N/A
Refractive Index	1.46
Optical Rotation	N/A
Miscellaneous Data	N/A
Solubility	Other Solvents: MISCIBLE WITH: ALCOHOL, NAPHTHA SOLUBLE IN ETHANOL, ACETONE, BENZENE, CHLOROFORM,E

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Phosgene gas, Hydrochloric acid.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: Toxic if absorbed through skin. Readily absorbed through skin.
Eye Contact: May cause eye irritation.
Inhalation: Toxic if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: Toxic if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
Liver. Kidneys. Heart. Nerves. Eyes.

SIGNS AND SYMPTOMS OF EXPOSURE
Damage to the eyes. Nausea, dizziness, and headache. Stomach pains, vomiting, diarrhea. Damage to the liver. Damage to the kidneys. Exposure to and/or consumption of alcohol may increase toxic effects. Exposure can cause:

TOXICITY DATA

Oral
Man

429 mg/kg
LDLO
Remarks: Cardiac: Change in rate. Lungs, Thorax, or Respiration:Cyanosis. Kidney, Ureter, Bladder:Interstitial nephritis.

Inhalation
Human
1,000 ppm
LCLO

Inhalation
Human
5 PPH/5M
LCLO

Oral
Rat
2350 mg/kg
LD50

Inhalation
Rat
8,000 ppm
LC50

Skin
Rat
5070 mg/kg
LD50

Intraperitoneal
Rat
1500 UL/KG
LD50

Oral
Mouse
8263 mg/kg
LD50

Inhalation
Mouse
9,526 ppm
LC50

Intraperitoneal
Mouse
572 MG/KG
LD50

Subcutaneous
Mouse
31 GM/KG
LD50
Remarks: Behavioral:Ataxia. Behavioral:Sleep.

Intraperitoneal
Dog
1500 MG/KG
LD50
Remarks: Liver:Liver function tests impaired.

Oral
Rabbit
5760 mg/kg
LD50

Skin
Rabbit
> 20000 mg/kg
LD50

Intravenous
Rabbit
5840 MG/KG
LD50
Remarks: Behavioral:Coma. Behavioral:Excitement. Lungs, Thorax, or Respiration:Dyspnea.

Oral
Guinea pig
5760 mg/kg
LD50

Skin
Guinea pig
>9400 UL/KG
LD50

Intraperitoneal
Chicken
4497 MG/KG
LD50
Remarks: Gastrointestinal:Ulceration or bleeding from small intestine. Gastrointestinal:Other changes.

Oral
Mammal
6000 mg/kg
LD50

Inhalation
Mammal
34,500 mg/m3
LC50

IRRITATION DATA
Skin
Human
Remarks: If not removed promptly, local application of Carbon Tetrachloride to human skin produces distinct pain with erythema, hyperemia and wheal formation followed by vesication.

Skin
Rabbit
4 mg
Remarks: Mild irritation effect

Skin
Rabbit
500 mg
24H
Remarks: Mild irritation effect

Eyes
Rabbit
2.2 mg
30S
Remarks: Mild irritation effect

Eyes
Rabbit
500 mg
24H
Remarks: Mild 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.

Species: Rat
Route of Application: Subcutaneous
Dose: 15600 MG/KG
Exposure Time: 12W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Liver:Tumors.

Species: Mouse
Route of Application: Oral
Dose: 4400 MG/KG
Exposure Time: 19W
Frequency: I
Result: Skin and Appendages: Other: Tumors. Tumorigenic:Neoplastic by RTECS criteria. Liver:Tumors.

Species: Mouse
Route of Application: Parenteral
Dose: 305 GM/KG
Exposure Time: 30W
Frequency: I
Result: Liver:Tumors. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Species: Hamster
Route of Application: Oral
Dose: 9250 MG/KG
Exposure Time: 30W
Frequency: I
Result: Liver:Tumors. Liver:Hepatitis, fibrous (cirrhosis, post-necrotic scarring). Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Species: Mouse
Route of Application: Oral
Dose: 12 GM/KG
Exposure Time: 88D
Frequency: I
Result: Tumorigenic:Neoplastic by RTECS criteria. Liver:Tumors.

Species: Rat
Route of Application: Subcutaneous
Dose: 100 GM/KG
Exposure Time: 25W

Frequency: I
Result: Liver:Tumors. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Species: Rat
Route of Application: Subcutaneous
Dose: 31 GM/KG
Exposure Time: 12W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Liver:Tumors.

Species: Rat
Route of Application: Subcutaneous
Dose: 182 GM/KG
Exposure Time: 70W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Endocrine:Thyroid tumors. Liver:Tumors.

Species: Mouse
Route of Application: Oral
Dose: 8580 MG/KG
Exposure Time: 9W
Frequency: I
Result: Liver:Tumors. Tumorigenic:Neoplastic by RTECS criteria.

Species: Mouse
Route of Application: Oral
Dose: 57600 MG/KG
Exposure Time: 12W
Frequency: I
Result: Tumorigenic:Neoplastic by RTECS criteria. Liver:Tumors.

IARC CARCINOGEN LIST

Rating: Group 2B

NTP CARCINOGEN LIST

Rating: Anticipated to be a carcinogen.

ACGIH CARCINOGEN LIST

Rating: A2

IRIS/EPA CARCINOGEN LIST
Rating: Group B2
Species: Rat, mouse
Route: Gavage

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 3 GM/KG
Route of Application: Oral
Exposure Time: (14D PREG)
Result: Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord).

Species: Rat
Dose: 300 PPM/7H

Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Homeostasis

Species: Rat
Dose: 2384 MG/KG
Route of Application: Parenteral
Exposure Time: (18D PREG)
Result: Specific Developmental Abnormalities: Hepatobiliary system. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

CHRONIC EXPOSURE - MUTAGEN

Species: Rat
Route: Intraperitoneal
Dose: 367 UMOL/KG
Mutation test: DNA

Species: Rat
Route: Subcutaneous
Dose: 31 GM/KG
Exposure Time: 12W
Mutation test: DNA damage

Species: Rat
Dose: 3 MMOL/L
Cell Type: liver
Mutation test: DNA damage

Species: Rat
Route: Intraperitoneal
Dose: 100 MG/KG
Mutation test: Other mutation test systems

Species: Rat
Route: Intraperitoneal
Dose: 100 MG/KG
Mutation test: Unscheduled DNA synthesis

Species: Rat
Route: Oral
Dose: 1400 MG/KG
Mutation test: Unscheduled DNA synthesis

Species: Rat
Route: Oral
Dose: 50 MG/KG
Mutation test: Other mutation test systems

Species: Rat
Route: Subcutaneous
Dose: 31 GM/KG
Exposure Time: 12W
Mutation test: Cytogenetic analysis

Species: Mouse
Route: Intraperitoneal
Dose: 367 UMOL/KG

Mutation test: DNA

Species: Mouse
Dose: 10 UMOL
Cell Type: liver
Mutation test: DNA

Species: Mouse
Route: Oral
Dose: 335 UMOL/KG
Mutation test: DNA damage

Species: Mouse
Dose: 6550 UMOL/L
Cell Type: lymphocyte
Mutation test: DNA damage

Species: Mouse
Route: Oral
Dose: 100 MG/KG
Mutation test: Unscheduled DNA synthesis

Species: Mouse
Route: Oral
Dose: 2 GM/KG
Mutation test: DNA inhibition

Species: Hamster
Dose: 500 UG/L
Cell Type: Embryo
Mutation test: Morphological transformation.

Species: Hamster
Dose: 1600 UMOL/L
Cell Type: lung
Mutation test: SLN

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

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD
Result: Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Species: Rat
Dose: 2 GM/KG
Route of Application: Oral
Exposure Time: (7-8D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rat
Dose: 150 MG/KG
Route of Application: Oral
Exposure Time: (8D PREG)
Result: Maternal Effects: Other effects. Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rat

Dose: 750 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rat
Dose: 250 PPM/8H
Route of Application: Inhalation
Exposure Time: (10-15D PREG)
Result: Effects on Newborn: Weaning or lactation index (e.g., # alive at weaning per # alive at day 4). Effects on Newborn: Viability index (e.g., # alive at day 4 per # born alive).

Species: Rat
Dose: 71500 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (15D MALE)
Result: Paternal Effects: Prostate, seminal vessicle, Cowper's gland, accessory glands. Paternal Effects: Testes, epididymis, sperm duct.

Species: Rat
Dose: 5 GM/KG
Route of Application: Intraperitoneal
Exposure Time: (1D MALE)
Result: Paternal Effects: Other effects on male.

Section 12 - Ecological Information

ACCUMULATION

Bioaccumulation Potential: No indication of bioaccumulation.

ACUTE ECOTOXICITY TESTS

Test Type: LC50 Fish
Species: Pimephales promelas (Fathead minnow)
Time: 96 h
Value: 42 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 48 h
Value: 530 mg/l

Test Type: LC50 Fish
Species: Lepomis macrochirus (Bluegill)
Time: 96 h
Value: 27 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 48 h
Value: 35 mg/l

ODC (OZONE DEPLETING CHEMICAL) - CAA602

Ozone Depleting Chemical: Warning: contains chlorofluorocarbons that may harm the environment.
Ozone Depletion Class: I
Ozone Depletion Group: IV

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: Carbon tetrachloride
UN#: 1846
Class: 6.1
Packing Group: Packing Group II
Hazard Label: Toxic substances.
PIH: Not PIH

IATA
Proper Shipping Name: Carbon tetrachloride
IATA UN Number: 1846
Hazard Class: 6.1
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: T-N
Indication of Danger: Toxic. Dangerous for the environment.
R: 23/24/25-40-48/23-59-52/53
Risk Statements: Toxic by inhalation, in contact with skin and if swallowed. Limited evidence of a carcinogenic effect. Toxic: danger of serious damage to health by prolonged exposure through inhalation. Dangerous for the ozone layer. Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 23-36/37-45-59-61
Safety Statements: Do not breathe vapor. Wear suitable protective clothing and gloves. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Refer to manufacturer/supplier for information on recovery/recycling. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Toxic. Dangerous for the environment.
Risk Statements: May cause cancer. Toxic by inhalation, in contact with skin and if swallowed. Toxic: danger of serious damage to health by prolonged exposure through inhalation. Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Dangerous for the ozone layer.
Safety Statements: Do not breathe vapor. Wear suitable protective clothing and gloves. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Refer to manufacturer/supplier for information on recovery/recycling. Avoid release to the environment. Refer to special instructions/safety data sheets.
US Statements: Probable Carcinogen (US). Calif. Prop. 65 carcinogen. Readily absorbed through skin. Target organ(s):

Liver. Kidneys.

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.