MATERIAL SAFETY DATA SHEET

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Section 1 - Product and Company Information

Product Name	1,2-DICHLOROETHANE, 99+%, A.C.S. REAGENT
Product Number	319929
Brand	SIAL
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
1,2-DICHLOROETHANE	107-06-2	Yes

Formula: C2H4Cl2

Synonyms: Aethylenchlorid (German) * 1,2-Bichloroethane * Bichlorure d'ethylene (French) * Borer sol * Brocide * Chlorure d'ethylene (French) * Cloruro di ethene (Italian) * 1,2-DCE * Destruxol borer-sol * 1,2-Dichloorethaan (Dutch) * 1,2-Dichlor-aethan (German) * Dichloremulsion * 1,2-Dichlorethane * Di-chlor-mulsion * Dichloro-1,2-ethane (French) * alpha,beta-Dichloroethane * sym-Dichloroethane * 1,2-Dichloroethane (OSHA) * 1,2-Dicloroetano (Italian) * Dutch liquid * Dutch oil * EDC * ENT 1,656 * Ethane dichloride * Ethyleendichloride (Dutch) * Ethylene chloride * Ethylene dichloride (ACGIH:OSHA) * 1,2-Ethylene dichloride * Glycol dichloride * NCI-C00511 * RCRA waste number U077

RTECS Number: KI0525000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Flammable (USA) Highly Flammable (EU). Toxic.
May cause cancer. Also harmful if swallowed. Harmful by inhalation. Irritating to respiratory system and skin. Risk of serious damage to eyes.
Probable Carcinogen (US). Target organ(s): Heart. Nerves. Calif. Prop. 65 carcinogen.

HMIS RATING

HEALTH: 2*
FLAMMABILITY: 3
REACTIVITY: 0

NFPA RATING

HEALTH: 2

FLAMMABILITY: 3
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

FLAMMABLE HAZARDS
Flammable Hazards: Yes

EXPLOSION HAZARDS
Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions.

FLASH POINT
55.4 ˚F 13 ˚C Method: closed cup

EXPLOSION LIMITS
Lower: 6.2 % Upper: 15.6 %

AUTOIGNITION TEMP
413 ˚C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

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

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area. Shut off all sources of ignition. Use nonsparking tools.

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
Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. 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. Keep away from heat, sparks, and open flame. Store under nitrogen.

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-air	TWA	50 PPM (200 MG/M3)
USA	OSHA.	PEL	8H TWA 50 PPM;CL 100 PPM;PK 20
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	1 PPM
		STEL	2 PPM

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	50 mg/m3
Poland		NDSCh	-
Poland		NDSP	

Section 9 - Physical/Chemical Properties

Appearance	Physical State: Clear liquid Color: Colorless	
Property	**Value**	**At Temperature or Pressure**
Molecular Weight	98.96 AMU	
pH	N/A	
BP/BP Range	82.0 - 84.0 ˚C	
MP/MP Range	- 35.0 ˚C	
Freezing Point	N/A	
Vapor Pressure	87 mmHg	25 ˚C
Vapor Density	3.4 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	1.253 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	55.4 ˚F 13 ˚C	Method: closed cup
Explosion Limits	Lower: 6.2 % Upper: 15.6 %	
Flammability	N/A	
Autoignition Temp	413 ˚C	
Refractive Index	1.444	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

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, Hydrogen chloride gas.

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.
Eye Contact: Causes severe eye irritation.
Inhalation: Harmful if inhaled. Material is irritating to mucous membranes and upper respiratory tract.
Ingestion: Harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
Heart. Liver. Kidneys. Central nervous system. Pancreas.

SIGNS AND SYMPTOMS OF EXPOSURE
Conjunctivitis. Pulmonary edema. Effects may be delayed. Irregular breathing. Ingestion can cause gastrointestinal disorders, nausea, and vomiting. Increased liver enzymes. Weakness. Drowsiness. Heavy or prolonged skin exposure may result in the absorption of harmful amounts of material. Convulsions. A simple asphyxiant, exposure can cause anesthetic action, difficulty in breathing, headache, and dizziness. Prolonged or repeated contact with skin can cause defatting and dermatitis. Contact with eyes can cause redness, tearing, and blurred vision. Ingestion may cause gastrointestinal irritation. CNS depression. Paresthesia. Somnolence.

TOXICITY DATA

Oral
Human
286 mg/kg
LDLO
Remarks: Gastrointestinal:Ulceration or bleeding from stomach. Gastrointestinal:Nausea or vomiting. Liver:Fatty liver degeneration.

Oral
Man
714 mg/kg
LDLO
Remarks: Cardiac: Change in rate. Lungs, Thorax, or Respiration:Cyanosis. Behavioral:Somnolence (general depressed activity).

Oral
Rat
670 mg/kg
LD50

Inhalation
Rat
1,000 ppm
LC50
Remarks: Behavioral:Coma. Lungs, Thorax, or Respiration:Cyanosis. Nutritional and Gross Metabolic:Changes in:Body temperature decrease.

Intraperitoneal
Rat
807 MG/KG
LD50

Subcutaneous
Rat
1 GM/KG
LD50
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Behavioral:Ataxia. Behavioral:General anesthetic.

Oral
Mouse

413 mg/kg
LD50
Remarks: Liver:Other changes. Lungs, Thorax, or Respiration:Other changes.

Intraperitoneal
Mouse
470 MG/KG
LD50

Oral
Dog
5700 mg/kg
LD50
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Behavioral:General anesthetic. Behavioral:Ataxia.

Inhalation
Monkey
3,000 ppm
LC50

Oral
Rabbit
860 mg/kg
LD50

Skin
Rabbit
2800 mg/kg
LD50
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Lacrimation. Behavioral:General anesthetic. Behavioral:Ataxia.

IRRITATION DATA

Skin
Rabbit
625 mg
Remarks: Open irritation test

Skin
Rabbit
500 mg
24H
Remarks: Mild irritation effect

Eyes
Rabbit
63 mg
Remarks: Severe 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: Oral
Dose: 5286 MG/KG
Exposure Time: 69W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Gastrointestinal:Tumors. Skin and Appendages: Other: Tumors.

Species: Rat
Route of Application: Inhalation
Dose: 5 PPM
Exposure Time: 7H/78W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Other: Tumors. Blood:Leukemia

Species: Mouse
Route of Application: Oral
Dose: 3536 MG/KG
Exposure Time: 78W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors. Skin and Appendages: Other: Tumors.

Species: Mouse
Route of Application: Inhalation
Dose: 5 PPM
Exposure Time: 7H/78W
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration:Tumors. Skin and Appendages: Other: Tumors.

Species: Mouse
Route of Application: Skin
Dose: 1120 GM/KG
Exposure Time: 74W
Frequency: I
Result: Skin and Appendages: Other: Tumors. Lungs, Thorax, or Respiration:Tumors. Tumorigenic:Neoplastic by RTECS criteria.

Species: Rat
Route of Application: Oral
Dose: 38 GM/KG
Exposure Time: 78W
Frequency: I
Result: Gastrointestinal:Tumors. Vascular:Tumors. Tumorigenic:Carcinogenic by RTECS criteria.

Species: Mouse
Route of Application: Oral
Dose: 76 GM/KG
Exposure Time: 78W
Frequency: I
Result: Tumorigenic Effects: Uterine tumors Skin and Appendages: Other: Tumors. Tumorigenic:Carcinogenic by RTECS criteria.

Species: Rat

Route of Application: Oral
Dose: 18 GM/KG
Exposure Time: 78W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria.
Vascular:Tumors. Gastrointestinal:Tumors.

Species: Mouse
Route of Application: Oral
Dose: 38 GM/KG
Exposure Time: 78W
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Skin and Appendages: Other: Tumors. Tumorigenic Effects: Uterine tumors

IARC CARCINOGEN LIST

Rating: Group 2B

NTP CARCINOGEN LIST

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

ACGIH CARCINOGEN LIST

Rating: A4

CHRONIC EXPOSURE - MUTAGEN
Result: Laboratory experiments have shown mutagenic effects.

Species: Human
Dose: 5 ML/L
Cell Type: lymphocyte
Mutation test: DNA inhibition

Species: Human
Dose: 100 MG/L
Cell Type: lymphocyte
Mutation test: Mutation in mammalian somatic cells.

Species: Rat
Route: Oral
Dose: 150 MG/KG
Mutation test: DNA damage

Species: Rat
Route: Inhalation
Dose: 150 PPM
Exposure Time: 6H
Mutation test: DNA damage

Species: Rat
Dose: 130 UMOL/L
Cell Type: liver
Mutation test: Unscheduled DNA synthesis

Species: Mouse
Route: Intraperitoneal
Dose: 300 MG/KG
Mutation test: specific locus test

Species: Mouse
Route: Intraperitoneal
Dose: 2 MMOL/KG
Mutation test: DNA damage

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

Species: Mouse
Route: Intraperitoneal
Dose: 29 MG/KG
Mutation test: DNA inhibition

Species: Mouse
Dose: 80 MG/KG
Cell Type: S. typhimurium
Mutation test: Body fluid assay

Species: Hamster
Dose: 2 MMOL/L (+S9)
Cell Type: ovary
Mutation test: Mutation in microorganisms

Species: Hamster
Dose: 200 UL/PLATE
Cell Type: Embryo
Mutation test: Morphological transformation.

Species: Hamster
Dose: 1 GM/L
Cell Type: lung
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 40 MMOL/L
Cell Type: ovary
Mutation test: Mutation in mammalian somatic cells.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 300 PPM/7H
Route of Application: Inhalation
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: 208 MG/M3/6H
Route of Application: Inhalation
Exposure Time: (2W PRE/1-21D PREG)
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: LC50 Fish
Species: Onchorhynchus mykiss (Rainbow trout)
Time: 96 h
Value: 225 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 24 h
Value: 540 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. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Ethylene dichloride
UN#: 1184
Class: 3
Packing Group: Packing Group II
Hazard Label: Flammable liquid
Hazard Label: Toxic substances.
PIH: Not PIH

IATA
Proper Shipping Name: Ethylene dichloride
IATA UN Number: 1184
Hazard Class: 3
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: F-T
Indication of Danger: Highly Flammable. Toxic.
R: 45-11-22-36/37/38
Risk Statements: May cause cancer. Highly flammable. Also harmful if swallowed. Irritating to eyes, respiratory system and skin.
S: 53-45
Safety Statements: Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Flammable (USA) Highly Flammable (EU). Toxic.
Risk Statements: May cause cancer. Also harmful if swallowed. Harmful by inhalation. Irritating to respiratory system and skin. Risk of serious damage to eyes.
Safety Statements: Keep away from sources of ignition - no smoking. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. In case of accident or if you feel

unwell, seek medical advice immediately (show the label where possible).
US Statements: Probable Carcinogen (US). Target organ(s): Heart. Nerves. 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.