

MATERIAL SAFETY DATA SHEET

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Version 1.9

Section 1 - Product and Company Information

Product Name CYCLOHEXANE, ANHYDROUS, 99.5%
Product Number 227048
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
CYCLOHEXANE	110-82-7	Yes

Formula C6H12
Synonyms Benzene, hexahydro- * Cicloesano (Italian) *
Cyclohexaan (Dutch) * Cyclohexan (German) *
Cyclohexane (ACGIH:OSHA) * Cykloheksan (Polish) *
Hexahydrobenzene * Hexamethylene * Hexanaphthene
* RCRA waste number U056

RTECS Number: GU6300000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Flammable (USA) Highly Flammable (EU). Harmful. Dangerous for the environment.

Irritating to skin. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness.

Target organ(s): Lungs. Central nervous system.

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. Do not induce vomiting.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE

In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

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 can occur under fire conditions. In advanced or massive fires the area should be evacuated and the fire should be fought from a remote explosion-resistant location.

FLASH POINT

- 0.4 °F - 18.0 °C Method: closed cup

EXPLOSION LIMITS

Lower: 1 % Upper: 9 %

AUTOIGNITION TEMP

260 °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.
Specific Method(s) of Fire Fighting: Use water spray to cool fire-exposed containers.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area. Shut off all sources of ignition.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

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. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE

Suitable: Keep container closed. Keep away from heat, sparks, and open flame. Store in a cool dry place. Store under nitrogen.

SPECIAL REQUIREMENTS

Store under inert gas.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS

Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

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 thoroughly after handling. Wash contaminated clothing before reuse.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	300 PPM
USA	MSHA Standard-air	TWA	300 PPM (1050 MG/M3)
USA	OSHA.	PEL	8H TWA 300 PPM (1050 MG/M3)
New Zealand	OEL		
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	300 PPM

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	300 MG/M3
Poland		NDSch	1000 MG/M3
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance Physical State: Liquid
Color: Colorless

Property	Value	At Temperature or Pressure
Molecular Weight	84.16 AMU	
pH	N/A	
BP/BP Range	80.7 °C	760 mmHg
MP/MP Range	6.5 °C	
Freezing Point	N/A	
Vapor Pressure	77 mmHg	20 °C
Vapor Density	2.9 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.778 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 Log Kow: 3.44	
Decomposition Temp.	N/A	
Flash Point	- 0.4 °F - 18.0 °C	Method: closed cup
Explosion Limits	Lower: 1 % Upper: 9 %	
Flammability	N/A	
Autoignition Temp	260 °C	
Refractive Index	1.426	
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.

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: May cause eye irritation.

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

Ingestion: May be harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)

Lungs. Central nervous system.

SIGNS AND SYMPTOMS OF EXPOSURE

Exposure can cause CNS depression, drowsiness, light-headedness, and irritability. Gastrointestinal disturbances. Lung irritation, chest pain, and edema which may be fatal.

TOXICITY DATA

Inhalation

Rat

13,900 mg/m³

LC50

Skin

Rabbit

> 2,000 mg/kg

LD50

Oral

Rat

12705 mg/kg

LD50

Oral

Mouse

813 mg/kg

LD50

Inhalation

Mammal

70,000 mg/m³

LC50

IRRITATION DATA

Skin

Rabbit

Remarks: No irritation effect

Eyes

Rabbit

Remarks: Mild irritation effect

Skin

Rabbit

1,548 mg

2D

I

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: EC50 Daphnia

Species: Daphnia magna

Time: 48 h

Value: 3.78 mg/l

Test Type: LC50 Fish

Species: Lepomis macrochirus (Bluegill)

Time: 96 h

Value: 34.7 mg/l

Test Type: LC50 Fish

Species: Pimephales promelas (Fathead minnow)

Time: 96 h

Value: 32.0 - 93.0 mg/l

ELIMINATION

Classification: Not significantly biodegradable.

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: Cyclohexane
UN#: 1145
Class: 3
Packing Group: Packing Group II
Hazard Label: Flammable liquid
PIH: Not PIH

IATA

Proper Shipping Name: Cyclohexane
IATA UN Number: 1145
Hazard Class: 3
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION

Symbol of Danger: F-Xn-N
Indication of Danger: Highly Flammable. Harmful. Dangerous for the environment.
R: 11-38-65-67-50/53
Risk Statements: Highly flammable. Irritating to skin. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 9-16-25-33-60-61-62
Safety Statements: Keep container in a well-ventilated place. Keep away from sources of ignition - no smoking. Avoid contact with eyes. Take precautionary measures against static discharges. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Flammable (USA) Highly Flammable (EU). Harmful. Dangerous for the environment.
Risk Statements: Irritating to skin. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Harmful: may cause lung damage if swallowed. Vapors may cause drowsiness and dizziness.
Safety Statements: Keep container in a well-ventilated place. Keep away from sources of ignition - no smoking. Avoid contact with eyes. Take precautionary measures against static

discharges. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

US Statements: Target organ(s): Lungs. Central nervous system.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes

DEMINIMIS: 1 %

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

TSCA INVENTORY ITEM: Yes

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 2006 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.