



Safety Data Sheet

1. PRODUCT IDENTIFICATION

| | |
|--------------|---|
| Name | Cyclohexane |
| Synonyms | hexahydrobenzene, benzenehexahydride – <i>rarely, if ever, used</i> |
| CAS# | 110-82-7 |
| Europe EC# | 203-806-2 |
| Product Uses | solvent for oils, fats, waxes, resins; reagent |

EMERGENCY INFORMATION

| | | |
|--------|------------------------|----------------|
| Canada | Call CANUTEC (collect) | (613) 996-6666 |
| U.S.A. | Call CHEMTREC | (800) 424-9300 |

2. HAZARDS

| | | | | | |
|----------------------|---|---|---|--|--|
| GHS Class (Category) | <i>flammable</i> (2) | <i>skin irritant</i> (2) | <i>aspiration</i> (1) | <i>STOT</i> (3) | <i>acute aquatic*</i> (2) |
| Signal Words | DANGER | WARNING | WARNING | WARNING | no Signal Word no Pictogram |
| Hazard Statements | <i>highly flammable liquid & vapour</i> (H225) | <i>causes skin irritation</i> (H315) | <i>may be fatal if swallowed & enters airways</i> (H304) | <i>may cause drowsiness or dizziness</i> (H336) | <i>toxic to aquatic life*</i> (H401) |



NOTE:

Some Safety Data Sheets classify cyclohexane as **chronic aquatic toxic, Category 1**: very toxic to aquatic life (H410). However, its acute toxicity is low (see Part 12), and, as it is water insoluble, buoyant & volatilises rapidly, it is hard to see how it can be “very toxic to aquatic life”.

GHS Precautionary Statements for Labelling

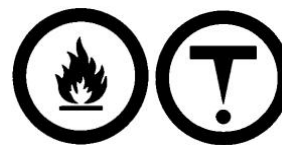
| | |
|-------------|--|
| P210 | Keep away from heat, sparks, open flames and hot surfaces. No smoking. |
| P240, P241 | Ground or bond container & receiving equipment. Use explosion-proof electrical, ventilating & lighting equipment. |
| P242, P243 | Use only non-sparking tools. Take precautionary measures against static discharge. |
| P262, P264 | Do not get in eyes, on skin or on clothing. Wash thoroughly after handling. |
| P270, P280 | Do not eat, drink or smoke when using this product. Wear eye protection, protective gloves & clothing of nitrile or “Viton”. |
| P273, P391 | Avoid release to the environment. Collect spillage. |
| P313 & P333 | If skin irritation or rash occurs, get medical advice/attention. |

Canada – WHMIS

B 2, D 2B

Key:

B 2 – Flash Point <38°C, **B 3** – Flash Point >38°C & <93°C
D 1 – Immediately Toxic, **D 2** – Chronic Toxicity
C – Oxidising Substance, **E** – Corrosive



3. COMPOSITION

| | % | TWAEV / TLV ppm / mg/m ³ | LD ₅₀ (mg/kg) ORAL | LD ₅₀ (mg/kg) SKIN | LC ₅₀ ppm INHALATION |
|-------------|------|--|----------------------------------|----------------------------------|------------------------------------|
| Cyclohexane | 100% | 100 / 344 | 5500 ¹ | 18,000 ² | 20,300 |

Please ensure that this SDS is given to, and explained to people using this product.

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4. FIRST AID

- SKIN: Wash with plenty of water. Remove contaminated clothing and do not reuse until thoroughly laundered.
- EYES: Wash eyes with plenty of water, holding eyelids open. Seek medical assistance if there is any irritation.
- INHALATION: Remove from contaminated area promptly. **CAUTION: Rescuer must not endanger himself!** If breathing stops, administer artificial respiration and seek medical aid promptly.
- INGESTION: Give plenty of water to dilute product. Do not induce vomiting (NOTE below). Keep victim quiet. If vomiting occurs, lower victim's head below hips to prevent inhalation of vomited material. Seek medical help promptly.

Inadvertent inhalation of vomited material may seriously damage the lungs. The danger of this is greater than the risk of poisoning through absorption of this relatively low-toxicity substance. The stomach should only be emptied under medical supervision, and after the installation of an airway to protect the lungs.

5. FIRE FIGHTING & FLAMMABILITY

- Flash Point -20°C / -4°F (closed cup); also -18°C / -1°F & other higher values
- Autoignition Temperature 245°C – 260°C / 473°F – 500°F
- Flammable Limits 1.3% – 8%
- Combustion Products carbon monoxide, nitrogen oxides, smoke, part oxidised hydrocarbon fragments
- Firefighting Precautions foam, dry chemical, water fog, water spray only to cool & dilute, product floats on water – water jet spreads flames; firefighters must wear SCBA
- Static Charge Accumulation readily accumulates static charge on agitation or pumping; **static discharge can cause ignition**

6. ACCIDENTAL RELEASE MEASURES

Serious Fire Potential: blanket spill with foam as a precaution against accidental ignition. Take extreme care to avoid sparks – do not operate (turn on OR off) electrical appliances near spill, unless explosion proof.

- Leak Precaution dyke to control spillage and prevent environmental contamination
- Handling Spill ventilate contaminated area; recover free liquid with suitable pumps; absorb residue on an inert sorbent, sweep & pick up using plastic or aluminium shovel, & store in closed containers for recycling or disposal

7. HANDLING & STORAGE

Store in a cool, dry environment, away from sources of ignition, heat & oxidising agents. **Only use non-sparking bronze or aluminium hand tools. All electrical & mechanical equipment (including lighting, switchgear and forklift trucks) used with or around this product must be explosion-proof.**

Always ground or electrically bond the source container, receiving container and transfer pump before transferring contents. Avoid splashing by ensuring that the product nozzle is below the surface in the receiving container.

Avoid breathing product vapour. Use with adequate ventilation. If dealing with a spill, and ventilation is impossible or impractical, wear a suitable respirator with an organic vapour cartridge.

Never cut, drill, weld or grind on or near this container. Avoid contact with skin and wash work clothes frequently. An eye bath and safety shower must be available near the workplace.

WARNING: Cyclohexane has a mild, pleasant odour, which may not warn of hazard!

WHEN FILLING STORAGE TANKS WITH THIS PRODUCT, IN ADDITION TO NORMAL GROUNDING PROCEDURES, READ THE FOLLOWING:
This product may form an explosive mixture inside a bulk storage tank. Prior to filling a bulk storage tank with this product, consider ventilating the headspace with nitrogen. In addition, consider asking the supplier to put an anti-static additive in the product when you order. If the bulk tank has a floating product level indicator, this should be inspected regularly. The float MUST HAVE a firmly fixed ground wire connecting it to its support cable. This connection must be free of corrosion.

For more detail, consult NFPA 77, 2007: "Recommended Practice on Static Electricity"

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8. EXPOSURE CONTROL & PERSONAL PROTECTION

| | | | |
|---------------|---|--------------|------------|
| Ontario TWAEV | 100ppm / 334mg/m ³ | Ontario STEV | not listed |
| ACGIH TLV | 100ppm / 334mg/m ³ | ACGIH STEL | not listed |
| OSHA PEL | 300ppm / 1050mg/m ³ | OSHA STEL | not listed |
| Ventilation | product should be used in sealed equipment; mechanical ventilation (<i>explosion-proof</i>) may be required to control airborne titre to regulated limits depending on handling procedure; respirators with organic vapour cartridges must be available for “escape” purposes should ventilation fail; <i>store respirators in air-tight containers (eg: “Tupperware” or “ZipLock”) to preserve cartridge “freshness”</i> | | |
| Hands | nitrile or “Viton” gloves recommended – <i>other types may also protect; confirm suitability with supplier</i> | | |
| Eyes | safety glasses with side shields – <i>always protect the eyes</i> | | |
| Clothing | no special protective clothing required | | |

9. PHYSICAL PROPERTIES

| | |
|---|---|
| Odour & Appearance | clear, colourless liquid with pleasant gasoline-like odour |
| Odour Threshold | 10-750ppm – <i>huge range for detection; odour is an unreliable guide to hazard</i> |
| Vapour Pressure | 77mmHg / 10.3kPa (20°C / 68°F) |
| Evaporation Rate (<i>Butyl Acetate = 1</i>) | 5.6 |
| Vapour Density (air = 1) | 2.9 |
| Boiling Range | 81°C / 177°F |
| Freezing Point | 6.6°C / 44°F |
| Specific Gravity | 0.780 (20/20°C) |
| Water Solubility | 5.5milligrams/litre (20°C / 68°F) – <i>virtually water-insoluble</i> |
| Also soluble in | most organic solvents |
| Log P _{o/w} (Octanol/H ₂ O partition) | 3.44 |
| Viscosity | 1.0centipoise (20°C / 68°F) – <i>thin very mobile liquid</i> |
| pH | none – <i>(does not liberate hydrogen ions when dissolved)</i> |
| Conversion Factor | 1ppm = 3.44g/m ³ |
| Molecular Weight | 84grams per mole |

10. REACTIVITY

| | |
|--------------------------------|--|
| Dangerously Reactive With | strong oxidising agents; <i>liquid NO₂ added to hot cyclohexane causes explosions</i> |
| Also Reactive With | none known |
| Stability | stable; will not polymerize |
| Decomposes in Presence of | not known |
| Decomposition Products | none apart from Hazardous Combustion Products |
| Sensitive to Mechanical Impact | no |

11. TOXICITY**Effects, Acute Exposure**

| | |
|-------------------------------|---|
| Skin Contact | degreasing – irritating, but little to no effect on intermittent contact |
| Skin Absorption | yes, but very low toxicity by this route |
| Eye Contact | liquid slightly irritating; vapour irritating above 300ppm |
| Inhalation | irritating above 250ppm; low toxicity; <i>high concentrations may cause headache, dizziness, drowsiness, intoxication</i> |
| Ingestion | as for inhalation, plus nausea & (temporary) laxative effect |
| LD ₅₀ (oral) | 12,850mg/kg (rat), 815mg/kg (mouse) ¹ , 5500mg/kg (rabbit) |
| LD ₅₀ (skin) | >18,000mg/kg (rabbit) ² |
| LC ₅₀ (inhalation) | 20,300ppm (mouse), 26,000 (rabbit) |

1. Oral LD₅₀ test data vary widely between species. Relevance to human toxicity cannot be assumed; 815mg/kg value appears unrealistic.

2. Given both as >18,000mg/kg & as >18,000mg/kg in 2 sources. One may be a typo. Even the lower value represents extremely low toxicity.

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11. TOXICITY, cont'd**Effects, Chronic Exposure**

| | |
|----------------------|--|
| General | prolonged exposure may cause dermatitis through degreasing action; suggestion of peripheral neuropathy on long exposure to high concentrations, but not expected in industrial use |
| Sensitising | not a sensitiser in humans or animals |
| Carcinogen/Tumorigen | not considered a tumorigen or a carcinogen in humans or animals |
| Reproductive Effect | no known effect in humans or animals |
| Mutagen | no known effect on humans or animals |
| Synergistic With | not known |

12. ECOLOGICAL INFORMATION

| | |
|------------------------------------|--|
| Bioaccumulation | cyclohexane should be a moderate bioaccumulator, however rapid volatilisation, low water solubility & great buoyancy (<i>floats on water</i>) limit this |
| Biodegradation | biodegradation data for cyclohexane is highly variable; from 10% in 10hr to highly resistant to biological attack; in one study, 45% biodegradation was seen in 8 days when cyclohexane was added to gasoline & observed; <i>rapid volatilization from soil or water limits possibility for biodegradability</i> |
| Abiotic Degradation | reacts with atmospheric hydroxyl radicals; estimated ½-life in air is 45hr |
| Mobility in soil, water | water insoluble, but moderately mobile in soil & water |
| Aquatic Toxicity | |
| LC ₅₀ (Fish, 96hr) | 4.5 ¹ , 93-117mg/litre (Pimephales promelas), 57.7mg/litre (Poecilia reticulata), 9mg/litre (Oryzias latipes) ¹ 55mg/litre (Leuciscus idus, 48hr) ¹ & others |
| EC ₅₀ (Crustacea, 24hr) | 7.3mg/litre (Artemia salina) ¹ , 0.9 ¹ & 3.8 ¹ mg/litre (Daphnia magna, 48hr), 135mg/litre (Daphnia magna, 96hr) |
| EC ₅₀ (Algæ) | 38mg/litre (Chlamidomonas sp.), 32mg/litre (Chlorella vulgaris), 9.3mg/litre (Pseudokirchnerella subcapitata) ¹ , >500mg/litre (Scenedesmus subspicatus) ¹ |
| EC ₅₀ (Bacteria) | 97mg/litre (Nitrosomonas sp.), 200mg/litre (Photobacterium phosphoreum), |

13. DISPOSAL

| | |
|----------------|--|
| Waste Disposal | do not flush to sewer , recycle solvent if possible, may be incinerated in approved facility |
| Containers | Drums should be reused. Recondition and pressure test by a licensed reconditioner prior to re-use. Pails must be vented and thoroughly dried prior to crushing and recycling. IBCs (intermediate bulk containers): polyethylene bottle must be pressure tested & recertified at 30 months. Replace at 60 months (5yrs). Steel containers must be inspected, pressure tested & recertified every 5 years. <i>Never cut, drill, weld or grind on or near this container, even if empty</i> |

14. TRANSPORT CLASSIFICATION

| | | |
|-------------------------|----------------------------------|------------------------|
| Canada TDG | PIN | UN - 1145 |
| AND | Shipping Name | cyclohexane |
| U.S.A. 49 CFR | Class & Packing Group | 3 (II) |
| Marine Pollutant | | not a marine pollutant |
| ERAP Required | | NO |



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15. REGULATIONS

| | |
|---------------|--------------|
| Canada DSL | on inventory |
| U.S.A. TSCA | on inventory |
| Europe EINECS | on inventory |

U.S.A. Regulations:

Immediately Dangerous to Life or Health: 1300 ppm

Allowable Tolerances: Cyclohexane is exempted from the requirement of a tolerance when used as a solvent, cosolvent in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops only.

OSHA Standards: Permissible Exposure Limit: Table Z-1 8-Hr Time Weighted Avg: 300 ppm (1050 mg/cu m).

NIOSH Recommendations: Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 300 ppm (1050 mg/cu m).

Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 100 ppm. Excursion Limit Recommendation: Excursions in worker exposure levels may exceed 3 times the TLV-TWA for no more than a total of 30 minutes during a work day, and under no circumstances should they exceed 5 times the TLV-TWA, provided that the TLV-TWA is not exceeded.

Atmospheric Standards: This action promulgates standards of performance for equipment leaks of Volatile Organic Compounds (VOC) in the Synthetic Organic Chemical Manufacturing Industry (SOCMI). The intended effect of these standards is to require all newly constructed, modified, and reconstructed SOCMI process units to use the best demonstrated system of continuous emission reduction for equipment leaks of VOC, considering costs, non air quality health and environmental impact and energy requirements. Cyclohexane is produced, as an intermediate or a final product, by process units covered under this subpart.

CERCLA Reportable Quantities: Persons in charge of vessels or facilities are required to notify the National Response Center (NRC) immediately, when there is a release of this designated hazardous substance, in an amount equal to or greater than its reportable quantity of 1000 lb or 454 kg. The toll free number of the NRC is (800) 424-8802; In the Washington D.C. metropolitan area (202) 426-2675. The rule for determining when notification is required is stated in 40 CFR 302.4 (section IV. D.3.b).

TSCA Requirements: Pursuant to section 8(d) of TSCA, EPA promulgated a model Health and Safety Data Reporting Rule. The section 8(d) model rule requires manufacturers, importers, and processors of listed chemical substances and mixtures to submit to EPA copies and lists of unpublished health and safety studies. Cyclohexane is included on this list. A testing consent order is in effect for cyclohexane for health effects testing and environmental release reports. FR citation: 11/18/94.

RCRA Requirements: As stipulated in 40 CFR 261.33, when cyclohexane, as a commercial chemical product or manufacturing chemical intermediate or an off-specification commercial chemical product or a manufacturing chemical intermediate, becomes a waste, it must be managed according to Federal and/or State hazardous waste regulations. Also defined as a hazardous waste is any residue, contaminated soil, water, or other debris resulting from the cleanup of a spill, into water or on dry land, of this waste. Generators of small quantities of this waste may qualify for partial exclusion from hazardous waste regulations (40 CFR 261.5).

FIFRA Requirements: Cyclohexane is exempted from the requirement of a tolerance when used as a solvent, cosolvent in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops only.

FDA Requirements: Cyclohexane is an indirect food additive for use only as a component of adhesives.

16. OTHER INFORMATION

Prepared for Megaloid Laboratories by Peter Bursztyn, (705) 734-1577

Data from RTECS, HSDB (Haz. Substance Data Base), Cheminfo (CCOHS), IUCLID Datasheets (ESIS – European Chem. Substance Info. System), & others.

Preparation Date: **October 2003** Revision Dates: **July 2006, November 2008, November 2011, November 2014**

(1) European Chemicals Agency (ECHA) dossier on Cyclohexane:

http://apps.echa.europa.eu/registered/data/dossiers/DISS-9d9cb612-c593-72ae-e044-00144f67d249/DISS-9d9cb612-c593-72ae-e044-00144f67d249_DISS-9d9cb612-c593-72ae-e044-00144f67d249.html

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