SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form	:	Substance
Trade name	:	Cyclohexane
Chemical name	:	Cyclohexane
CAS No	:	110-82-7
Formula	:	C6H12
Synonyms	:	Hexahydroxylbenzene; / hexahydroxylbenzol; / hexanaphtene; / hexamethylene

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture	:	Solvent used in adhesive formulations and as a dehydrating alcohol

1.3. Details of the supplier of the safety data sheet

US office:
Braskem S.A.
5100 Westheimer Rd - Suite 495
Houston, 77056 - USA

Manufacturer:
Braskem S.A.
Rua da União, 756
Mauá, SP, CEP: 09380-900, Brasil

Contact Email	:	productsafety@braskem.com
Emergency Telephone Number (CHEMTREC)	:	1-800-424-9300

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Flam. Liq. 2	H225
Skin Irrit. 2	H315
Muta. 1B	H340
Carc. 1A	H350
STOT SE 3	H336
STOT RE 1	H372
Asp. Tox. 1	H304

Full text of H-statements: see section 16

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :

GHS02 GHS07 GHS08

Signal word (GHS-US) : Danger

Hazard statements (GHS-US) :
H225 - Highly flammable liquid and vapour
H304 - May be fatal if swallowed and enters airways
H315 - Causes skin irritation
H336 - May cause drowsiness or dizziness
H340 - May cause genetic defects
H350 - May cause cancer
H372 - Causes damage to organs through prolonged or repeated exposure

Precautionary statements (GHS-US) :
P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P210 - Keep away from heat, sparks, open flames, hot surfaces. - No smoking
P233 - Keep container tightly closed
P240 - Ground/bond container and receiving equipment
P241 - Use explosion-proof electrical, ventilating equipment

P242 - Use only non-sparking tools
P243 - Take precautionary measures against static discharge
P260 - Do not breathe mist
P261 - Avoid breathing mist
P264 - Wash hands thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear eye protection, protective clothing, protective gloves
P301+P310 - If swallowed: Immediately call a doctor
P302+P352 - If on skin: Wash with plenty of water
P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P308+P313 - If exposed or concerned: Get medical advice/attention
P312 - Call a doctor if you feel unwell
P314 - Get medical advice/attention if you feel unwell
P331 - Do NOT induce vomiting
P332+P313 - If skin irritation occurs: Get medical advice/attention
P362 - Take off contaminated clothing and wash before reuse
P370+P378 - In case of fire: Use dry extinguishing powder, carbon dioxide (CO2), foam to extinguish
P403+P233 - Store in a well-ventilated place. Keep container tightly closed
P403+P235 - Store in a well-ventilated place. Keep cool
P405 - Store locked up
P501 - Dispose of contents/container to comply with applicable local, national and international regulation.

2.3. Other hazards

other hazards which do not result in classification : Exposure to high concentrations may lead to liver and kidney damage and heart muscle degeneration. Do not allow the product to be released into the environment. Attacks some forms of plastics, rubber, and coatings.

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Name : Cyclohexane

CAS No : 110-82-7

Name	Product identifier	%
Non aromatic (Impurity)	Not applicable	≤ 1,15
Total Aromatics (Impurity)	Not applicable	≤ 1
Benzene (Impurity)	(CAS No) 71-43-2	≤ 1

Full text of H-statements: see section 16

3.2. Mixture

Not applicable

4.1. Description of first aid measures

First-aid measures general : Do not induce vomiting. Call a physician immediately.

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing. Evacuate personnel to a safe area. If breathing is difficult, give oxygen. Seek medical attention immediately.

First-aid measures after skin contact : Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention.

First-aid measures after eye contact : Rinse immediately and plentifully with water, also under the eyelids, for at least 20 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention if irritation persists.

First-aid measures after ingestion : If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label. Never give anything by mouth to an unconscious person. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Do not induce vomiting. Call a physician immediately.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries	:	May cause drowsiness or dizziness.
Symptoms/injuries after inhalation	:	Irritation of respiratory tract. Excessive concentrations may cause nervous system depression, headache, and weakness leading to unconsciousness. May have a narcotic effect at high concentrations.
Symptoms/injuries after skin contact	:	Causes skin irritation. Drying up of the skin. Prolonged or repeated contact with the skin may cause dermatitis.
Symptoms/injuries after eye contact	:	May cause slight irritation.
Symptoms/injuries after ingestion	:	May be fatal if swallowed and enters airways. Risk of lung oedema.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically. Exposure to high concentrations may lead to liver and kidney damage and heart muscle degeneration.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	:	carbon dioxide (CO2), dry chemical powder, foam.
Unsuitable extinguishing media	:	Do not use a water jet since it may cause the fire to spread. Cool containers / tanks with spray water if possible.

5.2. Special hazards arising from the substance or mixture

Fire hazard	:	Highly flammable. Keep away from sources of ignition - No smoking. Incomplete combustion releases dangerous carbon monoxide, carbon dioxide and other toxic gases. Highly flammable liquid and vapour.
Explosion hazard	:	oxidizing agents. No flames, no sparks. Eliminate all sources of ignition. May form flammable/explosive vapour-air mixture. Heavier than air, vapours may travel long distances along ground, ignite and flash back to source. This material can accumulate static charge by flow or agitation and can be ignited by static discharge.
Reactivity	:	Highly flammable liquid and vapour.

5.3. Advice for firefighters

Firefighting instructions	:	Cool containers / tanks with spray water if possible.
Protective equipment for firefighters	:	Exposure controls / Personal protection equipment. In case of fire: Wear self-contained breathing apparatus. Refer to section 8. Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures	:	No flames, no sparks. Eliminate all sources of ignition. Avoid any direct contact with the product. For further information refer to section 8 : Exposure-controls/personal protection.

6.1.1. For non-emergency personnel

Protective equipment	:	Complete protective clothing. In case of fire: Wear self-contained breathing apparatus. Refer to section 8.
Emergency procedures	:	Evacuate unnecessary personnel. When leaks or spills occur, only properly protected personnel should remain in the area.

6.1.2. For emergency responders

Protective equipment	:	Do not attempt to take action without suitable protective equipment. Complete protective clothing. In case of fire: Wear self-contained breathing apparatus. For further information refer to section 8: "Exposure controls/personal protection".
Emergency procedures	:	No flames, no sparks. Eliminate all sources of ignition. Evacuate unnecessary personnel. Stop leak if safe to do so.

6.2. Environmental precautions

Avoid release to the environment. Do not allow uncontrolled discharge of product into the environment. Do not allow run-off from fire fighting to enter drains or water courses. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

For containment	:	Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams.

Methods for cleaning up	:	Take up liquid spill into absorbent material. Use only antistatically equipped (spark-free) tools. Use appropriate container to avoid environmental contamination. Keep container tightly closed and in a well-ventilated place. Comply with applicable regulations for solid waste disposal. Notify authorities if product enters sewers or public waters.
Other information	:	Do not allow uncontrolled discharge of product into the environment. Do not allow run-off from fire fighting to enter drains or water courses. Dispose of materials or solid residues at an authorized site.

6.4. Reference to other sections

For further information refer to section 8 : Exposure-controls/personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling	:	Use product in a well-ventilated area only. Avoid formation of vapours. Avoid all unnecessary exposure. Take precautionary measures against static discharge. This material can accumulate static charge by flow or agitation and can be ignited by static discharge.
Hygiene measures	:	Separate working clothes from town clothes. Launder separately. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures	:	Avoid static electricity discharges. Store in dry, cool, well-ventilated area. Use explosion-proof ventilating equipment. Keep away from open flames, hot surfaces and sources of ignition. Do not store near oxidizing agents or acidic material. Ground/bond container and receiving equipment.
Storage conditions	:	Store in tightly closed, properly ventilated containers away from heat, sparks, open flame. Store in a well-ventilated place. Keep cool. Keep container tightly closed. Store locked up.
Incompatible materials	:	Strong oxidizing agents. Strong acid. Bases.
Storage area	:	Keep away from open flames, hot surfaces and sources of ignition. Store in dry, cool, well-ventilated area. Store in tightly closed, leak-proof containers.
Special rules on packaging	:	Bulk transportation shall use a truck with stainless steel or carbon steel tank.
Packaging materials	:	Carbon steel. stainless steel. Glass. Teflon. Viton. Avoid : polypropylene.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Cyclohexane (110-82-7)		
ACGIH	ACGIH TWA (ppm)	100 ppm
ACGIH	Remark (ACGIH)	CNS impair
OSHA	OSHA PEL (TWA) (mg/m³)	1050 mg/m³
OSHA	OSHA PEL (TWA) (ppm)	300 ppm

Benzene (71-43-2)		
ACGIH	ACGIH TWA (ppm)	0,5 ppm
ACGIH	ACGIH STEL (ppm)	2,5 ppm
OSHA	OSHA PEL (TWA) (ppm)	10 ppm 1 ppm
OSHA	OSHA PEL (STEL) (ppm)	5 ppm (see 29 CFR 1910.1028)
OSHA	OSHA PEL (Ceiling) (ppm)	25 ppm
DNEL	DNEL	234 mg/l
PNEC	PNEC	1,9 mg/l

8.2. Exposure controls

Appropriate engineering controls	:	Use only in well-ventilated areas. Use explosion-proof electrical equipment. Use explosion-proof lighting equipment. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Contact lenses should not be worn.
Personal protective equipment	:	Protective clothing. Protective goggles. An approved organic vapour respirator/supplied air or self-contained breathing apparatus must be used when vapour concentration exceeds applicable exposure limits. Gas mask.

Materials for protective clothing	:	anti-static clothing in natural material or heat resistant synthetic material.
Hand protection	:	Wear suitable gloves resistant to chemical penetration. Use neoprene or rubber gloves. Protective gloves of PVC.
Eye protection	:	Chemical goggles or safety glasses. Wear face protection.
Skin and body protection	:	Chemical resistant suit. Boots. PVC (Polyvinyl chloride).
Respiratory protection	:	An approved organic vapour respirator/supplied air or self-contained breathing apparatus must be used when vapour concentration exceeds applicable exposure limits. Wear respiratory protection.
Environmental exposure controls	:	Do not allow into drains or water courses. Do not allow run-off from fire fighting to enter drains or water courses. Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	:	Liquid
Colour	:	Colourless
Odour	:	pungent
pH	:	No data available
Relative evaporation rate (butyl acetate=1)	:	No data available
Melting point	:	7 °C
Freezing point	:	No data available
Boiling point	:	81 °C
Flash point	:	-20 °C
Auto-ignition temperature	:	245 °C
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	No data available
Vapour pressure	:	95 mmHg @ 20°C
Relative vapour density at 20 °C	:	2,9 (air=1)
Relative density	:	No data available
Density	:	0,775 - 0,785 (water=1) @ 20°C
Solubility	:	insoluble in water. Soluble in : Acetone.
Log Pow	:	3,44
Log Kow	:	No data available
Viscosity, kinematic	:	No data available
Viscosity, dynamic	:	No data available
Explosive properties	:	No data available
Oxidising properties	:	No data available
Explosive limits	:	1,3 - 8,4 vol %

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Highly flammable liquid and vapour.

10.2. Chemical stability

Stable at room temperature. The product is stable at normal handling and storage conditions. Keep container tightly closed and dry.

10.3. Possibility of hazardous reactions

No polymerization. Hazardous polymerization may occur if exposure to fire conditions.

10.4. Conditions to avoid

Avoid ignition sources. Avoid contact with hot surfaces. Heat. No flames, no sparks. Eliminate all sources of ignition. Avoid the build-up of electrostatic charge.

10.5. Incompatible materials

Strong oxidizing agents. Strong acid. Bases.

10.6. Hazardous decomposition products

Carbon monoxide. oxidizing agents.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified
(Based on available data, the classification criteria are not met)

Benzene (71-43-2)	
LD50 oral rat	810 mg/kg
LD50 dermal rabbit	> 8260 mg/kg
ATE US (oral)	810,000 mg/kg bodyweight

cyclohexanone (108-94-1)	
ATE US (gases)	4500,000 ppmv/4h
ATE US (vapours)	11,000 mg/l/4h
ATE US (dust,mist)	1,500 mg/l/4h

Skin corrosion/irritation : Causes skin irritation.

Serious eye damage/irritation : Not classified
(Based on available data, the classification criteria are not met)

Respiratory or skin sensitisation : Not classified
(Based on available data, the classification criteria are not met)

Germ cell mutagenicity : May cause genetic defects.

Carcinogenicity : May cause cancer.

Benzene (71-43-2)	
IARC group	1 - Carcinogenic to humans
National Toxicology Program (NTP) Status	1 - Evidence of Carcinogenicity, 2 - Known Human Carcinogens

Reproductive toxicity : Not classified

Specific target organ toxicity (single exposure) : May cause drowsiness or dizziness.

Specific target organ toxicity (repeated exposure) : Causes damage to organs through prolonged or repeated exposure.

Aspiration hazard : May be fatal if swallowed and enters airways.

Potential Adverse human health effects and symptoms	:	Central nervous system depression. Repeated exposure may cause skin dryness or cracking. May cause skin irritation / dermatitis. In high concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination. Causes serious eye irritation. High concentrations may cause injuries to gastrointestinal tract, liver, kidneys and central nervous system.
Symptoms/injuries after inhalation	:	Irritation of respiratory tract. Excessive concentrations may cause nervous system depression, headache, and weakness leading to unconsciousness. May have a narcotic effect at high concentrations.
Symptoms/injuries after skin contact	:	Causes skin irritation. Drying up of the skin. Prolonged or repeated contact with the skin may cause dermatitis.
Symptoms/injuries after eye contact	:	May cause slight irritation.
Symptoms/injuries after ingestion	:	May be fatal if swallowed and enters airways. Risk of lung oedema.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general	:	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Ecology - air	:	Photodegradation in the air.

Benzene (71-43-2)	
LC50 fish 1	10,7 - 14,7 mg/l (Exposure time: 96 h - Species: Pimephales promelas [flow-through])
EC50 Daphnia 1	8,76 - 15,6 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])
LC50 fish 2	5,3 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [flow-through])
EC50 Daphnia 2	10 mg/l (Exposure time: 48 h - Species: Daphnia magna)

12.2. Persistence and degradability

Cyclohexane (110-82-7)	
Persistence and degradability	Product is not easily biodegradable.

Benzene (71-43-2)	
Persistence and degradability	Readily biodegradable. not persistent.

12.3. Bioaccumulative potential

Cyclohexane (110-82-7)	
BCF fish 1	167 mg/l
Log Pow	3,44 at 20°C
Bioaccumulative potential	Low bioaccumulation potential.

Benzene (71-43-2)	
BCF fish 1	3,5 - 4,4
Bioconcentration factor (BCF REACH)	> 2000
Log Pow	1,83
Bioaccumulative potential	not bioaccumulable.

12.4. Mobility in soil

Cyclohexane (110-82-7)	
Ecology - soil	not determined.

12.5. Other adverse effects

Effect on ozone layer	:	No additional information available
Effect on the global warming	:	No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Regional legislation (waste)	:	Disposal must be done according to official regulations.
Waste treatment methods	:	Dispose of contents/container to industrial incineration plant.
Waste disposal recommendations	:	Dispose of at authorized waste collection point. Dispose of this material and its container at hazardous or special waste collection point. Can be deposited in landfills, sent to an incineration or other appropriate means of disposal provided they meet the requirements of local laws. Collect in closed containers for disposal.

SECTION 14: Transport information

Classification for LAND transport: DOT

UN Number	:	UN1145
Proper Shipping Name	:	Cyclohexane
Class / Division	:	3
Packing group	:	II
Reportable quantity	:	Cyclohexane

Classification for SEA transport: IMO - IMDG

UN Number	:	UN1145
Proper Shipping Name	:	CYCLOHEXANE
Class / Division	:	3
Packing group	:	II
Marine pollutant	:	Product is considered marine pollutant based on available data
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code		
Product name	:	CYCLOHEXANE

Classification for AIR shipment: IATA - ICAO

UN Number	:	UN1145
Proper Shipping Name	:	Cyclohexane
Class / Division	:	3
Packing group	:	II

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product, therefore it cannot be considered exhaustive. See guidelines of US DOT, IMDG and IATA regulations before transporting the product. The transportation organization is responsible for compliance with laws, regulations and rules for the transport of the material.

SECTION 15: Regulatory information

15.1. US Federal regulations

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory except for:

Non aromatic	CAS No	C<=1,15%
Total Aromatics	CAS No	C<=1,00%
cyclohexanone	CAS No 108-94-1	C<=0,0001%

benzene (71-43-2)	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	10 lb
SARA Section 313 - Emission Reporting	0,1 %

15.2. International regulations

CANADA
No additional information available

benzene (71-43-2)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class B Division 2 - Flammable Liquid Class D Division 2 Subdivision A - Very toxic material causing other toxic effects Class D Division 2 Subdivision B - Toxic material causing other toxic effects

EU-Regulations
No additional information available

benzene (71-43-2)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flam. Liq. 2	H225
Skin Irrit. 2	H315
STOT SE 3	H336
Asp. Tox. 1	H304
Aquatic Acute 1	H400
Aquatic Chronic 1	H410

Full text of H-statements: see section 16

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

F; R11
Xn; R65
Xi; R38
N; R50/53
R67

Full text of R-phrases: see section 16

15.2.2. National regulations

Cyclohexane (110-82-7)
No data available

benzene (71-43-2)
Listed on IARC (International Agency for Research on Cancer) Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Korean ECL (Existing Chemicals List) Listed on NZIoC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Japanese Pollutant Release and Transfer Register Law (PRTR Law) Listed as carcinogen on NTP (National Toxicology Program) Listed on SARA Section 313 (Specific toxic chemical listings)

15.3. US State regulations

benzene (71-43-2)				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significance risk level (NSRL)
Yes	Yes	No	Yes	6,4 µg/day

SECTION 16: Other information

Full text of H-statements:

------	Acute Tox. 4 (Inhalation)	Acute toxicity (inhalation) Category 4
------	Acute Tox. 4 (Oral)	Acute toxicity (oral), Category 4
------	Asp. Tox. 1	Aspiration hazard, Category 1
------	Carc. 1A	Carcinogenicity, Category 1A
------	Eye Irrit. 2A	Serious eye damage/eye irritation, Category 2A
------	Flam. Liq. 2	Flammable liquids Category 2
------	Flam. Liq. 3	Flammable liquids, Category 3
------	Muta. 1B	Germ cell mutagenicity, Category 1B
------	Skin Irrit. 2	Skin corrosion/irritation Category 2
------	STOT RE 1	Specific target organ toxicity (repeated exposure) Category 1
------	STOT SE 3	Specific target organ toxicity (single exposure) Category 3
------	H225	Highly flammable liquid and vapour
------	H226	Flammable liquid and vapour
------	H302	Harmful if swallowed
------	H304	May be fatal if swallowed and enters airways
------	H315	Causes skin irritation
------	H319	Causes serious eye irritation
------	H332	Harmful if inhaled
------	H336	May cause drowsiness or dizziness
------	H340	May cause genetic defects
------	H350	May cause cancer
------	H372	Causes damage to organs through prolonged or repeated exposure

Braskem - SDS US

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product. It warns that the handling of any chemical substance requires the previous knowledge of its hazards for the user. It is up to the user of the product company providing this SDS to and promote the training of its employees about possible risks come upon of the product. The information contained herein is not absolute, but only general information on the use of the chemical and indication of safety and security measures.