

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

1.1. Product identifier

Chemical type	: Substance
Substance name	: Benzene.
Trade name	: Benzene.
EC index no	: 601-020-00-8
EC no	: 200-753-7
CAS No.	: 71-43-2
REACH registration No.	: 01-2119447106-44-0082
Product code	: 691: SDS # PbR0010
Synonyms	: Benzol / cyclohexatriene / phenyl hydride / nitration benzene

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

1.2.1. Relevant identified uses

Use of the substance/preparation : Intermediate

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Only representative:
Petrobras Europe Ltd.
4th Floor, 20 North Audley Street
London W1K 6WL, United Kingdom
Fax number: +44(0) 20 7355 8750
E-mail: reach@petrobras.com.br

Manufacturer:
Petróleo Brasileiro S. A.
Avenida Chile, 65.
20035-900 Rio de Janeiro - Brazil
E-mail: sac@petrobras.com.br

1.4. Emergency telephone number

Emergency number : For Chemical Emergency, Spill, Leak, Fire, Exposure or Accident Call CHEMTREC Day or Night
Within USA and Canada: 1-800-424-9300
Outside USA and Canada (collect calls accepted): 1-703-527-3887

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Flam. Liq. 2 H225
Skin Irrit. 2 H315
Eye Irrit. 2 H319
Muta. 1B H340
Carc. 1A H350
STOT RE 1 H372
Asp. Tox. 1 H304

Full text of H-phrases: see section 16.

Classification according to Directive 67/548/EEC or 1999/45/EC

F; R11
Carc.Cat.1; R45
Muta.Cat.2; R46
Xn; R65
Xi; R36/38
T; R48/23/24/25

Full text of R-phrases: see section 16.

Adverse physicochemical, human health and environmental effects

Depression of the central nervous system. This material or its emissions may alter blood formation within marrow and thereby aggravate existing bone marrow disease.

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according to Regulation (EC) No. 453/2010

2.2. Label elements

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

Hazard pictograms (CLP) :



GHS02

GHS07

GHS08

Signal word (CLP) :

Danger

Hazard statements (CLP) :

H225 - Highly flammable liquid and vapour
H304 - May be fatal if swallowed and enters airways
H315 - Causes skin irritation
H319 - Causes serious eye irritation
H340 - May cause genetic defects
H350 - May cause cancer
H372 - Causes damage to organs through prolonged or repeated exposure

Precautionary statements (CLP) :

P210 - Keep away from open flames, sparks. - No smoking.
P202 - Do not handle until all safety precautions have been read and understood
P243 - Take precautionary measures against static discharge
P280 - Wear eye protection, protective clothing, protective gloves.
P301+P310 - If swallowed, immediately call a doctor.
P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
P331 - Do NOT induce vomiting

2.3. Other hazards

This substance/mixture does not meet the PBT/vPvB criteria of REACH, annex XIII.

other hazards which do not result in classification

: None known.

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%	Classification according to Directive 67/548/EEC
Benzene	(CAS No.) 71-43-2 (EC no) 200-753-7 (EC index no) 601-020-00-8	99.9-100	F; R11 Carc.Cat.1; R45 Muta.Cat.2; R46 T; R48/23/24/25 Xn; R65 Xi; R36/38
Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Benzene	(CAS No.) 71-43-2 (EC no) 200-753-7 (EC index no) 601-020-00-8	99.9-100	Flam. Liq. 2, H225 Skin Irrit. 2, H315 Eye Irrit. 2, H319 Muta. 1B, H340 Carc. 1A, H350 STOT RE 1, H372 Asp. Tox. 1, H304

Full text of R-, H- and EUH-phrases: see section 16.

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

- First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. In case of irregular breathing or respiratory arrest provide artificial respiration. In case of breathing difficulties administer oxygen. Get immediate medical advice/attention. If medical advice is needed, have product container or label at hand.
- First-aid measures after skin contact : Take off immediately all contaminated clothing, including underwear and shoes. Rinse thoroughly with plenty of water for at least 20 minutes and take medical advice. If medical advice is needed, have product container or label at hand.
- First-aid measures after eye contact : Rinse immediately and plentifully with water, also under the eyelids, for at least 20 minutes. If medical advice is needed, have product container or label at hand.
- First-aid measures after ingestion : If swallowed, do not induce vomiting: seek medical advice immediately and show this container label. If accidentally swallowed rinse the mouth with plenty of water (only if the person is conscious) and obtain immediate medical attention.

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

Symptoms/injuries	: Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness.
Symptoms/injuries after inhalation	: Inhalation of the product into the lungs may cause very serious pneumonia. Hemorrhage. irritation of mucous membranes. Coughing.
Symptoms/injuries after skin contact	: Effects of skin contact may include: irritation and burn feeling.
Symptoms/injuries after eye contact	: Irritating to eyes. May cause destruction of eye tissue.
Symptoms/injuries after ingestion	: Can occur: irritation.

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

CNS depression. This material or its emissions may alter blood formation within marrow and thereby aggravate existing bone marrow disease.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media: : Foam. Water spray. dry chemical powder. Carbon dioxide (CO₂).

5.2. Special hazards arising from the substance or mixture

Fire hazard	: Toxic vapours may be released. irritating vapours vapours may be released.
Reactivity	: Hazardous decomposition products. Carbon monoxide. Carbon dioxide. Thermal decomposition can lead to the escape of irritating gases and vapours.

5.3. Advice for firefighters

Protective equipment for firefighters : In case of fire: Wear self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Cool tanks/drums with water spray/remove them into safety.

6.1.1. For non-emergency personnel

Emergency procedures : Evacuate unnecessary personnel. No flames, No sparks. Eliminate all sources of ignition. Do not smoke.

6.1.2. For emergency responders

Protective equipment : Refer to section 8.

6.2. Environmental precautions

Stop leak if safe to do so. Do not discharge into drains or the environment. Do not discharge into surface water. Prevent spreading over great surfaces (e.g. by damming or installing oil booms). Ensure all waste water is collected and treated via a waste water treatment plant.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up : Collect up the product and place it in a spare container: - suitably labelled. Keep container tightly closed. Keep the recovered product for subsequent recycling. Absorb remaining liquid with sand or inert absorbent and remove to safe place.

6.4. Reference to other sections

Refer to sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Provide local exhaust or general room ventilation to minimize vapour concentrations. Use only non-sparking tools. In order to rule out potential electrostatic discharge production, the system must be adequately grounded. Handle in accordance with good industrial hygiene and safety procedures. Wear recommended personal protective equipment. Avoid contact with skin, eye and clothing.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures: : Floors should be impenetrable, resistant to liquids and easy to clean. Non oxidizing material according to EC criteria. Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams.

Storage condition(s) : Store in tightly closed, leak-proof containers. All areas, containers, equipment and exposure points must have signals with the following phrase "DANGER: BENZENE – HEALTH HAZARD" and access to these areas must be restricted to authorized personnel only. The labeling must emphasize the carcinogenic nature of the product and be easily comprehensible to the workers and users. It is mandatory the inclusion of usage instructions, health risks and related diseases, and adequate control measures, in contrasting colors, and in a clear and visible manner.

Incompatible products : This material may attack some forms of plastics and rubbers.

Incompatible materials : Oxidizing agents.

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Storage area

: Ensure adequate ventilation of the storage area. The floor should be leak tight, jointless and not absorbent. Floors should be impenetrable, resistant to liquids and easy to clean. Keep away from open flames, hot surfaces and sources of ignition. Only use anti-static equipped (spark-free) tools.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Benzene (71-43-2)		
EU	IOELV TWA (mg/m ³)	3.25 mg/m ³
EU	IOELV TWA (ppm)	1 ppm
EU	Notation	Skin
Austria	MAK (mg/m ³)	3.2 mg/m ³
Austria	MAK (ppm)	1 ppm
Austria	MAK Short time value (mg/m ³)	12.8 mg/m ³
Austria	MAK Short time value (ppm)	4 ppm
Belgium	Limit value (mg/m ³)	3.25 mg/m ³
Belgium	Limit value (ppm)	1 ppm
Belgium	Remark*	C, D
France	VME (mg/m ³)	3.25 mg/m ³
France	VME (ppm)	1 ppm
Italy - Portugal - USA ACGIH	ACGIH TWA (ppm)	0.5 ppm
Italy - Portugal - USA ACGIH	ACGIH STEL (ppm)	2.5 ppm
USA NIOSH	NIOSH REL (TWA) (ppm)	0.1 ppm
USA NIOSH	NIOSH REL (STEL) (ppm)	1 ppm
USA OSHA	OSHA PEL (TWA) (ppm)	1 ppm
USA OSHA	OSHA PEL (STEL) (ppm)	5 ppm
Spain	VLA-ED (mg/m ³)	3.25 mg/m ³
Spain	VLA-ED (ppm)	1 ppm
Switzerland	VME (mg/m ³)	1.6 mg/m ³
Switzerland	VME (ppm)	0.5 ppm
The Netherlands	MAC TGG 8H (mg/m ³)	3.25 mg/m ³
United Kingdom	WEL TWA (ppm)	1 ppm
Czech Republic	Expoziční limity (PEL) (mg/m ³)	3 mg/m ³
Czech Republic	Expoziční limity (PEL) (ppm)	0.939 ppm
Czech Republic	Expoziční limity (NPK-P) (mg/m ³)	10 mg/m ³
Czech Republic	Expoziční limity (NPK-P) (ppm)	3.13 ppm
Czech Republic	Remark (CZ)	D, P
Denmark	Grænseværdie (langvarig) (mg/m ³)	1.6 mg/m ³
Denmark	Grænseværdie (langvarig) (ppm)	0.5 ppm
Denmark	Grænseværdie (kortvarig) (mg/m ³)	3.2 mg/m ³
Denmark	Grænseværdie (kortvarig) (ppm)	1.0 ppm
Finland	HTP-arvo (8h) (mg/m ³)	3.25 mg/m ³
Finland	HTP-arvo (8h) (ppm)	1 ppm
Finland	Huomautus (FI)	iho, Kaikki työt
Hungary	CK-érték	3 mg/m ³
Ireland	OEL (8 hours ref) (mg/m ³)	3 mg/m ³
Ireland	OEL (8 hours ref) (ppm)	1 ppm
Ireland	Notes (IE)	Sk, C1
Lithuania	IPRV (mg/m ³)	3.25 mg/m ³
Lithuania	IPRV (ppm)	1 ppm
Lithuania	TPRV (mg/m ³)	19 mg/m ³
Lithuania	TPRV (ppm)	6 ppm

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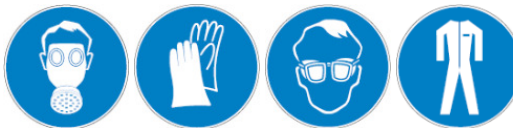
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Benzene (71-43-2)		
Lithuania	Remark (LT)	K O; IPRV 3,25mg/m ³ (1 ppm) galios nuo 2003 06 27 (pagal direktyvos 97/42 EC 2 str. 1 dalyje nurodytą datą).
Norway	Gjennomsnittsverdier (AN) (mg/m ³)	3 mg/m ³
Norway	Gjennomsnittsverdier (AN) (ppm)	1 ppm
Norway	Merknader (NO)	K
Poland	NDS (mg/m ³)	1.6 mg/m ³
Sweden	nivågränsvärde (NVG) (mg/m ³)	1.5 mg/m ³ 0.5 mg/m ³ H, C
Sweden	nivågränsvärde (NVG) (ppm)	0.5 ppm 1.5 ppm H, C
Sweden	kortidsvärde (KTV) (mg/m ³)	9 mg/m ³ 3 mg/m ³ H, C
Sweden	kortidsvärde (KTV) (ppm)	3 ppm 9 ppm H, C
Canada (Quebec)	VECD (mg/m ³)	15.5 mg/m ³
Canada (Quebec)	VECD (ppm)	5 ppm
Canada (Quebec)	VEMP (mg/m ³)	3 mg/m ³
Canada (Quebec)	VEMP (ppm)	1 ppm

8.2. Exposure controls

Appropriate engineering controls : Keep the container hermetically sealed. Provide adequate ventilation.

Personal protective equipment : Gas mask. Gloves. Safety glasses. Protective clothing.



Hand protection : protective gloves. PVC, PVA and PVAL.

Eye protection : Wear eye protection/face protection.

Skin and body protection : Wear long sleeves.

Respiratory protection : The filter class must be suitable for the maximum contaminant concentration (gas/vapour/aerosol/particulates) that may arise when handling the product. If the concentration is exceeded, closed-circuit breathing apparatus must be used! An approved organic vapour respirator/supplied air or self-contained breathing apparatus must be used when vapour concentration exceeds applicable exposure limits. In case of fire: Wear self-contained breathing apparatus.

Environmental exposure controls : This substance/product is registered with strictly controlled conditions as defined in Article 18(4) of Regulation (EC) No. 1907/2006 (REACH Regulation) and must therefore be handled as such. We refer to the industry guidance prepared by Concawe/Cefic/EFCG for advice on the confirmation of strictly controlled conditions, and which is available at <http://cefic.org/Templates/shwStory.asp?NID=719&HID=714>.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Colour	: colourless.
Odour	: Sweet. Solvent.
Odour threshold	: 1.5-4.7 ppm ASTDR, 1993
pH	: No data available
Melting point	: No data available
Solidification point	: No data available
Boiling point	: 80.1 °C
Flash point	: -11 °C
Relat. evapor. rate comp. to butylacetate	: 4 (n-butyl acetate=1)
Flammability (solid, gas)	: No data available
Explosive limits	: 1.4-8 vol %
Vapour pressure	: 75 mmHg @20°C
Relative vapour density at 20 °C	: 2.77
Relative density	: 0.878 g/cm ³

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Solubility	: soluble in most organic solvents. Water: 0.18 g/100ml @ 25°C
Log Pow	: 2.13
Self ignition temperature	: 562 °C
Decomposition temperature	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: 0.6 cP @ 20°C
Explosive properties	: No data available
Oxidising properties	: No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Hazardous decomposition products. Carbon monoxide. Carbon dioxide. Thermal decomposition can lead to the escape of irritating gases and vapours.

10.2. Chemical stability

Stable under normal conditions of use.

10.3. Possibility of hazardous reactions

No data available.

10.4. Conditions to avoid

Open flame. sparks. heat sources.

10.5. Incompatible materials

Oxidizing agents, strong.

10.6. Hazardous decomposition products

On combustion, forms. Carbon monoxide. carbon dioxide (CO₂).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

Benzene. (71-43-2)	
LD50 oral rat	> 2000 mg/kg
LD50 dermal rabbit	> 8260 mg/kg
LC50 inhalation rat (mg/l)	44.5 mg/l/4h

Skin corrosion/irritation	: Causes skin irritation.
Serious eye damage/irritation	: Causes serious eye irritation.
Respiratory or skin sensitisation	: Not classified Not sensitizing
Germ cell mutagenicity	: May cause genetic defects.
Carcinogenicity	: May cause cancer.
Reproductive toxicity	: Not classified
Specific target organ toxicity (single exposure)	: Not classified
Specific target organ toxicity (repeated exposure)	: Causes damage to organs through prolonged or repeated exposure.

Benzene. (71-43-2)	
LOAEL (oral,rat,90 days)	25 mg/kg bodyweight/day
NOAEL (oral,rat,90 days)	100 mg/kg bodyweight/day
NOAEL (inhalation,rat,gas,90 days)	30 ppmV/6h/day

Aspiration hazard	: May be fatal if swallowed and enters airways.
Potential Adverse human health effects and symptoms	: Inhalation may affect the nervous system causing headache, possibly dizziness, nausea, weakness, loss of coordination and unconsciousness.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general	: Water pollutant. Aromatic components of this product are generally the most toxic. This product may kill aquatic organisms and may adversely affect water quality.
Ecology - air	: Highly volatile.

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Benzene. (71-43-2)	
LC50 fishes	5.3 mg/l 96 hours
EC50 Daphnia	10 mg/l 48 hours
NOEC (acute)	0.8 mg/l 32 days- fish
NOEC (chronic)	3 mg/l 7 days- daphnia
ErC50 (algae)	100 mg/l 72 hours- Algae

12.2. Persistence and degradability

Benzene. (71-43-2)	
Persistence and degradability	Readily biodegradable.

12.3. Bioaccumulative potential

Benzene. (71-43-2)	
Log Pow	2.13
Bioaccumulative potential	not bioaccumulative.

12.4. Mobility in soil

Benzene. (71-43-2)	
Ecology - soil	Do not allow to enter into soil/subsoil. If product enters soil, it will be mobile and may contaminate groundwater.

12.5. Results of PBT and vPvB assessment

Benzene. (71-43-2)	
This substance/mixture does not meet the PBT/vPvB criteria of REACH, annex XIII.	

12.6. Other adverse effects

Other information : Volatile.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods : Consult the local waste disposal expert about waste disposal. Dispose of this material and its container to hazardous or special waste collection point. Disposal must be done according to official regulations.

SECTION 14: Transport information

In accordance with ADR / RID / ADNR / IMDG / ICAO / IATA

14.1. UN number

UN-No. : 1114

14.2. UN proper shipping name

Proper shipping name : BENZENE
Transport document description : UN 1114 BENZENE, 3, II, (D/E)

14.3. Transport hazard class(es)

Class (UN) : 3
Hazard labels (UN) : 3



14.4. Packing group

Packing group (UN) : II

14.5. Environmental hazards

Other information : No supplementary information available.

14.6. Special precautions for user

14.6.1. Overland transport

Hazard identification number (Kemler No.) : 33
Classification code : F1
Orange plates :



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Tunnel restriction code : D/E
Limited quantities (ADR) : LQ04
Excepted quantities (ADR) : E2

14.6.2. Transport by sea

Class : 3 - Flammable liquids

14.6.3. Air transport

Class : 3 - Flammable liquids

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

15.1.1. EU-Regulations

No ingredients included in the REACH Candidate list

Other regulations, restrictions and prohibition regulations : Compliance with following regulations: Regulation (EC) 1907/2006 as amended. Regulation (EC) 1272/2008 as amended. Directive 1999/45/EC as amended. Directive 67/548/EEC as amended.

15.1.2. National regulations

No additional information available

15.2. Chemical safety assessment

Chemical safety assessment has been established in the attachment.

SECTION 16: Other information

Sources of Key data : PETROBRAS. MSDS.

Abbreviations and acronyms : GHS - Globally Harmonised System. EEC - European Economic Community. EC - European Community. CSR - Chemical Safety Report. CLP - Classification, Labelling and Packaging. ASTM - American Society for Testing and Materials . REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals. SDS - Safety Data Sheet.

Other information : This substance/product is registered with strictly controlled conditions as defined in Article 18(4) of Regulation (EC) No. 1907/2006 (REACH Regulation) and must therefore be handled as such.

Full text of R-, H- and EUH-phrases:

Asp. Tox. 1	Aspiration hazard Category 1
Carc. 1A	Carcinogenicity Category 1A
Eye Irrit. 2	Serious Eye Damage/Irritation Category 2
Flam. Liq. 2	flammable liquids Category 2
Muta. 1B	flammable liquids Category 1 flammable liquids Category 3
Skin Irrit. 2	skin corrosion/irritation Category 2
STOT RE 1	Specific target organ toxicity (repeated exposure) Category 1
H225	Highly flammable liquid and vapour
H304	May be fatal if swallowed and enters airways
H315	Causes skin irritation
H319	Causes serious eye irritation
H340	May cause genetic defects
H350	May cause cancer
H372	Causes damage to organs through prolonged or repeated exposure
R11	Highly flammable.
R36/38	Irritating to eyes and skin.
R45	May cause cancer.
R46	May cause heritable genetic damage.
R48/23/24/25	Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.
R65	Harmful: may cause lung damage if swallowed.

SDS PETROBRAS USES

The information presented in this Safety Data Sheet is based on current knowledge and is believed to be complete and accurate. It describes the product for the purposes of health, safety and environment requirements only and shall, therefore, be used only as a guide. The data refers to a specific product and may not be valid for combined uses with other products. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. Petrobras shall not be responsible for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices.