

SAFETY DATA SHEET

According to OSHA Hazard Communication Standard, 29 CFR
1910.1200

Benzene Sustainable

Version
2.0

Revision Date:
03/06/2025

SDS Number:
800010062716

Print Date: 03/13/2025
Date of last issue: 12/29/2023

SECTION 1. IDENTIFICATION

Product name : Benzene Sustainable

Product code : Q9274

CAS-No. : 71-43-2

Manufacturer or supplier's details

Company : **Shell Chemical LP**
PO Box 576
HOUSTON TX 77001
USA

SDS Request : 1-800-240-6737

Customer Service : 1-855-697-4355

Emergency telephone number

Chemtrec Domestic (24 hr) : 1-800-424-9300

Chemtrec International (24 hr) : 1-703-527-3887

Recommended use of the chemical and restrictions on use

Recommended use : Raw material for use in the chemical industry.

Restrictions on use : This product must not be used in applications other than the above without first seeking the advice of the supplier.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Flammable liquids : Category 2

Aspiration hazard : Category 1

Skin irritation : Category 2

Eye irritation : Category 2A

Germ cell mutagenicity : Category 1B

Carcinogenicity : Category 1A

Specific target organ toxicity : Category 1 (Blood, Blood-forming organs)

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- repeated exposure

Long-term (chronic) aquatic hazard : Category 3

GHS label elements

Hazard pictograms

:



Signal word : Danger

Hazard statements : PHYSICAL HAZARDS:
H225 Highly flammable liquid and vapour.
HEALTH HAZARDS:
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 (Blood, Blood forming organs) through prolonged or repeated exposure.
ENVIRONMENTAL HAZARDS:
H412 Harmful to aquatic life with long lasting effects.

Precautionary statements : **Prevention:**
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/ lighting equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash hands thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P273 Avoid release to the environment.
Response:
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P370 + P378 In case of fire: Use appropriate media to extinguish.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P331 Do NOT induce vomiting.

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P302 + P352 IF ON SKIN: Wash with plenty of water and soap.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P308 + P313 IF exposed or concerned: Get medical advice/ attention.
P314 Get medical advice/ attention if you feel unwell.

Storage:

P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.

Disposal:

P501 Dispose of contents and container to appropriate waste site or reclaimer in accordance with local and national regulations.

Other hazards which do not result in classification

May form flammable/explosive vapour-air mixture.
This material is a static accumulator.
Even with proper grounding and bonding, this material can still accumulate an electrostatic charge.
If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.
May cause cancer.
May cause leukaemia (AML - acute myelogenous leukaemia).
The classification of this material is based on OSHA HCS 2012 criteria.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Hazardous components

Chemical name	Synonyms	CAS-No.	Concentration (% w/w)
Benzene	Benzene	71-43-2	<= 100

SECTION 4. FIRST AID MEASURES

General advice : Not expected to be a health hazard when used under normal conditions.

If inhaled : No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.

In case of skin contact : Remove contaminated clothing. Immediately flush skin with large amounts of water for at least 15 minutes, and follow by

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	washing with soap and water if available. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.
In case of eye contact	: Immediately flush eye(s) with plenty of water. Remove contact lenses, if present and easy to do. Continue rinsing. Transport to the nearest medical facility for additional treatment.
If swallowed	: Call emergency number for your location / facility. If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.
Most important symptoms and effects, both acute and delayed	: Not considered to be an inhalation hazard under normal conditions of use. Possible respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing. Skin irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blisters. If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing. Breathing of high vapour concentrations may cause central nervous system (CNS) depression resulting in dizziness, lightheadedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness and death. Damage to blood-forming organs may be evidenced by: a) fatigue and anaemia (RBC), b) decreased resistance to infection, and/or excessive bruising and bleeding (platelet effect). Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision.
Protection of first-aiders	: When administering first aid, ensure that you are wearing the appropriate personal protective equipment according to the incident, injury and surroundings.
Indication of any immediate medical attention and special treatment needed	: IMMEDIATE TREATMENT IS EXTREMELY IMPORTANT! Call a doctor or poison control center for guidance. Potential for chemical pneumonitis. Treat symptomatically. Potential for cardiac sensitisation, particularly in abuse situations. Hypoxia or negative inotropes may enhance these effects. Consider: oxygen therapy.

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SECTION 5. FIREFIGHTING MEASURES

- Suitable extinguishing media : Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
- Unsuitable extinguishing media : Do not use water in a jet.
- Specific hazards during fire-fighting : Clear fire area of all non-emergency personnel.
Hazardous combustion products may include:
A complex mixture of airborne solid and liquid particulates and gases (smoke).
Carbon monoxide.
Unidentified organic and inorganic compounds.
Flammable vapours may be present even at temperatures below the flash point.
The vapour is heavier than air, spreads along the ground and distant ignition is possible.
Will float and can be reignited on surface water.
- Specific extinguishing methods : Standard procedure for chemical fires.
- Further information : Keep adjacent containers cool by spraying with water.
- Special protective equipment for firefighters : Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

SECTION 6. ACCIDENTAL RELEASE MEASURES

- Personal precautions, protective equipment and emergency procedures : Observe all relevant local and international regulations.
Notify authorities if any exposure to the general public or the environment occurs or is likely to occur.
Local authorities should be advised if significant spillages cannot be contained.
Avoid contact with skin, eyes and clothing.
Isolate hazard area and deny entry to unnecessary or unprotected personnel.
Do not breathe fumes, vapour.
Do not operate electrical equipment.
- Environmental precautions : Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Attempt to disperse the vapour or to direct its flow to a safe location for

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example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Ventilate contaminated area thoroughly.

Methods and materials for containment and cleaning up : For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely. For small liquid spills (< 1 drum), transfer by mechanical means to a labeled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.

Avoid contact with skin, eyes and clothing.
Take precautionary measures against static discharges.
Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet.

Additional advice : For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet.
For guidance on disposal of spilled material see Section 13 of this Safety Data Sheet.
Notify authorities if any exposure to the general public or the environment occurs or is likely to occur.
Local authorities should be advised if significant spillages cannot be contained.

Observe all relevant local and international regulations.

U.S. regulations may require reporting releases of this material to the environment which exceed the reportable quantity (refer to Section 15) to the National Response Center at (800) 424-8802.

SECTION 7. HANDLING AND STORAGE

Technical measures : Avoid breathing of or direct contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet.
Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
Ensure that all local regulations regarding handling and storage facilities are followed.

Advice on safe handling : Avoid inhaling vapour and/or mists.

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Avoid contact with skin, eyes and clothing.
Avoid exposure. Obtain special instructions before use.
Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks.
Even with proper grounding and bonding, this material can still accumulate an electrostatic charge.
If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.
Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges.
These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements.
These activities may lead to static discharge e.g. spark formation.
Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/s until fill pipe submerged to twice its diameter, then ≤ 7 m/s). Avoid splash filling.
Do NOT use compressed air for filling, discharging, or handling operations.
Avoid breathing of or direct contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet.
Properly dispose of any contaminated rags or cleaning materials in order to prevent fires.

- Avoidance of contact : Strong oxidising agents.
- Product Transfer : Refer to guidance under Handling section.
- Conditions for safe storage : Refer to section 15 for any additional specific legislation covering the packaging and storage of this product.
- Further information on storage stability : Storage Temperature:
Ambient.
- Bulk storage tanks should be diked (bunded).
Locate tanks away from heat and other sources of ignition.
Cleaning, inspection and maintenance of storage tanks is a specialist operation, which requires the implementation of strict procedures and precautions.
Must be stored in a diked (bunded) well-ventilated area, away from sunlight, ignition sources and other sources of heat.
Keep away from aerosols, flammables, oxidizing agents, corrosives and from other flammable products which are not harmful or toxic to man or to the environment.
Electrostatic charges will be generated during pumping.
Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment to reduce the risk.
The vapours in the head space of the storage vessel may lie

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in the flammable/explosive range and hence may be flammable.

Packaging material : Suitable material: For containers, or container linings use mild steel, stainless steel.
Unsuitable material: Natural, butyl, neoprene or nitrile rubbers.

Specific use(s) : Not applicable

See additional references that provide safe handling practices for liquids that are determined to be static accumulators: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity).
IEC/TS 60079-32-1: Electrostatic hazards, guidance

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Benzene	71-43-2	TWA	0.25 ppm 0.8 mg/m ³	Shell Internal Standard (SIS) for 8-12 hour TWA.
Benzene		STEL	2.5 ppm 8 mg/m ³	Shell Internal Standard (SIS) for 15 min (STEL)
Benzene		TWA	0.02 ppm	ACGIH
Benzene		STEL	2.5 ppm	ACGIH
Benzene		PEL	1 ppm	OSHA CARC
Benzene		STEL	5 ppm	OSHA CARC
Benzene		TWA	10 ppm	OSHA Z-2
Benzene		CEIL	25 ppm	OSHA Z-2
Benzene		Peak	50 ppm (10 minutes)	OSHA Z-2

Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Benzene	71-43-2	S-Phenylmercapturic acid	Urine	End of shift (As soon as possible after exposure)	25 µg/g creatinine	ACGIH BEI

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		t,t-Muconic acid	Urine	End of shift (As soon as possible after exposure ceases)	500 µg/g creatinine	ACGIH BEI
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Monitoring Methods

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.

Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory.

Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.

National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods <http://www.cdc.gov/niosh/>

Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods <http://www.osha.gov/>

Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances <http://www.hse.gov.uk/>

Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA), Germany <http://www.dguv.de/inhalt/index.jsp>

L'Institut National de Recherche et de Sécurité, (INRS), France <http://www.inrs.fr/accueil>

Engineering measures

- : Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits.
- Local exhaust ventilation is recommended.
- Firewater monitors and deluge systems are recommended.
- Eye washes and showers for emergency use.
- The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances.
- Appropriate measures include:

General Information

Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveil-

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lance.

Items that cannot be decontaminated should be destroyed (see Chapter 13).

Personal protective equipment

Respiratory protection

: If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for organic gases and vapours [boiling point >65 °C (149 °F)]. Where respiratory protective equipment is required, use a full-face mask. Where air-filtering respirators are unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus.

Respirator selection, use and maintenance should be in accordance with the requirements of the OSHA Respiratory Protection Standard, 29 CFR 1910.134.

Hand protection
Remarks

: Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection. Longer term protection: Viton. Incidental contact/Splash protection: Nitrile rubber. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time maybe acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material. Glove thickness should be typically greater than 0.35 mm depending on the glove make and model. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

Eye protection

: Wear goggles for use against liquids and gas.

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Wear full face shield if splashes are likely to occur.

Skin and body protection : Wear chemical resistant gloves/gauntlets and boots. Where risk of splashing, also wear an apron.
Wear antistatic and flame-retardant clothing.

Protective measures : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Thermal hazards : Not applicable

Hygiene measures : Wash hands before eating, drinking, smoking and using the toilet.
Launder contaminated clothing before re-use.

Environmental exposure controls

General advice : Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour.
Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.
Information on accidental release measures are to be found in section 6.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Liquid.

Colour : colourless

Odour : aromatic

Odour Threshold : 2.7 ppm

pH : Not applicable

Melting point/freezing point : 5.5 °C / 41.9 °F

Initial boiling point and boiling range : 80.1 °C / 176.2 °F

Flash point : -11 °C / 12 °F

Method: No information available.

Evaporation rate : 5.1
Method: ASTM D 3539, nBuAc=1

Flammability
Flammability (solid, gas) : Not applicable

Lower explosion limit and upper explosion limit / flammability limit

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Upper explosion limit / Upper flammability limit	: 7.1 %(V)
Lower explosion limit / Lower flammability limit	: 1.4 %(V)
Vapour pressure	: 10 kPa (20 °C / 68 °F)
Relative vapour density	: 2.7 (15 °C / 59 °F) (Air = 1.0)
Relative density	: 0.8787 (20 °C / 68 °F) Method: ASTM D4052
Density	: 883 kg/m ³ (15 °C / 59 °F) Method: ASTM D4052
Solubility(ies) Water solubility	: 1.8 kg/m ³ Slight (20 °C / 68 °F))
Partition coefficient: n-octanol/water	: log Pow: 2.13 Method: Literature data.
Auto-ignition temperature	: 498 °C / 928 °F
Decomposition temperature	: Data not available
Viscosity Viscosity, dynamic	: 0.6 mPa.s (20 °C / 68 °F) Method: ASTM D445
Viscosity, kinematic	: 0.65 mm ² /s (20 °C / 68 °F) Method: ASTM D445
Explosive properties	: Not applicable
Oxidizing properties	: Data not available
Surface tension	: 0.03 mN/m
Conductivity	: Low conductivity: < 100 pS/m, The conductivity of this material makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10,000 pS/m., Whether a liquid is nonconductive or semi-conductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid
Molecular weight	: 78.11 g/mol

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Particle size : Data not available

SECTION 10. STABILITY AND REACTIVITY

Reactivity : The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.

Chemical stability : No hazardous reaction is expected when handled and stored according to provisions

Possibility of hazardous reactions : Stable under normal conditions of use.

Conditions to avoid : Avoid heat, sparks, open flames and other ignition sources. Prevent vapour accumulation.

Incompatible materials : Strong oxidising agents.

Hazardous decomposition products : Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases including carbon monoxide, carbon dioxide, sulphur oxides and unidentified organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation.

Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).

SECTION 11. TOXICOLOGICAL INFORMATION

Basis for assessment : Information given is based on product testing.
Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Information on likely routes of exposure

Exposure may occur via inhalation, ingestion, skin absorption, skin or eye contact, and accidental ingestion.

Acute toxicity

Components:

Benzene:

Acute oral toxicity : LD 50 (Rat, male): > 2,000 mg/kg
Method: Test(s) equivalent or similar to OECD Test Guideline 401
Remarks: Based on available data, the classification criteria are not met.

Acute inhalation toxicity : LC 50 (Rat, female): > 20 mg/l
Exposure time: 4 h
Test atmosphere: vapour

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Method: Test(s) equivalent or similar to OECD Test Guideline 403

Remarks: Based on available data, the classification criteria are not met.

High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness and/or death.

Acute dermal toxicity

: LD 50 (Rabbit): > 2,000 mg/kg

Method: Test(s) equivalent or similar to OECD Test Guideline 402

Remarks: Based on available data, the classification criteria are not met.

Skin corrosion/irritation

Components:

Benzene:

Species: Rabbit

Method: OECD Test Guideline 404

Remarks: Causes skin irritation.

Serious eye damage/eye irritation

Components:

Benzene:

Species: Rabbit

Method: Literature data

Remarks: Causes serious eye irritation.

Respiratory or skin sensitisation

Components:

Benzene:

Species: Mouse

Method: Literature data

Remarks: Based on available data, the classification criteria are not met.

Germ cell mutagenicity

Components:

Benzene:

Genotoxicity in vitro

: Method: OECD Test Guideline 471

Remarks: May cause genetic defects.

: Method: Other guideline method.

Remarks: May cause genetic defects.

: Method: Literature data

Remarks: May cause genetic defects.

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Genotoxicity in vivo : Test species: Mouse
Method: Test(s) equivalent or similar to OECD Test Guideline 474
Remarks: May cause genetic defects.

Germ cell mutagenicity- Assessment : May cause genetic defects.

Carcinogenicity

Components:

Benzene:

Species: Rat, (male and female)

Application Route: Oral

Method: Other guideline method.

Remarks: May cause cancer., Known human carcinogen., May cause leukaemia (AML - acute myelogenous leukaemia).

Species: Mouse, (male and female)

Application Route: Inhalation

Method: Literature data

Remarks: May cause cancer., Known human carcinogen., May cause leukaemia (AML - acute myelogenous leukaemia).

Carcinogenicity - Assessment : May cause cancer.

IARC

Group 1: Carcinogenic to humans

Benzene

71-43-2

Group 1: Carcinogenic to humans

OSHA

OSHA specifically regulated carcinogen

Benzene

71-43-2

OSHA specifically regulated carcinogen

NTP

Known to be human carcinogen

Benzene

71-43-2

Known to be human carcinogen

Reproductive toxicity

Components:

Benzene:

Effects on fertility :

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Species: Rat
Sex: male and female
Application Route: Inhalation

Method: Test(s) equivalent or similar to OECD Test Guideline 415.

Remarks: Based on available data, the classification criteria are not met.

Effects on foetal development

: Species: Rat, female
Application Route: Inhalation
Method: Test(s) equivalent or similar to OECD Test Guideline 414
Remarks: Based on available data, the classification criteria are not met., Causes foetotoxicity in animals at doses which are maternally toxic.

Reproductive toxicity - Assessment

: This product does not meet the criteria for classification in categories 1A/1B.

STOT - single exposure

Components:

Benzene:

Remarks: Based on available data, the classification criteria are not met., Inhalation of vapours or mists may cause irritation to the respiratory system.

STOT - repeated exposure

Components:

Benzene:

Exposure routes: Oral, Inhalation

Target Organs: hematopoietic system

Remarks: Causes damage to organs through prolonged or repeated exposure., Blood-forming organs: repeated exposure affects the bone marrow., Blood: may cause haemolysis of red blood cells and/or anaemia., Immune System: animal studies on this material or its components have demonstrated immunotoxicity., May cause MDS (Myelodysplastic Syndrome)., Exposure to very high concentrations of similar materials has been associated with irregular heart rhythms and cardiac arrest., Myelodysplastic syndrome (MDS) was observed in individuals exposed to very high levels (50 ppm to 300 ppm range) of benzene over a long period of time in the workplace. The relevance of these results to lower levels of exposure is not known.

Repeated dose toxicity

Components:

Benzene:

Species: Rat, male and female

Application Route: Oral

Method: Test(s) equivalent or similar to OECD Test Guideline 408

Target Organs: hematopoietic system

Species: Mouse, male and female

Application Route: Inhalation

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Test atmosphere: vapour
Method: Literature data
Target Organs: hematopoietic system

Aspiration toxicity

Components:

Benzene:

May be fatal if swallowed and enters airways.

Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Further information

Components:

Benzene:

Remarks: Classifications by other authorities under varying regulatory frameworks may exist.

SECTION 12. ECOLOGICAL INFORMATION

Basis for assessment : Information given is based on product testing.
Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Ecotoxicity

Components:

Benzene:

Toxicity to fish (Acute toxicity) : LC50 (Oncorhynchus mykiss (rainbow trout)): 5.3 mg/l
Exposure time: 96 h
Method: Test(s) equivalent or similar to OECD Guideline 203
Remarks: Toxic
LL/EL/IL50 > 1 <= 10 mg/l

Toxicity to daphnia and other aquatic invertebrates (Acute toxicity) : EC50 (Daphnia magna (Water flea)): 10 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202
Remarks: Toxic
LL/EL/IL50 > 1 <= 10 mg/l

Toxicity to algae (Acute toxicity) : ErC50 (Selenastrum capricornutum (green algae)): 100 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201
Remarks: Harmful
LL/EL/IL50 >10 <= 100 mg/l

Toxicity to fish (Chronic toxicity) : NOEC (Pimephales promelas (fathead minnow)): 0.8 mg/l
Exposure time: 32 d

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Method: Other guideline method.

Remarks: NOEC/NOEL > 0.1 - <=1.0 mg/l

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Ceriodaphnia dubia (Water flea)): 3 mg/l
Exposure time: 7 d
Method: Other guideline method.
Remarks: NOEC/NOEL > 1.0 - <= 10 mg/l

Toxicity to microorganisms (Acute toxicity) : IC50 (Nitrosomonas): 13 mg/l
Exposure time: 24 h
Method: Literature data.
Remarks: Harmful
LL/EL/IL50 >10 <= 100 mg/l

Persistence and degradability

Components:

Benzene:

Biodegradability : Biodegradation: 96 %
Exposure time: 28 d
Method: OECD Test Guideline 301F
Remarks: Readily biodegradable.
Not Persistent per IMO criteria.
International Oil Pollution Compensation (IOPC) Fund definition: "A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distills at a temperature of 340°C (645°F) and (b) at least 95% of which, by volume, distills at a temperature of 370°C (700°F) when tested by the ASTM Method D-86/78 or any subsequent revision thereof."

Bioaccumulative potential

Components:

Benzene:

Bioaccumulation : Species: Leuciscus idus (Golden orfe)
Bioconcentration factor (BCF): < 10
Exposure time: 3 d
Method: Test(s) equivalent or similar to OECD Test Guideline 305
Remarks: Does not bioaccumulate significantly.

Mobility in soil

Components:

Benzene:

Mobility : Remarks: Floats on water.

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Other adverse effects

Components:

Benzene:

Results of PBT and vPvB assessment : The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Recover or recycle if possible.
It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.

Do not dispose into the environment, in drains or in water courses.

Waste product should not be allowed to contaminate soil or water.

Disposal should be in accordance with applicable regional, national, and local laws and regulations.
Local regulations may be more stringent than regional or national requirements and must be complied with.

MARPOL - see International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) which provides technical aspects at controlling pollutions from ships.

Contaminated packaging : Drain container thoroughly.
After draining, vent in a safe place away from sparks and fire.
Residues may cause an explosion hazard.
Do not puncture, cut, or weld uncleaned drums.
Send to drum recoverer or metal reclaimer.

SECTION 14. TRANSPORT INFORMATION

National Regulations

49 CFR

UN/ID/NA number : UN 1114
Proper shipping name : BENZENE
Class : 3
Packing group : II
Labels : 3
Reportable quantity : BENZENE
(10 lb)
ERG Code : 130

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Marine pollutant : no

International Regulations

IATA-DGR

UN/ID No. : UN 1114
Proper shipping name : BENZENE
Class : 3
Packing group : II
Labels : 3

IMDG-Code

UN number : UN 1114
Proper shipping name : BENZENE
Class : 3
Packing group : II
Labels : 3
Marine pollutant : no

Maritime transport in bulk according to IMO instruments

Pollution category : Y
Ship type : 3; Must be Double Hulled
Product name : Benzene and mixtures having 10% benzene or more (i)

Special precautions for user

Remarks : Special Precautions: Refer to Section 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.

Additional Information : This product may be transported under nitrogen blanketing. Nitrogen is an odourless and invisible gas. Exposure to nitrogen may cause asphyxiation or death. Personnel must observe strict safety precautions when involved with a confined space entry.
Transport in bulk according to Annex II of Marpol and the IBC Code

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Benzene	71-43-2	10	10

*: The components with RQs are given for information.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

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SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Flammable (gases, aerosols, liquids, or solids)
Skin corrosion or irritation
Serious eye damage or eye irritation
Germ cell mutagenicity
Carcinogenicity
Specific target organ toxicity (single or repeated exposure)
Aspiration hazard

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Benzene	71-43-2	>= 90 - <= 100 %
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Clean Water Act

The following Hazardous Chemicals are listed under the U.S. CleanWater Act, Section 311, Table 117.3:

Benzene	71-43-2	100 %
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US State Regulations

Pennsylvania Right To Know

Benzene	71-43-2
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California Prop. 65

WARNING: This product can expose you to chemicals including Benzene, which is/are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

California List of Hazardous Substances

Benzene	71-43-2
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California Regulated Carcinogens

Benzene	71-43-2
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California Regulated Carcinogens

Benzene	71-43-2
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Other regulations:

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

The components of this product are reported in the following inventories:

AIIC	: Listed
DSL	: Listed
IECSC	: Listed
ENCS	: Listed

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KECI	: Listed
NZIoC	: Listed
PICCS	: Listed
TCSI	: Listed
TSCA	: Listed

SECTION 16. OTHER INFORMATION

Further information

NFPA Rating (Health, Fire, Reactivity) 2, 3, 0

Full text of other abbreviations

ACGIH	: USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI	: ACGIH - Biological Exposure Indices (BEI)
OSHA CARC	: OSHA Specifically Regulated Chemicals/Carcinogens
OSHA Z-2	: USA. Occupational Exposure Limits (OSHA) - Table Z-2
ACGIH / TWA	: 8-hour, time-weighted average
ACGIH / STEL	: Short-term exposure limit
OSHA CARC / PEL	: Permissible exposure limit (PEL)
OSHA CARC / STEL	: Excursion limit
OSHA Z-2 / TWA	: 8-hour time weighted average
OSHA Z-2 / CEIL	: Acceptable ceiling concentration
OSHA Z-2 / Peak	: Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift
Abbreviations and Acronyms	: The standard abbreviations and acronyms used in this document can be looked up in reference literature (e.g. scientific dictionaries) and/or websites.

ACGIH = American Conference of Governmental Industrial Hygienists

ADR = European Agreement concerning the International Carriage of Dangerous Goods by Road

AICS = Australian Inventory of Chemical Substances

ASTM = American Society for Testing and Materials

BEL = Biological exposure limits

BTEX = Benzene, Toluene, Ethylbenzene, Xylenes

CAS = Chemical Abstracts Service

CEFIC = European Chemical Industry Council

CLP = Classification Packaging and Labelling

COC = Cleveland Open-Cup

DIN = Deutsches Institut für Normung

DMEL = Derived Minimal Effect Level

DNEL = Derived No Effect Level

DSL = Canada Domestic Substance List

EC = European Commission

EC50 = Effective Concentration fifty

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ECETOC = European Center on Ecotoxicology and Toxicology Of Chemicals
ECHA = European Chemicals Agency
EINECS = The European Inventory of Existing Commercial Chemical Substances
EL50 = Effective Loading fifty
ENCS = Japanese Existing and New Chemical Substances Inventory
EWC = European Waste Code
GHS = Globally Harmonised System of Classification and Labelling of Chemicals
IARC = International Agency for Research on Cancer
IATA = International Air Transport Association
IC50 = Inhibitory Concentration fifty
IL50 = Inhibitory Level fifty
IMDG = International Maritime Dangerous Goods
INV = Chinese Chemicals Inventory
IP346 = Institute of Petroleum test method N° 346 for the determination of polycyclic aromatics DMSO-extractables
KECI = Korea Existing Chemicals Inventory
LC50 = Lethal Concentration fifty
LD50 = Lethal Dose fifty per cent.
LL/EL/IL = Lethal Loading/Effective Loading/Inhibitory loading
LL50 = Lethal Loading fifty
MARPOL = International Convention for the Prevention of Pollution From Ships
NOEC/NOEL = No Observed Effect Concentration / No Observed Effect Level
OE_HP V = Occupational Exposure - High Production Volume
PBT = Persistent, Bioaccumulative and Toxic
PICCS = Philippine Inventory of Chemicals and Chemical Substances
PNEC = Predicted No Effect Concentration
REACH = Registration Evaluation And Authorisation Of Chemicals
RID = Regulations Relating to International Carriage of Dangerous Goods by Rail
SKIN_DES = Skin Designation
STEL = Short term exposure limit
TRA = Targeted Risk Assessment
TSCA = US Toxic Substances Control Act
TWA = Time-Weighted Average
vPvB = very Persistent and very Bioaccumulative

A vertical bar (|) in the left margin indicates an amendment from the previous version.

Sources of key data used to compile the Safety Data Sheet : The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell Health Services, material suppliers' data, CONCAWE, EU IUCLID date base, EC 1272 regulation, etc).

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The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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