

# SAFETY DATA SHEET



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## 24-Hour Emergency Number (CHEMTREC)

USA: 800-424-9300  
International: 703-527-3887

All non-emergency numbers should be directed  
to Customer Service at 800-PURITY1

## BENZENE

SDS No. M0017

### 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Benzene

Synonyms: Benzole, Phene, Phenyl Hydride, Cyclohexatriene

Recommended Use: This product is recommended for laboratory and manufacturing use only. It is not recommended for drug, food or household use.

### 2. HAZARDS IDENTIFICATION



#### **Classification:**

Flammable Liquids: GHS Category 2

Acute Toxicity, Oral: GHS Category 5

Skin Irritation: GHS Category 2

Eye Irritation: GHS Category 2A

Germ Cell, Mutagenicity: GHS Category 1B

Carcinogenicity: GHS Category 1A

Aspiration Hazard: GHS Category 1

Acute Aquatic Toxicity: GHS Category 3

#### **Label Elements**

Signal Word: DANGER!

#### Hazard Statements:

H225 – Highly flammable liquid and vapor.

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.

H412 – Harmful to aquatic life with long lasting effects.

#### Precautionary Statements:

P201 – Obtain special instructions before use.

Clear focus. Consistent results. Complete confidence.

P210 – Keep away from heat/sparks/open flames/hot surfaces. – No smoking.  
 P280 – Wear protective gloves/protective clothing/eye protection/face protection.  
 P301+P310 – If SWALLOWED: Immediately call a POISON CENTER or doctor/physician.  
 P303+P361+P353 – If on skin or hair: Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.  
 P308+P313 – If exposed or concerned: Get medical advice.  
 P331 – Do NOT induce vomiting.

### **Emergency Overview**

Causes eye, skin, and respiratory tract irritation. Harmful if swallowed, inhaled, absorbed through the skin. Causes eye, skin, and respiratory tract irritation. Aspiration hazard if swallowed. Causes cancer. May cause blood abnormalities and central nervous system effects. Highly flammable liquid and vapor. Vapor may cause flash fire. Static electrical hazard. Target Organs: Central nervous system, respiratory system, eyes, bone marrow, immune system, and skin.

### HMIS Rating:

Health – 2 Flammability – 3 Physical Hazard – 0 PPE – User supplied

NOTE: HMIS ratings use a numbering scale that ranges from 0 - 4 to indicate the degree of hazard. A value of zero means the chemical presents no hazard while a value of four indicates a high hazard. These ratings are based on the inherent properties of this chemical under expected conditions of normal use and are not intended to be used in emergency situations. PPE is determined by the user based on their needs and conditions.

## **3. COMPOSITION AND INFORMATION ON INGREDIENTS**

| <u>Ingredient</u> | <u>CAS No</u> | <u>Percent</u> | <u>Hazardous</u> |
|-------------------|---------------|----------------|------------------|
| Benzene           | 71-43-2       | >99%           | Yes              |

## **4. FIRST-AID MEASURES**

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Ingestion: Potential for aspiration if swallowed. Get medical aid immediately. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.

Skin Contact: Remove any contaminated clothing. Wash skin with water for at least 15 minutes. Wash clothing before reuse. Get medical attention if irritation persists.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention.

Notes to Physician: Treat symptomatically and supportively.

## **5. FIRE FIGHTING MEASURES**

Flammability: Highly flammable liquid and vapor (GHS Category 2)

Auto-ignition Temperature: 498° C (928° F)

Flash Point: -11° C (12° F)

Flammable Limits: Lower Limit – 1.3 vol %, Upper Limit – 7.1 vol %

Products of Combustion: May decompose into irritating and highly toxic gases under fire conditions (carbon monoxide and carbon dioxide).

Specific Fire Hazards: Use water spray to keep fire-exposed containers cool. Extremely flammable liquid and vapor. Vapor may cause flash fire. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. This liquid floats on water and may travel to a source of ignition and spread fire. May accumulate static electricity.

Fire Fighting Media Use water spray, dry chemical, carbon dioxide, or appropriate foam.

National Fire Protective Association: Health - 2, Flammability - 3, Reactivity - 0

NOTE: NFPA ratings use a numbering scale that ranges from 0 - 4 to indicate the degree of hazard. A value of zero means the chemical presents no hazard while a value of four indicates a high hazard. They are for use by emergency personnel to address the hazards that are presented by short term, acute exposure to this product under fire, spill, or similar emergencies. Ratings involve data and interpretations that may vary from company to company.

## 6. ACCIDENTAL RELEASE MEASURES

Use water spray to reduce vapors. Water spray may reduce vapors but still not prevent ignition in closed spaces. Absorb spilled liquid with sorbent pads, socks, or other inert material such as vermiculite, sand, or earth. Do not use sawdust or any combustible material. Use spark-proof tools. Provide ventilation to the affected area and remove all ignition sources. Approach the spill from upwind and pick up absorbed material and place it in a suitable container. Always use proper personal protective equipment as described in section 8.

## 7. HANDLING AND STORAGE

**Precautions:** Always use proper personal protective equipment as described in section 8. Wash thoroughly after handling. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Remove contaminated clothing and wash before reuse. Empty containers contain product residue (liquid and vapor) and can be dangerous. Keep container tightly closed and away from heat, spark, and flame. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks, or open flames. Use with adequate ventilation. Avoid breathing vapor or mist.

**Storage:** Keep in a flammables area away in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from oxidizers.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Engineering Controls:** Use explosion-proof ventilation equipment. Facilities storing or using the material should be equipped with eyewash station and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

**Personal Protection:** Wear protective chemical goggles or appropriate eye protection. Use butyl rubber gloves and protective clothing to prevent skin exposure. A respiratory protection program that meets OSHA 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever possible. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

**Exposure Limits:**

ACGIH – 0.5 ppm TWA; 2.5 ppm STEL; Skin – potential significant contribution to overall exposure by cutaneous route  
NIOSH – 0.1 ppm TWA; 500 ppm IDLH

OSHA Final PELs – 1 ppm TWA; 10 ppm TWA (applies to industry segments exempt from the benzene standard at 29 CFR 1910.1028); 25 ppm Ceiling (applies to industry segments exempt from the 1 ppm TWA and 5 ppm STEL of the benzene standard); 0.5 ppm Action Level; 1 ppm TWA; 5 ppm STEL (Cancer hazard, Flammable - see 29 C FR 1910.1028)

OSHA Vacated PELs - Benzene: 10 ppm TWA (unless specified in 1910.1028)

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Physical State and Appearance:** Clear, colorless liquid.

**Odor:** Sweet, aromatic odor

**Odor Threshold:** <1 – 160 ppm

**Molecular Formula:** C<sub>6</sub>H<sub>6</sub>

**Molecular Weight:** 78.11

**Auto-ignition Temperature:** 498° C (928° F)

**Flash Point:** -11° C (12° F)

**Flammable Limits:** Lower Limit – 1.3 vol %, Upper Limit – 7.1 vol %

**pH:** Not available.

**Boiling Point:** 80.1° C @ 760 mm Hg

Freezing/Melting Point: 5.5° C

Decomposition Temperature: Not available

Specific Gravity: 0.8765 @ 20° C

Vapor Density (Air=1): 2.8

Vapor Pressure: 75 mm Hg @ 20° C.

Evaporation Rate (Butyl acetate = 1): Not available

Viscosity: 0.647 mPa @ 20° C

Solubility: 0.180 g/100 ml @ 25° C

Conductivity: Nonconductive; Conductivity =  $5 \times 10^{-3}$  pS/m; Dielectric Constant = 2.3; Relaxation Time Constant = ~100 seconds (dissipation)

## 10. STABILITY AND REACTIVITY

Stability: Stable under normal temperature and pressure.

Conditions to Avoid: Ignition sources, excess heat, confined spaces.

Incompatibility With Various Substances: Strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

## 11. TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, skin absorption, skin contact

Acute Exposure Hazards:

INHALATION HAZARD: Causes respiratory tract irritation. May cause drowsiness, unconsciousness, and central nervous system depression. Exposure may lead to irreversible bone marrow injury. Exposure may lead to aplastic anemia. Potential symptoms of overexposure by inhalation are dizziness, headache, vomiting, visual disturbances, staggering gait, hilarity, fatigue, and other symptoms of central nervous system depression.

INGESTION HAZARD: May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. May cause effects similar to those for inhalation exposure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.

SKIN CONTACT HAZARD: Causes skin irritation. Harmful if absorbed through the skin. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.

EYE CONTACT HAZARD: Causes eye irritation.

Chronic Exposure Hazards: May cause bone marrow abnormalities with damage to blood forming tissues. May cause anemia and other blood cell abnormalities. Chronic exposure to benzene has been associated with an increased incidence of leukemia and multiple myeloma (tumor composed of cells of the type normally found in the bone marrow).

Immunodepressive effects have been reported. This substance has caused adverse reproductive and fetal effects in laboratory animals.

Animal Toxicity:

Dermal, guinea pig: LD50 = >9400 uL/kg;

Draize test, rabbit, eye: 88 mg Moderate;

Draize test, rabbit, eye: 2 mg/24H Severe;

Draize test, rabbit, skin: 20 mg/24H Moderate;

Inhalation, mouse: LC50 = 9980 ppm;

Inhalation, mouse: LC50 = 24 mL/kg/2H;

Inhalation, rat: LC50 = 10000 ppm/7H;

Inhalation, rat: LC50 = 34 mL/kg/2H;

Inhalation, rat: LC50 = 6.5 mL/kg/4H;

Oral, mouse: LD50 = 4700 mg/kg;

Oral, rat: LD50 = 930 mg/kg;

Oral, rat: LD50 = 1 mL/kg;

Oral, rat: LD50 = 1800;

Benzene is considered very toxic; probable human oral lethal dose would be 50-500 mg/kg. Human inhalation of approximately 20,000 ppm (2% in air) was fatal in 5-10 minutes. While percutaneous absorption of liquid benzene through intact human skin can be limited (e.g., 0.05% of the applied dose), the absorbed dose via direct dermal contact combined with that received from body surface exposure to benzene in workplace air is such that a substantial fraction (20-40%) of the total exposure is due to skin absorption.

**Carcinogenicity:** ACGIH: A1 - Confirmed Human Carcinogen; California: carcinogen, initial date 2/27/87; NTP: Known carcinogen; IARC: Group 1 carcinogen

**Epidemiology:** IARC has concluded that epidemiological studies have established the relationship between benzene exposure and the development of acute myelogenous leukemia, and that there is sufficient evidence that benzene is carcinogenic to humans.

**Teratogenicity:** Inhalation, rat: TCLO = 50 ppm/24H (female 7-14 day(s) after conception) Effects on Embryo or Fetus - extra-embryonic structures (e.g., placenta, umbilical cord) and Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus).; Inhalation, mouse: TCLO = 5 ppm (female 6-15 day(s) after conception) Effects on Embryo or Fetus - cytological changes (including somatic cell genetic material) and Specific Developmental Abnormalities - blood and lymphatic systems (including spleen and marrow)..

**Reproductive Effects:** Inhalation, rat: TCLO = 670 mg/m<sup>3</sup>/24H (female 15 day(s) pre-mating and female 1-22 day(s) after conception) female fertility index (e.g. # females pregnant per # sperm positive females; # females pregnant per # females mated).; Oral, mouse: TDLo = 12 gm/kg (female 6-15 day(s) after conception) Fertility - post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants)..

**Mutagenicity:** DNA Inhibition: Human, Leukocyte = 2200 umol/L.; DNA Inhibition: Human, HeLa cell = 2200 umol/L.; Mutation Test Systems - not otherwise specified: Human, Lymphocyte = 5 umol/L.; Cytogenetic Analysis: Inhalation, Human = 125 ppm/1Y.; Cytogenetic Analysis: Human, Leukocyte = 1 mmol/L/72H.; Cytogenetic Analysis: Human, Lymphocyte = 1 mg/L.

**Neurotoxicity:** Following acute inhalation of benzene in relatively high concentrations, factory workers exhibited symptoms of neurotoxicity. These symptoms reported to occur at levels ranging from 250 to 3000 ppm included headache, vertigo and dizziness. Exposure to higher concentrations of benzene [20,000 ppm (mg/m<sup>3</sup>)] for five to ten minutes can result in death. Neurological findings on lethal exposures are similar to those reported on non-lethal exposures to benzene. These symptoms are similar to the consequences of exposure to multiple organic solvents, including benzene, and are reversible when solvents are removed.

## 12. ECOLOGICAL INFORMATION

### Ecotoxicity:

Fish: Mosquito Fish: TLm = 395 mg/L; 24 Hr; Unspecified

Fish: Goldfish: LC50 =46 mg/L; 24 Hr; Modified ASTM D 1345

Fish: Fathead Minnow: LC50 = 15.1 mg/L; 96 Hr; Flow-through at 25°C (pH 7.9-8.0)

Fish: Rainbow trout: LC50 = 5.3 mg/L; 96 Hr; Flow-through at 25°C (pH 7.9-8.0)

Fish: Bluegill/Sunfish: LD50 = 20 mg/L; 24-48 Hr; Unspecified

If benzene is released to soil, it will be subject to rapid volatilization near the surface and that which does not evaporate will be highly to very highly mobile in the soil and may leach to groundwater. If benzene is released to water, it will be subject to rapid volatilization. It will not be expected to significantly adsorb to sediment, bioconcentrate in aquatic organisms or hydrolyze. It may be subject to biodegradation

**Environmental Fate:** If benzene is released to the atmosphere, it will exist predominantly in the vapor phase. Gas-phase benzene will not be subject to direct photolysis but it will react with photochemically produced hydroxyl radicals with a half-life of 13.4 days. The reaction time in polluted atmospheres which contain nitrogen oxides or sulfur dioxide is accelerated with the half-life being reported as 4-6 hours. Benzene is fairly soluble in water and is removed from the atmosphere in rain. Products of photooxidation include phenol, nitrophenols, nitrobenzene, formic acid, and peroxyacetyl nitrate.

## 13. DISPOSAL CONSIDERATIONS

Material that cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Processing, use or contamination of this product may change the waste management options. Waste generators must decide if discarded material is a hazardous waste. State and local disposal regulations may differ from federal disposal definitions found in 40 CFR 261.3. Dispose of container and unused contents in accordance with federal, state and local requirements. Benzene is a "U" listed waste (U019- Ignitable waste, Toxic waste).

## 14. TRANSPORT INFORMATION

### US DOT, IATA, IMO

Proper Shipping Name: Benzene

Hazard Class: 3

UN Number: UN1114

Packing Group: II

### Canada TDG

Additional Information: Flashpoint -11 C

## 15. REGULATORY INFORMATION

### US Federal Regulations:

TSCA: CAS# 71-43-2 is listed on the TSCA Inventory.

Health and Safety Reporting List: Not listed.

Chemical Test Rules: CAS# 71-43-2: Not listed.

Section 12b: Not listed.

TSCA Significant New Use Rule: Does not have an SNUR under TSCA.

CERCLA Hazardous Substances: CAS# 71-43-2; 10 lb final RQ (received an adjusted RQ of 10 lbs based on potential carcinogenicity)

SARA Section 302: Does not have a TPQ

SARA Codes: CAS# 71-43-2 – immediate, delayed, fire

Section 313: Benzene (71-43-2) is not subject to SARA Title III Section 313 and 40 CFR 373 reporting requirements.

Clean Air Act: CAS# 71-43-2 is listed as a hazardous air pollutant (HAP). It is not a Class 1 Ozone Depleter. It is not a Class 2 Ozone Depleter.

Clean Water Act: CAS# 71-43-2 is listed as a Hazardous Substance. It is a Priority Pollutant. It is a Toxic Pollutant.

OSHA: Not considered highly hazardous by OSHA.

### US State Regulations:

CAS# 71-43-2 is on the following state right-to-know lists: California, New Jersey, Pennsylvania, Minnesota, and Massachusetts

The following statements are made in order to comply with the California Safe Drinking Water Act: WARNING: This product contains Benzene, a chemical known to the state of California to cause cancer. WARNING: This product contains Benzene, a chemical known to the state of California to cause male reproductive toxicity.

California This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. CAS# 71-43-2: 6.4 æg/day NSRL (oral); 13 æg/day NSRL (inhalation)

### Canada:

DSL/NDSL: CAS# 71-43-2 is listed on Canada's DSL list.

WHMIS: This product has a classification of B2, D2A, D2B. This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and this MSDS contains all the information required by those regulations.

Ingredient Disclosure List: CAS# 71-43-2 is listed on Canada's Ingredient Disclosure List.

### DSC (EEC):

Hazard Symbols: T, F

Risk Phrases: 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, contact with skin and if swallowed; R65 Harmful: may cause lung damage if swallowed.

Safety Phrases: S45 - In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible); S53 - Avoid exposure - obtain special instructions before use.  
WGK (Water Danger/protection): CAS# 71-43-2: 3

## 16. OTHER INFORMATION

Originally Prepared: 8/29/2008

Last Revised: 05/15/2017 - Updated Pictograms H&P statements and HMIS.

The information contained herein is based on current knowledge and experience; no responsibility is accepted that the information is sufficient or correct in all cases. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers and the protection of the environment.

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