

BENZENE**PRODUCT IDENTIFICATION****Chemical Name and Synonyms:**

Benzene; Benzol; Carbon oil; Cyclohexatriene; Phenyl hydride

Chemical Family:

Aromatic hydrocarbon

Chemical Formula:

C₆H₆

Product Use:

Laboratory solvent

Manufacturer's Name and Address:

Caledon Laboratories Ltd.
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HAZARDOUS INGREDIENTS OF MATERIALS

Ingredients	%	TLV Units	CAS No.
Benzene	99	0.5 ppm	71-43-2

STEL 2.5 ppm

PHYSICAL DATA**Physical State:**

Liquid

Odour and Appearance:

Clear, colourless to light yellow with an aromatic odour

Odour Threshold (ppm):

61 ppm (detection); 97 ppm (recognition) Poor warning qualities, threshold is above TLV.

Vapour Pressure (mm Hg):

75 mm Hg at 20°C

Vapour Density (Air = 1):

2.7

Evaporation Rate:

2.8 (diethyl ether = 1)

Boiling Point (°C):

80°C

Freezing Point (°C):

5.5°C

pH:

Not applicable

Specific Gravity:

0.877 @ 20°C

Coefficient of Water/Oil distribution:

LogP(oct) 1.18-1.9

SHIPPING DESCRIPTION**UN:**

1114

T.D.G. Class:

3 (9.2)

Pkg. Group:

II

REACTIVITY DATA**Chemical Stability:**

Stable

Incompatibility with other substances:

May react violently or explosively with strong oxidizing agents, strong acids, halogens and halogenated compounds, oxygen, oxone. Can explode on contact with chromic anhydride, permanganic acid, chlorine, nitryl perchlorate. Spontaneously flammable with sodium or potassium peroxide. Metal perchlorates recrystallized from benzene, can explode spontaneously. Contact with acids liberates toxic gas. Attacks rubber and plastics. Not corrosive to metals.

Reactivity:

Avoid high temperatures, sparks, open flames, hot surfaces, all sources of ignition, all incompatible materials, generation of mist or vapour.

Hazardous Decomposition Products:

CO_x

FIRE AND EXPLOSION DATA**Flammability:**

Extremely flammable liquid and vapour. Mixtures with air are explosive. Can accumulate static charge by flow or agitation. Vapours are heavier than air and may travel considerable distance to source of ignition and flash back. Liquid can float on water and may spread fire.

Extinguishing Media:

Dry chemical, foam, carbon dioxide. Water may be used to cool containers and disperse vapours but will be ineffective for extinguishing fire because it will not cool liquid below flash point. Fight fire from upwind, from a safe distance. Firefighters must wear protective equipment (NIOSH/ OSHA approved positive-pressure, full face-piece self-contained breathing apparatus) and encapsulating chemical splash suit to prevent any inhalation or contact with this chemical.

Flash Point (Method Used):

-11°C (TCC)

Autoignition Temperature:

498°C

Upper Flammable Limit (% by volume):

7.1%

Lower Flammable Limit (% by volume):

1.3%

Hazardous Combustion Products:

CO_x, irritating aldehydes, ketones.

Sensitivity to Impact:

Not expected to be sensitive

Sensitivity to Static discharge:

Liquid can accumulate static charge by flow or agitation. Vapour in the flammable range can be ignited by a electrostatic discharge of sufficient energy.

TOXICOLOGICAL PROPERTIES AND HEALTH DATA**Toxicological Data:****LD₅₀:**

(oral rat) 930 mg/kg, 1 mL/kg; (dermal, guinea pig) 9,400 µL/kg

LC₅₀:

(rat) 34mL/kg/2h; 6.5 mL/kg/4h

Effects of Acute Exposure to Product:**Inhaled:**

Toxic. Irritating to upper respiratory tract. Exposure to 50-150 ppm causes central nervous system depression with drowsiness, dizziness, headache, nausea. Exposure to 20,000 ppm for a 5-10 minutes can cause death. High concentrations

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cause decreased judgement, feelings of well being, loss of balance, delirium, coma with motor restlessness, cardiac arrhythmias, pulmonary edema, cardiac or respiratory failure and death. Respiratory or cardiac complications may occur from within a few minutes to several days after exposure. May cause liver or kidney damage, and damage to blood and immune systems. If the exposure is not fatal, symptoms, such as unsteady gait, cardiac distress, internal bleeding, secondary infections, may persist for several weeks.

In contact with skin:

Based on animal studies, moderately irritating to skin, causing burning sensation, blistering and swelling. May be absorbed through skin, increasing systemic effects in "Inhaled".

In contact with eyes:

No human information. Based on animal studies, vapour is moderately irritating to eyes; liquid can cause burning sensation and transient corneal injury but not permanent damage.

Ingested:

Toxic. Causes burning sensation in mouth and throat. Readily absorbed, causing systemic intoxication with symptoms as in "Inhaled". Aspiration may cause immediate pulmonary edema and hemorrhage. The usual lethal dose in humans is 10-15 mL, but smaller amounts have been reported to cause death. If ingestion is not fatal, it may produce longterm effects that persist for up to a year.

Effects of Chronic Exposure to Product:

Studies have proved conclusively that prolonged or repeated exposure causes severe effects on the blood system, damage to bone marrow, and all types of blood cells, harmful changes to the immune system, including reduced lymphocyte counts.

Carcinogenicity:

Confirmed human carcinogen (designation A1). Causes cancer of white blood cells; aplastic anaemia; leukemia

Teratogenicity:

Crosses placental barrier, may cause teratogenic effects. Animal testing shows benzene fetotoxic, causing reduced birth weight and minor skeletal variations at levels that produce mild maternal toxicity.

Reproductive Effects:

Effects at doses which caused other significant signs of toxicity.

Mutagenicity:

Causes chromosomal aberrations in virtually all studies on animals and workers.

Synergistic Products:

Alcohols react synergistically. The use of alcoholic beverages may increase the toxic effects. The use of epinephrine may cause cardiac arrhythmias. Interactions with other medications have been reported.

PREVENTIVE MEASURES

Engineering Controls:

Non-sparking, grounded, separate, exhaust ventilation required.

Respiratory Protection:

At any concentration above the TLV, at any detectable concentration, or for fire or spill conditions where the concentration is unknown, NIOSH/OSHA approved positive-pressure, full face-piece self-contained breathing apparatus or positive-pressure, full face-piece supplied-air respirator with an auxiliary positive-pressure, self-contained breathing apparatus. IDLH (Immediately Dangerous to Life or Health) for benzene is 500 ppm; carcinogenic effects were not considered in establishing this value.

Eye Protection:

Chemical safety goggles and face shield.

Skin Protection:

Polyvinyl alcohol, Viton™/butyl rubber, Barrier (PE/PA/PE), Silver Shield/4H™ (polyethylene/ethylene vinyl alcohol), Responder™, Tychem™ BR/LV, Tychem™ TK gloves. Other impervious clothing, coveralls, boots, etc. as required to prevent contact.

Other Personal Protective Equipment:

Safety shower and eye-wash fountain available in work area.

Leak and Spill Procedure:

Eliminate all sources of ignition. Evacuate area. Cleanup personnel must be thoroughly trained in the hazards of this chemical and must wear protective equipment and clothing sufficient to prevent inhalation of vapours or mists and contact with skin and eyes. Do not touch spilled product. Stop or reduce discharge if safe to do so. Contain spill with activated carbon adsorbent or other inert material (sand, earth). Prevent from entering sewers or waterways, or confined spaces. Collect material into sealed, labelled containers for collection by disposal company. Contaminated absorbent may pose the same hazards as the spilled product; handle with the same caution. Ventilate area of spill, and flush with copious amounts of running water.

Waste Disposal:

Follow all federal, provincial and local regulations for disposal.

Handling Procedures and Equipment:

FLAMMABLE, TOXIC, CARCINOGEN, TERATOGEN, MUTAGEN. Workers must be thoroughly trained in the handling of hazardous materials and in the particular hazards of this material and its safe use, and must wear appropriate protective equipment and clothing. Ensure that engineering controls are operating effectively. Eliminate all ignition sources. Post "No Smoking" signs. Ground and bond equipment and containers to prevent a static charge buildup. Use spark-resistant tools and avoid "splash filling" of containers. Keep storage and work areas free of combustible or incompatible materials. Use the smallest amount possible for the purpose in a designated, well ventilated area. Avoid generating mists or vapours. AVOID ALL CONTACT AND INHALATION. Empty containers may contain hazardous residues; treat with caution.

Storage Requirements:

Store in suitable, labelled containers, in a cool, dry, well-ventilated area, out of direct sunlight and away from all sources of ignition and incompatible or combustible materials. Keep containers tightly closed. Storage facilities should be made of fire-resistant materials. Provide raised sills and trenches to drain to a safe area. Do not expose sealed containers to elevated temperatures. Protect from damage, and inspect frequently for signs of leaking. Treat empty containers with caution, as they may contain hazardous residues. Post "NO SMOKING" signs. Have appropriate fire extinguishers and spill cleanup equipment near the storage area.

FIRST AID MEASURES

Specific Measures:

Eyes:

IMMEDIATELY flush eyes with gently running water for at least thirty (30) minutes, holding eyelids open while flushing. Wear gloves to avoid contact. Take care not to flush contaminated water into unaffected eye. Get MEDICAL ATTENTION immediately.

Skin:

Under running water, remove contaminated clothing (including

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rings, watches, belts and shoes). Wear gloves to avoid contact. IMMEDIATELY flush exposed area with large amounts of warm running water for at least thirty (30) minutes or until chemical is removed. Get medical attention. Discard contaminated clothing.

Inhalation:

IMMEDIATELY remove to fresh air (caution must be used by rescuers to avoid exposure to contaminating fumes). Remove any sources of ignition. Give oxygen and get medical attention for any breathing difficulty. If breathing has stopped give artificial respiration (use a mouth guard to prevent contact with chemical). If breathing and pulse are absent give CPR.

IMMEDIATELY OBTAIN MEDICAL ATTENTION. Stay with casualty until medical assistance is reached.

Ingestion:

DO NOT INDUCE VOMITING. DANGER OF ASPIRATION WITH VOMITING. If casualty is alert and not convulsing, rinse out mouth with water, and give 1 to 2 glasses of water or milk to drink to dilute material. GET MEDICAL ATTENTION

IMMEDIATELY. If spontaneous vomiting occurs, have casualty lean forward with head down to avoid breathing in of vomitus. Rinse mouth and give more water to drink.

REFERENCES USED

CCINFO disc: Cheminfo

Royal Society of Chemistry: Chemical Safety Data Sheets, Vol. 1, 1992

Sax, Lewis: Hawley's Condensed Chemical Dictionary, 11th ed., 1987

Suppliers' Material Safety Data Sheets

ADDITIONAL INFORMATION

Date Issued:

November 1, 1988

Revision:

February 2012

MSDS:

1600-1, 1600-3, 1600-4, 1601-2

Proposed WHMIS Designation:

B2; D2A; D2B

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