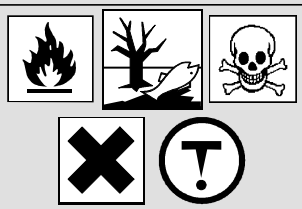
TCI AMERICA

Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
	**Flammable material; avoid heat and sources of ignition.** **Toxic compound, do not ingest or inhale. Avoid all contact with this material.** **Irritating to skin, eyes, and the respiratory system.** **CARCINOGEN. MINIMIZE EXPOSURE.** **Environmental hazard.**	

Section I. Chemical Product and Company Identification

Chemical Name **Benzene**

Catalog Number	B0020
Synonym	Not available.
Chemical Formula	C_6H_6
CAS Number	71-43-2

Supplier
TCI America
9211 N. Harborgate St.
Portland OR
1-800-423-8616

In case of Emergency Call
Chemtrec®
(800) 424-9300 (U.S.)
(703) 527-3887 (International)

Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
Benzene	71-43-2	Min. 99.5%(GC)	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen.	Rat LD_{50} (oral) 930 mg/kg Rabbit LD_{50} (dermal) >9400 uL/kg Rat LD_{50} (inhalation) 10,000 ppm/7H

Section III. Hazards Identification

Acute Health Effects

Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death.
Irritating to eyes and skin on contact. Inhalation causes irritation of the lungs and respiratory system. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.
Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

Chronic Health Effects

CARCINOGENIC EFFECTS : Carcinogenic by RTECS criteria
MUTAGENIC EFFECTS : Not available.
TERATOGENIC EFFECTS : TUMORIGENIC EFFECTS
Human TCLo Inhalation; 10 ppm/ 8 hours/ 10 years intermittent
TOXIC EFFECTS
Tumorigenic - Carcinogenic by RTECS criteria
Blood - Leukemia
Man TCLo Inhalation; 200 mg/m3/78weeks intermittent
TOXIC EFFECTS
Tumorigenic - Carcinogenic by RTECS criteria
Blood - Leukemia
Blood - Thrombocytopenia
Mouse TDLo Oral; 12875 mg/kg/103 weeks intermittent
TOXIC EFFECTS
Tumorigenic - Carcinogenic by RTECS criteria
Liver - Tumors
Blood - Lymphomas including Hodgkin's disease
DEVELOPMENTAL TOXICITYREPRODUCTIVE EFFECTS
Rat TCLo Inhalation; 50 ppm/24 hours; female 7-14 days of pregnancy.
TOXIC EFFECTS
Effects on Embryo or Fetus - Extra embryonic structures (e.g., placenta, umbilical cord)
Effects on Embryo or Fetus - Tetotoxicity (except death, e.g., stunted fetus)
Mouse TCLo Inhalation; 5 ppm; female 6-15 days of pregnancy.
TOXIC EFFECTS
Effects on Embryo or Fetus - Cytological changes (including somatic cell genetic material)
Specific Developmental Abnormalities - Blood and lymphatic system (including spleen and marrow)
Mouse TDLo Intraperitioneal; 5 mg/kg; male 1 day prior to mating.
TOXIC EFFECTS
Effects on Fertility - Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea)
Effects on Embryo or Fetus - Fetal death
Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Continued on Next Page *Emergency phone number (800) 424-9300*

Section IV. First Aid Measures

Eye Contact	Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.
Skin Contact	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Inhalation	If the victim is not breathing, perform mouth-to-mouth resuscitation. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, oxygen can be administered. Seek medical attention if respiration problems do not improve.
Ingestion	INDUCE VOMITING by sticking finger in throat. Lower the head so that the vomit will not reenter the mouth and throat. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive.

Section V. Fire and Explosion Data

Flammability	Flammable.	Auto-Ignition	498°C (928.4°F)
Flash Points	-10°C (14°F).	Flammable Limits	LOWER: 1.2% UPPER: 8%
Combustion Products	These products are toxic carbon oxides (CO, CO_2).		
Fire Hazards	Not available.		
Explosion Hazards	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.		
Fire Fighting Media and Instructions	Flammable liquid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Consult with local fire authorities before attempting large scale fire-fighting operations.		

Section VI. Accidental Release Measures

Spill Cleanup Instructions	Flammable Material. Toxic Material. Irritating Material. Carcinogenic Material. Environmental hazard. Keep away from heat. Mechanical exhaust required. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. DO NOT get water inside container. DO NOT touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Consult federal, state, and/or local authorities for assistance on disposal.

Section VII. Handling and Storage

Handling and Storage Information	FLAMMABLE. TOXIC. IRRITANT. CARCINOGEN. ENVIRONMENTAL HAZARD. Keep locked up.. Keep away from heat. Mechanical exhaust required. Avoid excessive heat and light. DO NOT ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Treat symptomatically and supportively. Always store away from incompatible compounds such as oxidizing agents, metals, acids, alkalis (bases).

Section VIII. Exposure Controls/Personal Protection

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash station and safety shower is proximal to the work-station location.
Personal Protection	Splash goggles. Lab coat. Vapor respirator. Boots. Gloves. A MSHA/NIOSH approved respirator must be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. 
Exposure Limits	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen.

Section IX. Physical and Chemical Properties

Physical state @ 20°C	Liquid. (Clear, Colorless.)	Solubility	Miscible in many organic solvents, alcohol, chloroform, ether, carbon disulfide, acetone, oils, carbon tetrachloride, glacial acetic acid.
Specific Gravity	0.88 (water=1)		
Molecular Weight	78.11	Partition Coefficient	Not available.
Boiling Point	80°C (176°F) 760 mmHg	Vapor Pressure	10 kPa (@ 20°C)
Melting Point	5°C (41°F)	Vapor Density	2.77 (Air = 1)
Refractive Index	1.499 to 1.502	Volatility	Not available.
Critical Temperature	Not available.	Odor	Characteristic.
Viscosity	Not available.	Taste	Not available.

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Section X. Stability and Reactivity Data

Stability	This material is stable if stored under proper conditions. (See Section VII for instructions)
Conditions of Instability	Avoid excessive heat and light.
Incompatibilities	Reactive with storng oxidizing agents, metals, acids, alkalis (bases), halogens.

Section XI. Toxicological Information

RTECS Number	CY1400000
Routes of Exposure	Eye Contact. Ingestion. Inhalation.
Toxicity Data	Rat LD_{50} (oral) 930 mg/kg Rabbit LD_{50} (dermal) >9400 uL/kg Rat LD_{50} (inhalation) 10,000 ppm/7H
Chronic Toxic Effects	**CARCINOGENIC EFFECTS** : Carcinogenic by RTECS criteria **MUTAGENIC EFFECTS** : Not available. **TERATOGENIC EFFECTS** : TUMORIGENIC EFFECTS Human TCLo Inhalation; 10 ppm/ 8 hours/ 10 years intermittent TOXIC EFFECTS Tumorigenic - Carcinogenic by RTECS criteria Blood - Leukemia Man TCLo Inhalation; 200 mg/m3/78weeks intermittent TOXIC EFFECTS Tumorigenic - Carcinogenic by RTECS criteria Blood - Leukemia Blood - Thrombocytopenia Mouse TDLo Oral; 12875 mg/kg/103 weeks intermittent TOXIC EFFECTS Tumorigenic - Carcinogenic by RTECS criteria Liver - Tumors Blood - Lymphomas including Hodgkin's disease **DEVELOPMENTAL TOXICITY**: REPRODUCTIVE EFFECTS Rat TCLo Inhalation; 50 ppm/24 hours; female 7-14 days of pregnancy. TOXIC EFFECTS Effects on Embryo or Fetus - Extra embryonic structures (e.g., placenta, umbilical cord) Effects on Embryo or Fetus - Tetotoxicity (except death, e.g., stunted fetus) Mouse TCLo Inhalation; 5 ppm; female 6-15 days of pregnancy. TOXIC EFFECTS Effects on Embryo or Fetus - Cytological changes (including somatic cell genetic material) Specific Developmental Abnormalities - Blood and lymphatic system (including spleen and marrow) Mouse TDLo Intraperitioneal; 5 mg/kg; male 1 day prior to mating. TOXIC EFFECTS Effects on Fertility - Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea) Effects on Embryo or Fetus - Fetal death Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
Acute Toxic Effects	Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death. Irritating to eyes and skin on contact. Inhalation causes irritation of the lungs and respiratory system. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

Section XII. Ecological Information

Ecotoxicity	Not available.
Environmental Fate	Benzene's production, existence in gasoline, and use in the production of ethylbenzene and styrene as well as many other chemicals may result in its release to the environment through various waste streams. Benzene is found in volcanoes, as a constituent of crude oil, from forest fires, and as a plant volatile. If released to air, a vapor pressure of 94.8 mm Hg at 25 deg C indicates benzene will exist solely as a vapor in the ambient atmosphere. Vapor-phase benzene will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 13 days. Vapor-phase benzene is also degraded by ozone radicals and nitrate found in the atmosphere but at such low rates as to not be important. Since benzene is very water soluble, it may be removed from the atmosphere by rain. If released to soil, benzene is expected to have high mobility based upon a Koc of 85. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 5.56X10-3 atm-cu m/mole. Benzene may volatilize from dry soil surfaces based upon its vapor pressure. Benzene is expected to biodegrade in soils based on a biodegradation study in a base-rich para-brownish soil where 20 ppm benzene was 24% degraded in 1 week, 44% in 5 weeks, and 47% in 10 weeks. If released into water, benzene is not expected to adsorb to sediment and suspended solids in water based upon the Koc. Volatilization from water surfaces is expected to be an important fate process based upon this compound's Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 1 hr and 3.5 days, respectively. Biodegradation of benzene in water is expected based on an experiment using an enriched aerobic bacterial culture in which benzene began to degrade 12 hrs after incubation in an aqueous (soil-free) solution with 50% of benzene degrading after 60 hrs and almost complete degradation within 90 hrs. In aqueous solution, benzene will react with hydroxyl radical (OH radical ave concn = 1.0X10-17 molec/cu cm) at a reaction rate of 7.8X10+9 L/mol sec which results in an estimated half-life of 103 days. A BCF ranging from 1.1-20 suggests bioconcentration in aquatic organisms is low. Hydrolysis is not expected to occur due to the lack of hydrolyzable functional groups. Occupational exposure to benzene may occur through inhalation and dermal contact with this compound at workplaces where benzene is produced or used. The general population may be exposed to benzene via inhalation of ambient air, ingestion of drinking water, and dermal contact with gasoline products containing benzene. Benzene is widely detected in atmospheric samples due to its presence in gasoline.

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Section XIII. Disposal Considerations

Waste Disposal	Recycle to process, if possible. Consult your local regional authorities. You may be able to dissolve or mix material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber system. Observe all federal, state and local regulations when disposing of the substance.

Section XIV. Transport Information

DOT Classification	CLASS 3: Flammable liquid.
PIN Number	UN1114
Proper Shipping Name	Benzene
Packing Group (PG)	II
DOT Pictograms	

Section XV. Other Regulatory Information and Pictograms

TSCA Chemical Inventory (EPA)	This compound is **ON** the EPA Toxic Substances Control Act (TSCA) inventory list.
WHMIS Classification (Canada)	CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). On DSL.
EINECS Number (EEC)	200-753-7
EEC Risk Statements	R10- Flammable. R18- In use, may form flammable/explosive vapor-air mixture. R23/24/25- Toxic by inhalation, in contact with skin and if swallowed. R36/37/38- Irritating to eyes, respiratory system and skin. R45- May cause cancer.
Japanese Regulatory Data	ENCS No. (3)-1

Section XVI. Other Information

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Validated on 12/4/2006.
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Notice to Reader

TCI laboratory chemicals are for research purposes only and are NOT intended for use as drugs, food additives, households, or pesticides. The information herein is believed to be correct, but does not claim to be all inclusive and should be used only as a guide. Neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All chemical reagents must be handled with the recognition that their chemical, physiological, toxicological, and hazardous properties have not been fully investigated or determined. All chemical reagents should be handled only by individuals who are familiar with their potential hazards and who have been fully trained in proper safety, laboratory, and chemical handling procedures. Although certain hazards are described herein, we can not guarantee that these are the only hazards which exist. Our MSDS sheets are based only on data available at the time of shipping and are subject to change without notice as new information is obtained. Avoid long storage periods since the product is subject to degradation with age and may become more dangerous or hazardous. It is the responsibility of the user to request updated MSDS sheets for products that are stored for extended periods. Disposal of unused product must be undertaken by qualified personnel who are knowledgeable in all applicable regulations and follow all pertinent safety precautions including the use of appropriate protective equipment (e.g. protective goggles, protective clothing, breathing equipment, facial mask, fume hood). For proper handling and disposal, always comply with federal, state, and local regulations.