

## MATERIAL SAFETY DATA SHEET

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Version 1.7

## Section 1 - Product and Company Information

Product Name	BENZENE, 99%, A.C.S. REAGENT
Product Number	319953
Brand	ALDRICH
Company	Sigma-Aldrich
Street Address	3050 Spruce Street
City, State, Zip, Country	SAINT LOUIS MO 63103 US
Technical Phone:	314 771 5765
Emergency Phone:	414 273 3850 Ext. 5996
Fax:	800 325 5052

## Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
BENZENE	71-43-2	Yes
Formula	C6H6	
Synonyms	(6)Annulene * Benzeen (Dutch) * Benzen (Polish) * Benzene (ACGIH:OSHA) * Benzin (Obs.) * Benzine (Obs.) * Benzol (OSHA) * Benzole * Benzolene * Benzolo (Italian) * Bicarburet of hydrogen * Carbon oil * Coal naphtha * Cyclohexatriene * Fenzen (Czech) * Mineral naphtha * NCI-C55276 * Phene * Phenyl hydride * Pyrobenzol * Pyrobenzole * RCRA waste number U019	
RTECS Number:	CY1400000	

## Section 3 - Hazards Identification

## EMERGENCY OVERVIEW

Flammable (USA) Highly Flammable (EU). Toxic.

May cause cancer. Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed. Irritating to respiratory system and skin. Risk of serious damage to eyes.

Danger: contains benzene, cancer hazard. Calif. Prop. 65 reproductive hazard. Target organ(s): Blood. Bone marrow.

## HMIS RATING

HEALTH: 2\*

FLAMMABILITY: 3

REACTIVITY: 0

## NFPA RATING

HEALTH: 2

FLAMMABILITY: 3

REACTIVITY: 0

\*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

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## Section 4 - First Aid Measures

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### ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

### INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

### DERMAL EXPOSURE

In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

### EYE EXPOSURE

In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

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## Section 5 - Fire Fighting Measures

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### FLAMMABLE HAZARDS

Flammable Hazards: Yes

### EXPLOSION HAZARDS

Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions.

### FLASH POINT

12 °F -11 °C Method: closed cup

### EXPLOSION LIMITS

Lower: 1.3 % Upper: 8 %

### AUTOIGNITION TEMP

562 °C

### FLAMMABILITY

N/A

### EXTINGUISHING MEDIA

Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

### FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.  
Specific Hazard(s): Flammable liquid. Vapor may travel considerable distance to source of ignition and flash back.  
Emits toxic fumes under fire conditions.

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## Section 6 - Accidental Release Measures

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### PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area. Shut off all sources of ignition.

### PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP

Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

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Section 7 - Handling and Storage

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HANDLING

User Exposure: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE

Suitable: Keep container closed. Keep away from heat, sparks, and open flame.

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Section 8 - Exposure Controls / PPE

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ENGINEERING CONTROLS

Safety shower and eye bath. Use nonsparking tools. Use only in a chemical fume hood.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Government approved respirator.  
Hand: Compatible chemical-resistant gloves.  
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES

Wash contaminated clothing before reuse. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	0.5 PPM3
		STEL	2.5 PPM
USA	MSHA Standard	Ceiling	co25 PPM (80 MG/M3) (SKIN)
New Zealand	OEL		
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	0.1 PPM
		Ceiling	co1 PPM/15M

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	10 MG/M3
Poland		NDSch	40 MG/M3
Poland		NDSP	-

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Section 9 - Physical/Chemical Properties

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Appearance	Physical State: Liquid	
	Color: Colorless	
Property	Value	At Temperature or Pressure
Molecular Weight	81.14 AMU	
pH	N/A	
BP/BP Range	80 - 80.2 °C	760 mmHg
MP/MP Range	5.5 °C	
Freezing Point	N/A	
Vapor Pressure	74.6 mmHg	20 °C
Vapor Density	2.77 g/l	
Saturated Vapor Conc.	N/A	

SG/Density	0.879 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	12 °F -11 °C	Method: closed cup
Explosion Limits	Lower: 1.3 % Upper: 8 %	
Flammability	N/A	
Autoignition Temp	562 °C	
Refractive Index	1.501	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

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## Section 10 - Stability and Reactivity

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### STABILITY

Stable: Stable.

Materials to Avoid: Acids, Bases, Halogens, Strong oxidizing agents, Avoid contact with metal salts.

### HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

### HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

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## Section 11 - Toxicological Information

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cancer hazard

### ROUTE OF EXPOSURE

Skin Contact: Causes skin irritation.

Skin Absorption: Toxic if absorbed through skin.

Eye Contact: Causes severe eye irritation.

Inhalation: Toxic if inhaled. Vapor or mist is irritating to the mucous membranes and upper respiratory tract.

Ingestion: Toxic if swallowed.

### TARGET ORGAN(S) OR SYSTEM(S)

Blood. Bone marrow. Eyes. Female reproductive system.

### SIGNS AND SYMPTOMS OF EXPOSURE

Exposure can cause: Nausea, dizziness, and headache. Narcotic effect. Inhalation of high concentrations of benzene may have an initial stimulatory effect on the central nervous system characterized by exhilaration, nervous excitation and/or giddiness, depression, drowsiness, or fatigue. The victim may experience tightness in the chest, breathlessness, and loss of consciousness. Tremors, convulsions, and death due to respiratory paralysis or circulatory collapse can occur in a few minutes to several hours following severe exposures. Aspiration

of small amounts of liquid immediately causes pulmonary edema and hemorrhage of pulmonary tissue. Direct skin contact may cause erythema. Repeated or prolonged skin contact may result in drying, scaling dermatitis, or development of secondary skin infections. The chief target organ is the hematopoietic system. Bleeding from the nose, gums, or mucous membranes and the development of purpuric spots, pancytopenia, leukopenia, thrombocytopenia, aplas

#### TOXICITY DATA

Inhalation  
Human  
2 PPH/5M  
LCLO

Oral  
Man  
50 mg/kg  
LDLO

Inhalation  
Human  
65 mg/m<sup>3</sup>  
LCLO  
Remarks: Blood:Other changes.

Oral  
Rat  
930 mg/kg  
LD50  
Remarks: Behavioral:Tremor. Behavioral:Convulsions or effect on seizure threshold.

Inhalation  
Rat  
10,000 ppm  
LC50

Intraperitoneal  
Rat  
1100 UG/KG  
LD50

Oral  
Mouse  
4700 mg/kg  
LD50

Inhalation  
Mouse  
9,980 ppm  
LC50  
Remarks: Behavioral:General anesthetic. Behavioral:Muscle weakness. Lungs, Thorax, or Respiration:Dyspnea.

Skin  
Mouse  
48 mg/kg  
LD50

Intraperitoneal

Mouse  
340 MG/KG  
LD50

Skin  
Rabbit  
>9400 UL/KG  
LD50

Skin  
Guinea pig  
>9400 UL/KG  
LD50

Oral  
Mammal  
5700 mg/kg  
LD50

#### IRRITATION DATA

Skin  
Rabbit  
15 mg  
24H  
Remarks: Open irritation test

Skin  
Rabbit  
20 mg  
24H  
Remarks: Moderate irritation effect

Eyes  
Rabbit  
88 mg  
Remarks: Moderate irritation effect

Eyes  
Rabbit  
2 mg  
24H  
Remarks: Severe irritation effect

#### CHRONIC EXPOSURE - CARCINOGEN

Result: This is or contains a component that has been reported to be carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Species: Man  
Route of Application: Inhalation  
Dose: 200 MG/M3  
Exposure Time: 78W-  
Frequency: I  
Result: Tumorigenic: Carcinogenic by RTECS criteria.  
Blood: Leukemia Blood: Thrombocytopenia.

Species: Human  
Route of Application: Inhalation  
Dose: 10 PPM  
Exposure Time: 8H/10Y  
Frequency: I

Result: Tumorigenic: Carcinogenic by RTECS criteria.  
Blood: Leukemia

Species: Rat  
Route of Application: Oral  
Dose: 52 GM/KG  
Exposure Time: 52W  
Frequency: I  
Result: Tumorigenic: Carcinogenic by RTECS criteria.  
Endocrine: Tumors. Blood: Leukemia

Species: Rat  
Route of Application: Inhalation  
Dose: 1200 PPM  
Exposure Time: 6H/10W  
Frequency: I  
Result: Tumorigenic: Equivocal tumorigenic agent by RTECS  
criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and  
Taste): Ear: Tumors.

Species: Mouse  
Route of Application: Oral  
Dose: 18250 MG/KG  
Exposure Time: 2Y  
Frequency: C  
Result: Tumorigenic: Carcinogenic by RTECS criteria.  
Endocrine: Tumors. Blood: Lymphomas including Hodgkin's disease.

Species: Mouse  
Route of Application: Inhalation  
Dose: 300 PPM  
Exposure Time: 6H/16W  
Frequency: I  
Result: Tumorigenic: Equivocal tumorigenic agent by RTECS  
criteria. Blood: Lymphomas including Hodgkin's disease.

Species: Mouse  
Route of Application: Skin  
Dose: 1200 GM/KG  
Exposure Time: 49W  
Frequency: I  
Result: Tumorigenic: Neoplastic by RTECS criteria. Skin and  
Appendages: Other: Tumors.

Species: Mouse  
Route of Application: Intraperitoneal  
Dose: 1200 MG/KG  
Exposure Time: 8W  
Frequency: I  
Result: Tumorigenic: Neoplastic by RTECS criteria. Lungs, Thorax,  
or Respiration: Tumors.

Species: Mouse  
Route of Application: Subcutaneous  
Dose: 600 MG/KG  
Exposure Time: 17W  
Frequency: I  
Result: Tumorigenic: Equivocal tumorigenic agent by RTECS  
criteria. Blood: Leukemia Blood: Lymphomas including Hodgkin's  
disease.

Species: Mouse

Route of Application: Parenteral  
Dose: 670 MG/KG  
Exposure Time: 19W  
Frequency: I  
Result: Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Blood: Leukemia Blood: Lymphomas including Hodgkin's disease.

Species: Human  
Route of Application: Inhalation  
Dose: 150 PPM  
Exposure Time: 15M/8Y  
Frequency: I  
Result: Tumorigenic: Carcinogenic by RTECS criteria.  
Blood: Leukemia

Species: Rat  
Route of Application: Oral  
Dose: 52 GM/KG  
Exposure Time: 1Y  
Frequency: I  
Result: Tumorigenic: Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste): Ear: Tumors.  
Blood: Leukemia

Species: Rat  
Route of Application: Oral  
Dose: 10 GM/KG  
Exposure Time: 52W  
Frequency: I  
Result: Tumorigenic: Carcinogenic by RTECS criteria.  
Endocrine: Tumors. Blood: Leukemia

Species: Man  
Route of Application: Inhalation  
Dose: 600 MG/M3  
Exposure Time: 4Y-  
Frequency: I  
Result: Tumorigenic: Carcinogenic by RTECS criteria.  
Blood: Leukemia

Species: Man  
Route of Application: Inhalation  
Dose: 150 PPM  
Exposure Time: 11Y  
Frequency: I  
Result: Tumorigenic: Carcinogenic by RTECS criteria.  
Blood: Lymphomas including Hodgkin's disease.

Species: Mouse  
Route of Application: Inhalation  
Dose: 1200 PPM  
Exposure Time: 6H/10W  
Frequency: I  
Result: Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste): Ear: Tumors. Lungs, Thorax, or Respiration: Tumors.

Species: Mouse  
Route of Application: Oral  
Dose: 2400 MG/KG  
Exposure Time: 8W



Frequency: I  
Result: Tumorigenic:Neoplastic by RTECS criteria. Lungs, Thorax,  
or Respiration:Tumors.

Species: Human  
Route of Application: Inhalation  
Dose: 8 PPB  
Exposure Time: 4W  
Frequency: I  
Result: Tumorigenic:Carcinogenic by RTECS criteria.  
Blood:Leukemia

Species: Human  
Route of Application: Inhalation  
Dose: 10 MG/M3  
Exposure Time: 11Y-  
Frequency: I  
Result: Tumorigenic:Carcinogenic by RTECS criteria.  
Blood:Leukemia

Species: Mouse  
Route of Application: Inhalation  
Dose: 300 PPM  
Exposure Time: 6H/16W  
Frequency: I  
Result: Tumorigenic:Carcinogenic by RTECS criteria.  
Blood:Leukemia

#### OSHA CARCINOGEN LIST

cancer hazard

#### IARC CARCINOGEN LIST

Rating: Group 1

#### NTP CARCINOGEN LIST

Rating: Clear evidence.  
Species: Mouse/rat  
Route: Gavage

#### ACGIH CARCINOGEN LIST

Rating: A1

#### CHRONIC EXPOSURE - TERATOGEN

Species: Rat  
Dose: 50 PPM/24H  
Route of Application: Inhalation  
Exposure Time: (7-14D PREG)  
Result: Effects on Embryo or Fetus: Extra embryonic structures  
(e.g., placenta, umbilical cord). Effects on Embryo or Fetus:  
Fetotoxicity (except death, e.g., stunted fetus).

Species: Mouse  
Dose: 9 GM/KG  
Route of Application: Oral  
Exposure Time: (6-15D PREG)  
Result: Effects on Embryo or Fetus: Fetotoxicity (except death,  
e.g., stunted fetus).

Species: Mouse  
Dose: 500 PPM/7H  
Route of Application: Inhalation  
Exposure Time: (6-15D PREG)  
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse  
Dose: 500 MG/M3/12H  
Route of Application: Inhalation  
Exposure Time: (6-15D PREG)  
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse  
Dose: 5 PPM  
Route of Application: Inhalation  
Exposure Time: (6-15D PREG)  
Result: Effects on Embryo or Fetus: Cytological changes (including somatic cell genetic material). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Species: Mouse  
Dose: 20 PPM/6H  
Route of Application: Inhalation  
Exposure Time: (6-15D PREG)  
Result: Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Species: Mouse  
Dose: 219 MG/KG  
Route of Application: Intraperitoneal  
Exposure Time: (14D PREG)  
Result: Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow). Specific Developmental Abnormalities: Hepatobiliary system.

Species: Mouse  
Dose: 1100 MG/KG  
Route of Application: Subcutaneous  
Exposure Time: (12D PREG)  
Result: Effects on Embryo or Fetus: Other effects to embryo.

Species: Mouse  
Dose: 7030 MG/KG  
Route of Application: Subcutaneous  
Exposure Time: (12-13D PREG)  
Result: Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse  
Dose: 13200 UG/KG  
Route of Application: Intravenous  
Exposure Time: (13-16D PREG)  
Result: Effects on Embryo or Fetus: Cytological changes (including somatic cell genetic material).

Species: Rabbit  
Dose: 1 GM/M3/24H  
Route of Application: Inhalation  
Exposure Time: (7-20D PREG)  
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Other developmental abnormalities.

#### CHRONIC EXPOSURE - MUTAGEN

Result: Laboratory experiments have shown mutagenic effects.

Species: Human  
Dose: 2200 UMOL/L  
Cell Type: leukocyte  
Mutation test: DNA inhibition

Species: Human  
Dose: 2200 UMOL/L  
Cell Type: HeLa cell  
Mutation test: DNA inhibition

Species: Human  
Dose: 5 UMOL/L  
Cell Type: lymphocyte  
Mutation test: Other mutation test systems

Species: Human  
Route: Inhalation  
Dose: 125 PPM  
Exposure Time: 1Y  
Mutation test: Cytogenetic analysis

Species: Human  
Dose: 1 MMOL/L  
Exposure Time: 72H  
Cell Type: leukocyte  
Mutation test: Cytogenetic analysis

Species: Human  
Dose: 1 MG/L  
Cell Type: lymphocyte  
Mutation test: Cytogenetic analysis

Species: Human  
Route: Unreported  
Dose: 10 PPM  
Exposure Time: 4W  
Mutation test: Cytogenetic analysis

Species: Human  
Dose: 200 UMOL/L  
Cell Type: lymphocyte  
Mutation test: Sister chromatid exchange

Species: Human  
Dose: 1 GM/L  
Cell Type: lymphocyte  
Mutation test: Mutation in mammalian somatic cells.

Species: Rat  
Route: Inhalation

Dose: 1 PPM  
Exposure Time: 6H  
Mutation test: Micronucleus test

Species: Rat  
Dose: 1 MMOL/L  
Cell Type: liver  
Mutation test: Unscheduled DNA synthesis

Species: Rat  
Route: Inhalation  
Dose: 400 PPM  
Mutation test: DNA inhibition

Species: Rat  
Dose: 1 MMOL/L  
Cell Type: liver  
Mutation test: Other mutation test systems

Species: Rat  
Dose: 1 MMOL/L  
Cell Type: Bone marrow  
Mutation test: Other mutation test systems

Species: Rat  
Route: Subcutaneous  
Dose: 1 GM/L  
Mutation test: Other mutation test systems

Species: Rat  
Route: Subcutaneous  
Dose: 2200 MG/KG  
Mutation test: Other mutation test systems

Species: Rat  
Route: Inhalation  
Dose: 300 MG/M3/16W-I  
Mutation test: Cytogenetic analysis

Species: Rat  
Route: Subcutaneous  
Dose: 2400 MG/KG  
Exposure Time: 12D  
Mutation test: Cytogenetic analysis

Species: Rat  
Route: Intraperitoneal  
Dose: 234 MG/KG  
Mutation test: Cytogenetic analysis

Species: Rat  
Route: Oral  
Dose: 39060 UG/KG  
Mutation test: Cytogenetic analysis

Species: Rat  
Route: Inhalation  
Dose: 3 PPM  
Exposure Time: 6H  
Mutation test: Sister chromatid exchange

Species: Rat

Dose: 1 MMOL/L  
Cell Type: leukocyte  
Mutation test: Sister chromatid exchange

Species: Mouse  
Dose: 12500 NMOL/L  
Cell Type: Embryo  
Mutation test: Micronucleus test

Species: Mouse  
Route: Subcutaneous  
Dose: 440 MG/KG  
Mutation test: Micronucleus test

Species: Mouse  
Route: Oral  
Dose: 40 MG/KG  
Mutation test: Micronucleus test

Species: Mouse  
Route: Intraperitoneal  
Dose: 264 MG/KG  
Exposure Time: 24H  
Mutation test: Micronucleus test

Species: Mouse  
Route: Inhalation  
Dose: 10 PPM  
Exposure Time: 6H  
Mutation test: Micronucleus test

Species: Mouse  
Dose: 62500 UG/L (+S9)  
Cell Type: lymphocyte  
Mutation test: Mutation in microorganisms

Species: Mouse  
Dose: 2500 MG/L (+S9)  
Cell Type: Embryo  
Mutation test: Mutation in microorganisms

Species: Mouse  
Dose: 1 GM/L  
Cell Type: Embryo  
Mutation test: Morphological transformation.

Species: Mouse  
Dose: 150 GM/L  
Cell Type: fibroblast  
Mutation test: Morphological transformation.

Species: Mouse  
Dose: 3840 UMOL/L  
Cell Type: lymphocyte  
Mutation test: DNA damage

Species: Mouse  
Route: Intraperitoneal  
Dose: 2640 MG/KG  
Exposure Time: 3D  
Mutation test: DNA

Species: Mouse  
Route: Oral  
Dose: 2 GM/KG  
Mutation test: Other mutation test systems

Species: Mouse  
Dose: 5 MMOL/L  
Cell Type: Other cell types  
Mutation test: Other mutation test systems

Species: Mouse  
Route: Oral  
Dose: 20 GM/KG  
Mutation test: DNA inhibition

Species: Mouse  
Dose: 10 MMOL/L  
Cell Type: lymphocyte  
Mutation test: Other mutation test systems

Species: Mouse  
Route: Intraperitoneal  
Dose: 880 MG/KG  
Mutation test: DNA inhibition

Species: Mouse  
Route: Inhalation  
Dose: 3000 PPM  
Exposure Time: 4H  
Mutation test: DNA inhibition

Species: Mouse  
Dose: 3 MMOL/L  
Cell Type: Bone marrow  
Mutation test: DNA inhibition

Species: Mouse  
Route: Inhalation  
Dose: 10 PPM  
Exposure Time: 6H  
Mutation test: Sister chromatid exchange

Species: Mouse  
Route: Intraperitoneal  
Dose: 5 GM/KG  
Mutation test: Sister chromatid exchange

Species: Mouse  
Route: Oral  
Dose: 20 MG/KG  
Mutation test: Cytogenetic analysis

Species: Mouse  
Route: Intraperitoneal  
Dose: 264 MG/KG  
Exposure Time: 3D  
Mutation test: Cytogenetic analysis

Species: Mouse  
Route: Inhalation  
Dose: 3000 PPM  
Mutation test: Cytogenetic analysis

Species: Mouse  
Route: Oral  
Dose: 1 MG/KG  
Mutation test: Dominant lethal test

Species: Mouse  
Route: Intraperitoneal  
Dose: 5 MG/KG  
Mutation test: Dominant lethal test

Species: Mouse  
Dose: 12500 UG/L  
Cell Type: lymphocyte  
Mutation test: Mutation in mammalian somatic cells.

Species: Mouse  
Route: Inhalation  
Dose: 40 PPB/6W-C  
Mutation test: Mutation in mammalian somatic cells.

Species: Mouse  
Route: Oral  
Dose: 2 GM/KG  
Exposure Time: 5D  
Mutation test: Mutation in mammalian somatic cells.

Species: Hamster  
Dose: 100 UG/L  
Cell Type: Embryo  
Mutation test: Morphological transformation.

Species: Hamster  
Dose: 17 MMOL/L  
Cell Type: ovary  
Mutation test: DNA damage

Species: Hamster  
Dose: 550 MG/L  
Cell Type: lung  
Mutation test: Cytogenetic analysis

Species: Hamster  
Dose: 600 MG/L  
Cell Type: ovary  
Mutation test: Cytogenetic analysis

Species: Hamster  
Dose: 750 MG/L  
Cell Type: ovary  
Mutation test: Sister chromatid exchange

Species: Hamster  
Dose: 62500 UG/L  
Cell Type: liver  
Mutation test: SLN

Species: Hamster  
Dose: 30 UMOL/L  
Cell Type: Embryo  
Mutation test: SLN

Species: Hamster  
Dose: 10 UMOL/L  
Cell Type: Embryo  
Mutation test: Mutation in mammalian somatic cells.

Species: Rabbit  
Route: Subcutaneous  
Dose: 2344 MG/KG  
Mutation test: DNA damage

Species: Rabbit  
Route: Subcutaneous  
Dose: 2 GM/KG  
Mutation test: DNA inhibition

Species: Rabbit  
Dose: 1 MMOL/L  
Cell Type: Bone marrow  
Mutation test: Other mutation test systems

Species: Cat  
Dose: 1 MMOL/L  
Cell Type: Bone marrow  
Mutation test: Other mutation test systems

Species: Rabbit  
Route: Subcutaneous  
Dose: 8400 MG/KG  
Mutation test: Cytogenetic analysis

#### CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat  
Dose: 670 MG/M3/24H  
Route of Application: Inhalation  
Exposure Time: (15D PRE/1-22D PREG)  
Result: Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated ).

Species: Rat  
Dose: 56600 UG/M3/24H  
Route of Application: Inhalation  
Exposure Time: (1-22D PREG)  
Result: Effects on Newborn: Biochemical and metabolic.

Species: Rat  
Dose: 150 PPM/24H  
Route of Application: Inhalation  
Exposure Time: (7-14D PREG)  
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).  
Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse  
Dose: 12 GM/KG  
Route of Application: Oral  
Exposure Time: (6-15D PREG)  
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Mouse



Dose: 6500 MG/KG  
Route of Application: Oral  
Exposure Time: (8-12D PREG)  
Result: Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Species: Mouse  
Dose: 5 MG/KG  
Route of Application: Intraperitoneal  
Exposure Time: (1D MALE)  
Result: 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.

Species: Mouse  
Dose: 4 GM/KG  
Route of Application: Parenteral  
Exposure Time: (12D PREG)  
Result: Effects on Newborn: Weaning or lactation index (e.g., # alive at weaning per # alive at day 4).

Species: Rabbit  
Dose: 1 GM/M3/24H  
Route of Application: Inhalation  
Exposure Time: (7-20D PREG)  
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Fertility: Abortion. Effects on Embryo or Fetus: Fetal death.

Species: Rabbit  
Dose: 500 PPM/7H  
Route of Application: Inhalation  
Exposure Time: (6-18D PREG)  
Result: Maternal Effects: Other effects.

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## Section 12 - Ecological Information

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No data available.

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## Section 13 - Disposal Considerations

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### APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

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## Section 14 - Transport Information

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### DOT

Proper Shipping Name: Benzene  
UN#: 1114  
Class: 3  
Packing Group: Packing Group II  
Hazard Label: Flammable liquid  
PIH: Not PIH

### IATA

Proper Shipping Name: Benzene

IATA UN Number: 1114  
Hazard Class: 3  
Packing Group: II

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## Section 15 - Regulatory Information

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### EU DIRECTIVES CLASSIFICATION

Symbol of Danger: F T  
Indication of Danger: Highly Flammable. Toxic.  
R: 45 11 48/23/24/25  
Risk Statements: May cause cancer. Highly flammable. Toxic:  
danger of serious damage to health by prolonged exposure through  
inhalation, in contact with skin and if swallowed.  
S: 53 45  
Safety Statements: Restricted to professional users. Attention -  
Avoid exposure - obtain special instructions before use. In case  
of accident or if you feel unwell, seek medical advice  
immediately (show the label where possible).

### US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Flammable (USA) Highly Flammable (EU).  
Toxic.  
Risk Statements: May cause cancer. Toxic: danger of serious  
damage to health by prolonged exposure through inhalation, in  
contact with skin and if swallowed. Irritating to respiratory  
system and skin. Risk of serious damage to eyes.  
Safety Statements: Restricted to professional users. Attention -  
Avoid exposure - obtain special instructions before use. In case  
of accident or if you feel unwell, seek medical advice  
immediately (show the label where possible).  
US Statements: Danger: contains benzene, cancer hazard. Calif.  
Prop. 65 reproductive hazard. Target organ(s): Blood. Bone  
marrow.

### UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes  
DEMINIMIS: 0.1 %  
NOTES: This product is subject to SARA section 313 reporting  
requirements.  
TSCA INVENTORY ITEM: Yes

### UNITED STATES - STATE REGULATORY INFORMATION

OSHA Remarks: OSHA-regulated carcinogen. See CFR title 29 part  
1910.1028

### CALIFORNIA PROP - 65

California Prop - 65: This product is or contains chemical(s)  
known to the state of California to cause cancer. This product  
is or contains chemical(s) known to the state of California to  
cause developmental toxicity. This product is or contains  
chemical(s) known to the state of California to cause male  
reproductive toxicity.

### CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in  
accordance with the hazard criteria of the CPR, and the MSDS  
contains all the information required by the CPR.  
DSL: Yes  
NDSL: No

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## Section 16 - Other Information

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DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2004 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.