# SIGMA-ALDRICH

## Material Safety Data Sheet

Version 3.1 Revision Date 10/26/2007 Print Date 05/12/2008

Product name	: Benzene			
	Benzene			
Product Number	: 12540			
Brand	: Fluka			
Company	: Sigma-Aldrich			
	3050 Spruce S	itreet		
	SAINT LOUIS	MO 63103		
<b>-</b>	USA	<b>2</b> 2		
l elephone	: +1 800-325-58	32		
Fax Emergency Phone #	· (314) 776-655	5		
Linergency r none #	. (314) 770-000			
OMPOSITION/INFORMA	TION ON INGREDIEN	ſS		
Formula				
Molecular Weight	· 78 11 a/mol			
	i renr g,mer			
CAS-No.	EC-No.	Index-No.	Concentration	
Benzene				
71-43-2	200-753-7	601-020-00-8	-	
AZARDS IDENTIFICATIC Emergency Overview	DN			
AZARDS IDENTIFICATIO Emergency Overview OSHA Hazards Flammable Liquid Target Organ Effect Irritant Carcinogen Mutagen Target Organs Blood, Eyes, Fem HMIS Classification Health Hazard: 2	DN	n., Bone marrow		
AZARDS IDENTIFICATIO Emergency Overview OSHA Hazards Flammable Liquid Target Organ Effect Irritant Carcinogen Mutagen Target Organs Blood, Eyes, Fem HMIS Classification Health Hazard: 2 Chronic Health Haza	DN I ale reproductive system	n., Bone marrow		
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AZARDS IDENTIFICATIO Emergency Overview OSHA Hazards Flammable Liquid Target Organ Effect Irritant Carcinogen Mutagen Target Organs Blood, Eyes, Fem HMIS Classification Health Hazard: 2 Chronic Health Haza Flammability: 3 Physical hazards: 0 NFPA Rating Health Hazard: 2 Fire : 3 Reactivity Hazard: 0	DN ale reproductive system ard: *	n., Bone marrow		

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed.

#### 4. FIRST AID MEASURES

#### **General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

## If inhaled

If breathed in, move person into fresh air. If not breathing give artificial respiration Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

#### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

## **5. FIRE-FIGHTING MEASURES**

#### **Flammable properties**

Flash point -11.0 °C (12.2 °F) - closed cup

Ignition temperature 562 °C (1,044 °F)

#### Suitable extinguishing media

For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

#### Specific hazards

Flash back possible over considerable distance. Container explosion may occur under fire conditions.

## Special protective equipment for fire-fighters

Wear self contained breathing apparatus for fire fighting if necessary.

#### Further information

Use water spray to cool unopened containers.

## 6. ACCIDENTAL RELEASE MEASURES

#### Personal precautions

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

#### **Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

## Methods for cleaning up

Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

## 7. HANDLING AND STORAGE

## Handling

Avoid exposure - obtain special instructions before use. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

## Storage

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in cool place.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

## Components with workplace control parameters

Components	CAS-No.	Value	Control	Update	Basis	
Benzene	71-43-2	TWA	0.5 ppm 1.6 mg/m3	1997-05-21	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004:Committees on Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)	
		STEL	2.5 ppm 8 mg/m3	1997-05-21	US. American Conference of Governmental and Industrial Hygienists Threshold Limit Values for Chemical Substances in the Work Environment; Annual Reports for the Year 2004:Committees on Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs)	
		TWA	1 ppm	1989-03-01	US. Department of Labor - Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000 Z-1-A	
Remarks	Sec. 1910.1 The final be benzene ex the action le production, percentage limits in Tat See Table 2 1910.1028.	Sec. 1910.1028 Benzene. The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except some subsegments of industry where exposures are consistently und the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, co production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table Z-2 apply. See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910 1028				
		STEL	5 ppm	1989-03-01	US. Department of Labor - Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1000 Z-1-A	
	See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028. The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, coke					
12540			Sigma-Aldrich	Corporation		

limits in Tab Sec. 1910.1	ole Z-2 app 1028 Benz	oly. ene.		
	TWA	1 ppm	1993-06-30	US. Department of Labor - Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL) 29 CFR 1910.1000 Air Contaminants.
	STEL	5 ppm	1993-06-30	US. Department of Labor - Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL) 29 CFR 1910.1000 Air Contaminants.
	TWA	10 ppm	1993-06-30	US. Department of Labor - Occupational Safety and Health Administration; (OSHA) Standards, Toxic and Hazardous Substances, Subpart Z 29 CFR Part 1910.1000, Table Z-2
(Z37.40-196	59) This sta and 5 ppm	andard applies t	o the industry segmination of the industry segmination of the standard at 19	Lents exempt from the 1 ppm 8- 010 1028
	CEIL	25 ppm	1993-06-30	US. Department of Labor - Occupational Safety and Health Administration; (OSHA) Standards, Toxic and Hazardous Substances, Subpart Z 29 CFR Part 1910.1000, Table Z-2
(Z37.40-190	59) This st	andard applies t	o the industry segme	ents exempt from the 1 ppm 8-
nour IWA a	AMP	50 ppm	12ene standard at 19 1993-06-30	US. Department of Labor - Occupational Safety and Health Administration; (OSHA) Standards, Toxic and Hazardous Substances, Subpart Z 29 CFR Part 1910.1000, Table 7-2

## Personal protective equipment

## **Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

## Hand protection

Handle with gloves.

## Eye protection

Safety glasses

## Skin and body protection

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

## **Hygiene measures**

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

#### Appearance

	Form	liquid
	Colour	colourless
Sa	afety data	
	рН	no data available
	Melting point	5.5 °C (41.9 °F)
	Boiling point	80.0 - 80.2 °C (176.0 - 176.4 °F)
	Flash point	-11.0 °C (12.2 °F) - closed cup
	Ignition temperature	562 °C (1,044 °F)
	Lower explosion limit	1.3 %(V)
	Upper explosion limit	8 %(V)
	Vapour pressure	221.3 hPa (166.0 mmHg) at 37.7 °C (99.9 °F) 99.5 hPa (74.6 mmHg) at 20.0 °C (68.0 °F)
	Density	0.88 g/cm3
	Water solubility	no data available

## **10. STABILITY AND REACTIVITY**

## Storage stability

Stable under recommended storage conditions.

**Conditions to avoid** Heat, flames and sparks.

Materials to avoid acids, Bases, Halogens, Strong oxidizing agents, Metallic salts

## Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides

## Hazardous reactions

Vapours may form explosive mixture with air.

## **11. TOXICOLOGICAL INFORMATION**

## Acute toxicity

LD50 Oral - rat - 2,990 mg/kg

LC50 Inhalation - rat - female - 4 h - 44,700 mg/m3

LD50 Dermal - rabbit - 8,263 mg/kg

## Irritation and corrosion

Skin - rabbit - Skin irritation

Eyes - rabbit - Eye irritation

## Sensitisation

no data available

## Chronic exposure

Carcinogenicity - Human - male - Inhalation Tumorigenic:Carcinogenic by RTECS criteria. Leukaemia Blood:Thrombocytopenia.

Carcinogenicity - rat - Oral Tumorigenic:Carcinogenic by RTECS criteria. Endocrine:Tumors. Leukaemia

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

IARC: Group 1 - The agent (mixture) is carcinogenic to humans. (Benzene)

NTP: Known to be human carcinogens. (Benzene)

OSHA: 19.101.028 (Benzene)

Genotoxicity in vitro - Human - lymphocyte Sister chromatid exchange

Genotoxicity in vitro - mouse - lymphocyte Mutation in mammalian somatic cells.

Genotoxicity in vivo - mouse - Inhalation Sister chromatid exchange

Laboratory experiments have shown mutagenic effects.

Developmental Toxicity - rat - Inhalation 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).

Developmental Toxicity - mouse - Inhalation Effects on Embryo or Fetus: Cytological changes (including somatic cell genetic material). Specific Developmental Abnormalities: Blood and lymphatic system (including spleen and marrow).

Reproductive toxicity - mouse - Intraperitoneal 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.

## Signs and Symptoms of Exposure

Nausea, Dizziness, Headache, narcosis, 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, aplastic anemia, and leukemia may occur as the condition progresses. The bone marrow may appear normal, aplastic or hyperplastic, and may not correlate with peripheral blood-forming tissues. The onset of effects of prolonged benzene exposure may be delayed for many months or years after the actual exposure has ceased., Blood disorders

#### **Potential Health Effects**

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.
Ingestion	Aspiration hazard if swallowed - can enter lungs and cause damage. May be harmful if swallowed.
Target Organs	Blood, Eyes, Female reproductive system., Bone marrow,

## **12. ECOLOGICAL INFORMATION**

## Elimination information (persistence and degradability)

degradable.
d

Bioaccumulation	Leuciscus idus (Golden orfe) - 3 d
	Bioconcentration factor (BCF): 10

## **Ecotoxicity effects**

Toxicity to fish	LC50 - Oncorhynchus mykiss (rainbow trout) - 5.90 mg/l - 96 h	
	LC50 - Pimephales promelas (fathead minnow) - 15.00 - 32.00 mg/l - 96 h	
	LC50 - Lepomis macrochirus (Bluegill) - 230.00 mg/l - 96 h	
	NOEC - Pimephales promelas (fathead minnow) - 10.2 mg/l - 7 d	
	LOEC - Pimephales promelas (fathead minnow) - 17.2 mg/l - 7 d	
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 22.00 mg/l - 48 h	
	EC50 - Daphnia magna (Water flea) - 9.20 mg/l - 48 h	
Toxicity to algae	EC50 - Selenastrum capricornutum (green algae) - 29.00 mg/l - 72 h	

#### Further information on ecology

no data available

## **13. DISPOSAL CONSIDERATIONS**

#### Product

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. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION			
<b>DOT (US)</b> UN-Number: 1114 Class: 3 Proper shipping name: Benzene	Packing group: II		
IMDG UN-Number: 1114 Class: 3 Proper shipping name: BENZENE Marine pollutant: No	Packing group: II	EMS-No: F-E, S-D	
IATA UN-Number: 1114 Class: 3 Proper shipping name: Benzene	Packing group: II		
15. REGULATORY INFORMATION			
<b>OSHA Hazards</b> Flammable Liquid, Target Organ Effect, Irr	ritant, Carcinogen, Mutagen		
TSCA Status On TSCA Inventory			
<b>DSL Status</b> All components of this product are on the o	Canadian DSL list.		
SARA 302 Components SARA 302: No chemicals in this material a	are subject to the reporting rec	uirements of SARA Title	e III, Section 302.
SARA 313 Components			
Benzene		CAS-No. 71-43-2	Revision Date 1987-01-01
<b>SARA 311/312 Hazards</b> Fire Hazard, Acute Health Hazard, Chroni	c Health Hazard		
Massachusetts Right To Know Compor	nents		
Benzene		CAS-No. 71-43-2	Revision Date 1987-01-01
Pennsylvania Right To Know Compone	nts		Devision Data
Benzene		71-43-2	1987-01-01
New Jersey Right To Know Component	S		
Benzene		CAS-No. 71-43-2	Revision Date
California Prop. 65 Components WARNING! This product contains a c California to cause cancer. Benzene	hemical known in the State of	CAS-No. 71-43-2	Revision Date 2004-05-12
<b>California Prop. 65 Components</b> WARNING! This product contains a c California to cause birth defects or oth Benzene	hemical known in the State of her reproductive harm.	CAS-No. 71-43-2	Revision Date 2004-05-12
16. OTHER INFORMATION			
Fluka - 12540	Sigma-Aldrich Corporation www.sigma-aldrich.com		Page 8 of 9

## **Further information**

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