

Material Safety Data Sheet

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Version 1.3

According to 91/155/EEC

1 - Product and Company Information

Product Name	STYRENE, MONOMER, STAB.
Product Number	85959
Company	Sigma-Aldrich Pte Ltd #08-01 Citilink Warehouse Singapore 118529 Singapore
Technical Phone #	65 271 1089
Fax	65 271 1571

2 - Composition/Information on Ingredients

Product Name	CAS #	EC no	Annex I Index Number
STYRENE	100-42-5	202-851-5	601-026-00-0

Formula	C8H8
Molecular Weight	104.15 AMU
Synonyms	Benzene, vinyl- * Cinnamene * Ethenylbenzene * Ethylene, phenyl- * NCI-C02200 * Phenethylene * Phenylethene * Phenylethylene (OSHA) * Stirollo (Italian) * Styreen (Dutch) * Styren (Czech) * Styrene (OSHA) * Styrene, monomer (ACGIH) * Styrol (German) * Styrole * Styrolene * Vinylbenzen (Czech) * Vinylbenzene * Vinyl benzene (OSHA) * Vinylbenzol

3 - Hazards Identification

SPECIAL INDICATION OF HAZARDS TO HUMANS AND THE ENVIRONMENT
Flammable. Harmful by inhalation. Irritating to eyes and skin.

4 - First Aid Measures

AFTER INHALATION

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

AFTER SKIN CONTACT

In case of contact, immediately wash skin with soap and copious amounts of water.

AFTER EYE CONTACT

In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

AFTER INGESTION

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

5 - Fire Fighting Measures

EXTINGUISHING MEDIA

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

Unsuitable: Water may be effective for cooling, but may not effect extinguishment.

SPECIAL RISKS

Specific Hazard(s): Vapor may travel considerable distance to source of ignition and flash back. Flammable liquid.

Explosion Hazards: Container explosion may occur under fire conditions. Forms explosive mixtures in air.

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

SPECIFIC METHOD(S) OF FIRE FIGHTING

Use water spray to cool fire-exposed containers.

6 - Accidental Release Measures

PERSONAL PRECAUTION PROCEDURES TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area. Shut off all sources of ignition.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP

Absorb on sand or vermiculite and place in closed containers for disposal. Ventilate area and wash spill site after material pickup is complete.

7 - Handling and Storage

HANDLING

Directions for Safe Handling: Do not breathe vapor. Do not get in eyes, on skin, on clothing.

STORAGE

Conditions of Storage: Keep tightly closed. Keep away from heat, sparks, and open flame.

Store at 2-8°C

SPECIAL REQUIREMENTS: Light sensitive.

8 - Exposure Controls / Personal Protection

ENGINEERING CONTROLS

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

GENERAL HYGIENE MEASURES

Wash thoroughly after handling.

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	50 MG/M3
Poland		NDSCh	200 MG/M3
Poland		NDSP	-

EXPOSURE LIMITS - DENMARK

Source	Type	Value
OEL	TWA	105 mg/m3
		25 ppm

Remarks: LHK

EXPOSURE LIMITS - GERMANY

Source	Type	Value
TRGS 900	OEL	85 mg/m3
		20 ppm

Remarks: 4

Remarks: Y

EXPOSURE LIMITS - NORWAY

Source	Type	Value
	OEL	105 mg/m3
		25 ppm

Remarks: M

EXPOSURE LIMITS - SWEDEN

Source	Type	Value
	LLV (Level	90 mg/m3
		20 ppm

Remarks: H

EXPOSURE LIMITS - SWITZERLAND

Source	Type	Value
OEL	OEL	85 mg/m3
		20 ppm

Remarks: C M

EXPOSURE LIMITS - UNITED KINGDOM

Source	Type	Value
OEL	OEL	430 mg/m3
		100 ppm
OEL	STEL	1,080 mg/m3
		250 ppm

PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection: Government approved respirator.

Hand Protection: Compatible chemical-resistant gloves.

Eye Protection: Chemical safety goggles.

9 - Physical and Chemical Properties

Appearance	Physical State: Clear liquid Color: Colorless	
Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	145 - 146 °C	760 mmHg
MP/MP Range	-31 °C	
Flash Point	32 °C	Method: closed cup
Flammability	N/A	
Autoignition Temp	480 °C	
Oxidizing Properties	N/A	
Explosive Properties	N/A	
Explosion Limits	Lower: 1.1 % Upper: 8.9 %	
Vapor Pressure	4.3 mmHg	15 °C

SG/Density	0.906 g/cm3
Partition Coefficient	N/A
Viscosity	N/A
Vapor Density	3.6 g/l
Saturated Vapor Conc.	N/A
Evaporation Rate	N/A
Bulk Density	N/A
Decomposition Temp.	N/A
Solvent Content	N/A
Water Content	N/A
Surface Tension	N/A
Conductivity	N/A
Miscellaneous Data	N/A
Solubility	Solubility in Water:Insoluble.

10 - Stability and Reactivity

STABILITY

Stable: Stable.

Conditions to Avoid: May polymerize on exposure to light.

Materials to Avoid: Oxidizing agents Copper, Copper alloys.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

STABILIZERS PRESENT

Inhibited with 10-15 ppm 4-tert-butylcatechol.

HAZARDOUS POLYMERIZATION

Hazardous Polymerization: May occur

11 - Toxicological Information

RTECS NUMBER: WL3675000

ACUTE TOXICITY

LCLO

Inhalation

Human

10,000 ppm

30M

LD50

Oral

Rat

2650 mg/kg

Remarks: Behavioral:Somnolence (general depressed activity).

Liver:Other changes.

LC50

Inhalation

Rat

12,000 mg/m3

4H

LD50

Intraperitoneal

Rat

898 MG/KG

LD50

Oral
Mouse
316 mg/kg

LC50
Inhalation
Mouse
9,500 mg/m3
4H

LD50
Intraperitoneal
Mouse
660 MG/KG

LD50
Intravenous
Mouse
90 MG/KG

LD50
Oral
Mammal
> 1500 mg/kg

IRRITATION DATA

Skin
Human
500 mg

Skin
Rabbit
500 mg
Remarks: Open irritation test

Skin
Rabbit
100 %
Remarks: Moderate irritation effect

Eyes
Rabbit
100 mg
Remarks: Severe irritation effect

Eyes
Rabbit
100 mg
24H
Remarks: Moderate irritation effect

SIGNS AND SYMPTOMS OF EXPOSURE

Exposure can cause: Dermatitis. CNS depression. Nausea, dizziness, and headache.

ROUTE OF EXPOSURE

Skin Contact: Causes skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: Causes eye irritation. Lachrymator.
Inhalation: Material is irritating to mucous membranes and upper respiratory tract. May be harmful if inhaled.

Ingestion: May be harmful if swallowed.

TARGET ORGAN INFORMATION

Central nervous system. Blood. Lymphatic system. Endocrine system.

CHRONIC EXPOSURE - CARCINOGEN

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

Rat

Route of Application: Oral

Exposure Time: 43W

Result: Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Other: Tumors.

Rat

Route of Application: Inhalation

Exposure Time: 4H/5D/1Y

Result: Tumorigenic: Carcinogenic by RTECS criteria. Skin and Appendages: Other: Tumors. Blood: Leukemia

Mouse

Route of Application: Inhalation

Exposure Time: 6H/2Y

Result: Tumorigenic: Carcinogenic by RTECS criteria. Lungs, Thorax, or Respiration: Tumors.

IARC CARCINOGEN LIST

Rating: Group 2B

CHRONIC EXPOSURE - MUTAGEN

Result: Laboratory experiments have shown mutagenic effects.

Human

100 UMOL/L

Cell Type: lymphocyte

Unscheduled DNA synthesis

Human

28 MMOL/L

Cell Type: HeLa cell

DNA inhibition

Human

300 MG/KG

Cell Type: lymphocyte

Body fluid assay

Human

7500 PPB/8H/5D-I

Inhalation

Cytogenetic analysis

Human

300 PPM

72H

Cell Type: lymphocyte

Cytogenetic analysis

Human
1204 MG/M3/5Y-I
Inhalation
Sister chromatid exchange

Human
10 UMOL/L
Cell Type: lymphocyte
Sister chromatid exchange

Rat
145 UG/PLATE
Cell Type: Embryo
Morphological transformation.

Rat
3 MMOL/L
Cell Type: liver
DNA damage

Rat
3800 UMOL/L
Cell Type: liver
Unscheduled DNA synthesis

Rat
300 PPM
Inhalation
8W
Cytogenetic analysis

Rat
750 MG/KG
Intraperitoneal
Sister chromatid exchange

Rat
40 GM/KG
Intraperitoneal
8W
sperm

Mouse
250 MG/KG
Intraperitoneal
Micronucleus test

Mouse
10 MMOL/KG
Intraperitoneal
DNA damage

Mouse
450 MG/KG
Intraperitoneal
Sister chromatid exchange

Mouse
125 PPM
Inhalation
4D
Sister chromatid exchange

Mouse
1 GM/KG
Cell Type: S. cerevisiac
Host-mediated assay

Mouse
1 GM/KG
Cell Type: S. pombe
Host-mediated assay

Mouse
3500 MG/KG
Intraperitoneal
7W
sperm

Hamster
240 UMOL/PLATE (+S9)
Cell Type: lung
Mutation in microorganisms

Hamster
100 MG/L
Cell Type: lung
Cytogenetic analysis

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 4 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: Rat
Dose: 11470 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Urogenital system.

Species: Rat
Dose: 1500 UG/M3/24H
Route of Application: Inhalation
Exposure Time: (1-22D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 8600 MG/KG
Route of Application: Oral
Exposure Time: (1-22D PREG/21D POST)
Result: Effects on Newborn: Behavioral.

Species: Rat
Dose: 5575 MG/KG
Route of Application: Oral
Exposure Time: (MULTIGENERATIONS)
Result: Effects on Newborn: Viability index (e.g., # alive at

day 4 per # born alive). Effects on Newborn: Weaning or lactation index (e.g., # alive at weaning per # alive at day 4).

Species: Rat
Dose: 293 PPM/6H
Route of Application: Inhalation
Exposure Time: (7-21D PREG)
Result: Effects on Newborn: Behavioral.

Species: Rat
Dose: 5 MG/M3/24H
Route of Application: Inhalation
Exposure Time: (1-22D PREG)
Result: Effects on Newborn: Stillbirth. Effects on Newborn: Weaning or lactation index (e.g., # alive at weaning per # alive at day 4).

Species: Rat
Dose: 1500 UG/M3/24H
Route of Application: Inhalation
Exposure Time: (1-7D PREG)
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 Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rat
Dose: 50 PPM/6H
Route of Application: Inhalation
Exposure Time: (7-12D PREG)
Result: Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Species: Mouse
Dose: 500 PPM/6H
Route of Application: Inhalation
Exposure Time: (6-16D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Hamster
Dose: 1000 PPM/6H
Route of Application: Inhalation
Exposure Time: (6-18D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

12 - Ecological Information

ELIMINATION

Elimination: 60 %

ECOTOXICOLOGICAL EFFECTS

Test Type: LC50 Fish
Species: Leuciscus idus
Time: 48 h
Value: 17 - 66 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna

Time: 24 h
Value: 182 mg/l

13 - Disposal Considerations

SUBSTANCE DISPOSAL

Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

14 - Transport Information

RID/ADR

UN#: 2055
Class: 3
PG: III
Proper Shipping Name: Styrene monomer, inhibited

IMDG

UN#: 2055
Class: 3
PG: III
Proper Shipping Name: Styrene monomer, inhibited
Marine Pollutant: No
Severe Marine Pollutant: No

IATA

UN#: 2055
Class: 3
PG: III
Proper Shipping Name: Styrene monomer, stabilized
Inhalation Packing Group I: No

15 - Regulatory Information

CLASSIFICATION AND LABELING ACCORDING TO EU DIRECTIVES

ANNEX I INDEX NUMBER: 601-026-00-0
NOTA: D
INDICATION OF DANGER: Xn
Harmful.
R-PHRASES: 10 20 36/38
Flammable. Harmful by inhalation. Irritating to eyes and skin.
S-PHRASES: 23
Do not breathe vapor.

COUNTRY SPECIFIC INFORMATION

Germany

WGK: 2

SWITZERLAND

SWISS POISON CLASS: 3

NORWAY

Labelling for organic solvents where the package is 1 liter or more.
YL-tall m3/l: 8571
YL-group: 5
Safety phrases: 38 42 210

In case of insufficient ventilation, wear suitable respiratory equipment. During fumigation/spraying wear suitable respiratory equipment. Use compressed air- or fresh air line breathing apparatus in confined spaces.

16 - Other Information

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.

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