

Material Safety Data Sheet

Styrene monomer, stabilized

1- IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY / UNDERTAKING

1.1 Identification of the substance

Chemical name : STYRENE

Designation or trade name : STYRENE

Other means of identification

Commonly used synonyms : Vinyl benzene , Phenyl ethylene , Benzene ethenyl

Molecular weight : 104.15

Empirical formula : C₈H₈

Structural formula : C₆H₅CH=CH₂

1.2 Use of the substance

Used as monomer in the production of plastics and synthetic rubbers.

2- HAZARDS IDENTIFICATION

Classification : Xn R : 10-20-36/38

- Most important physicochemical hazards: The product is flammable.
- Adverse effects
 - Human health: harmful by inhalation, irritant for eyes and skin. Aspiration into the lungs May cause chemical Pneumonia. Reversible effects on the central nervous system can be Produced (see sect. 4).
 - Environment: Styrene is readily biodegradable and does not bio accumulate significantly. (See secl.12-Ecological information).
- Symptoms relating to use and misuse
The product is intended for professional users. For symptoms connected with exposure see sect. 4
- Other hazards :
The product may polymerise spontaneously , with a fast increase in temperature , if not properly Inhibited (see sect . 3 and 7).

Material Safety Data Sheet
Styrene monomer, stabilized

3 - COMPOSITION / INFORMATION ON INGREDIENTS

- General description of components , and their concentrations and hazards

Component Chemical Name	EINECS N (or ELINCS)	Conc. range%	CAS N•	Classification	
				Symbols	R phrases
STYRENE		>99%	100 – 42-5	Xn	10-20-39/38

The product also contains 8-15 ppm of an inhibitor of polymerization (Tert-butyl-catecol , CAS N 98-29-3) .

Classification according to Directive CEE 67/548 and subsequent amendments.

- Hazards of the substance

See sect. 2 and 15.

4 – FIRST AID MEASURES

- **Immediate medical attention is required** : yes

- Symptoms and effects ; instruction for on the spot actions

• **Inhalation**

Symptoms

: dizziness , headaches , disturbances of balance and coordination, Cough , nausea , convulsion and cyanosis , lineation of the Respiratory tract. Aspiration into the lungs may cause chemical Pneumonia.

Expected delayed effects : N.D.

First aid actions

: move the affected person from pollutes area and keep him/her In a warm, well-Ventilated environment. It not breathing give Artificial respiration. If breathing is difficult give oxygen. Seek Medical assistance.

• **Skin contact**

Symptoms

: possible skin irritation.

Expected delayed effects

: Dermatitis may result from prolonged or repeated exposure.

First aid actions

: remove contaminated clothes. Wash skin with water and soap. Seek medical assistance if irritation persists.

• **Eye contact**

Symptoms

: reddening, irritation, pain.

Expected delayed effects

: N.D.

First aid actions

: wash with plenty of water. If irritation persists , seek medical Assistance.

• **ingestion**

Symptoms

: strong irritant effect. Nausea, vomiting. Diarrhoea, abdominal pain.

Expected delayed effects

: N.D.

First aid actions

: Immediately obtain medical attention. Rinse mouth with water, Give nothing by mouth. Do not induce vomiting.

Material Safety Data Sheet

Styrene monomer, stabilized

5. FIRE – FIGHTING MEASURES

- Suitable extinguishing media

Water, water spray, foam. Dry chemicals. Carbon dioxide.

-Extinguishing media which must not be used for safety reasons

Water in jet (see below).

-special exposure hazards arising from the substance itself , combustion products, resulting gases

When involved in a fire, the product can release fumes made up of hazardous substances such as carbon Monoxide (where oxygen is scarce) and other aromatic hydrocarbons.

- special protective equipment for fire- fighters

Full protective clothing and self – contained breathing apparatus.

-specific fire and explosion hazards

The product is flammable. The vapours may present fire and explosion hazards. The vapours are heavier than air and may travel along the ground and reach distant ignition sources. Remove all ignitions sources. Take all measures to avoid the build up of static charges. Keep all heat sources away from the product's vapours. Polymerisation can be started by heat. If polymerisation takes place in a closed container, it is possible that a violent rupturing of the vessel may occur.

-specific fire– fighting measures

Keep containers cool with water spray if they are close to a fire. Use water spray to disperse the vapours, to keep the surfaces cool or to protect the fire- fighters . Do not use high pressure water in jet directly.

6. ACCIDENTAL RELEASE MEASURES

- Personal precautions

Do not breathe fumes. Evacuate the non essential personnel and ventilate the area where the spillage occurred. Wear suitable personal protective equipment (self contained breathing apparatus) and avoid contact with skin and eyes by using gloves and goggles. NO smoking. Avoid sparks. Extinguish naked flames and all sources of ignition. Take precautionary measures against static discharge. Wear suitable personal protections (e.g: nitrile or neoprene rubber gloves, rubber boots, one – piece suit; safety goggles) for respiratory protection see sect . 8 "Protection of respiratory apparatus".

- Environmental precautions

Prevent contamination if soil and water , avoid the product to spread or enter into drains , surface channels and groundwater. Use sand, earth or other appropriate barriers.

-Methods for cleaning

- Small spillages: Contain and clean with absorbent material (sand, sawdust, earth), then collect in labelled sealable containers for disposal. Scrub contaminated surfaces. Scrub contaminated surfaces with detergent solution.
- Large spillages: contain with sandbanks, recover the product by suction in to labelled sealable containers. Ensure a suitable amount of inhibitor to avoid spontaneous polymerisation. See a also above "small spillages".

-other information

Risk of explosion, vapour may form an explosive mixture with air. Local authorities should be advised, particularly if a spillage cannot be contained.

Material Safety Data Sheet

Styrene monomer, stabilized

7. HANDLING AND STORAGE

7.1 Handling

The concentration in air should be kept below the exposure limits by means of suitable exhaust systems and ventilation. Exposure of eyes and skin is to be avoided, as well as inhalation of vapours evolved.

The spilled product may make surfaces very slippery.

Styrene vapours are heavier than air, can cover a considerable distance and reach a fire source causing a back fire effect. Do not smoke. Avoid sparks. Remove all ignition sources. Take measures to avoid the build up of static charges.

Loading devices should be earthed to avoid static charges; spark-proof tools should be used.

7.2 Storage

Take precautionary measures against static discharge. Earth all equipments. Avoid splash filling. Do not use compressed air for filling. Discharging or handling Store in steel containers preferably outside, on the ground, and surrounded by sand-banks to contain spills or losses. Containers should be stored and opened in a well ventilated area far from free flames. Do not store under direct sunlight. Keep the temperature below the flash point. See also sect. 10 "Conditions to avoid". Do not use jacketed heating systems for drums. Avoid to keep the storage vessels under nitrogen or other inert gases. In the normal conditions the storage under air is considered advisable. The material should contain a suitable amount of substances inhibiting polymerization. (8-15 PPM depending on the expected storage time). Tert-butylcatecol is generally used.

Damaged or punctured drums should be emptied. Wash empty containers with water to remove liquid or residual flammable vapours.

Recommended materials for containers: stainless steel.

7.3 Specific uses

Recommendations: N.A.

8.EXPOSURE CONTROL / PERSONAL PROTECTION

8.1 Exposure limit values

A) Occupational

Threshold limit values ACGIH (Tab.2007)

Substance	TLV-TWA PPM	TLV-STEL PPM	NOTE	Critical effects
Styrene monomer	20,A	40 ,A		Upper respiratory tract: central nervous system Impair: periph neuropathy

A: Not classifiable as human carcinogen

Recommended monitoring procedures: N.D.

Material Safety Data Sheet

Styrene monomer, stabilized

B) Biological

Adopted Biological Exposure Indices (B.E.1) Determinant- ACGIH2007

Determinant	Sampling Time	B.E.I	Notation
<u>STYRENE</u>			
Mandelic acid plus Phenylglyoxylic Acid in urine	End of shift	400mg/g creating	NS
Styrene in venous blood	End of shift	0.2 mg	Sq

NS=the determinant is not specific

Sq= semi- qualitative (the quantitative interpretation of the measure is ambiguous).

8.2 Exposure control

-occupational exposure control

Work rooms must be provided with adequate ventilation and or fume collectors. So as to prevent Their concentrations to exceed the fixed TLV-TWA values (see below).

The selection of suitable personal protection equipments may differ according to the exposure and To the risk involved in the particular work conditions.

-Protection of respiratory apparatus

The concentration levels should be kept below the exposure limits. Respiratory protection equipments such as masks with suitable filler for organic vapours. Should be used for certain operations.

In emergencies and in situations where the exposure limit may be broadly exceed, use approved self contained breathing apparatus.

-Skin protection

Use suitable impermeable rubber gloves, Breakthrough time of the glove material : See manufacturing data.

-Eye protection

Use safety goggles

-Specific hygiene measures

No smoking, eating or drinking when the substance is used.

9. PHYSICAL AND CHEMICAL PROPERTIES

A appearance(physical state at 23°C)	: liquid
Colour	: colourless
Odour	: pungent aromatic (olfactory threshold : 0.1ppm)
PH	: N. Ap.
Boiling point	:145° C
Melting point	: -31° C
Sell ignition temperature	: 490° C
Flash point	: 31 °C
Explosion limit- lower	: 1.1% v/v
Explosion limit- Upper	: 6.1%v/v
Vapour pressure	: 6.7 mbar (20°C)
Density	: 906 kg/m ³ (20°C/4°C)
Vapour density (air=1)	: 3.6
Solubility in water	: 0.29 kg/m ³ (20°C)
Solubility with other solvents	: soluble in chlorinated and aromatic solvents, ketenes Alcohols
Octanol / water partition coefficient	:3.06 (log Pow)

Material Safety Data Sheet

Styrene monomer, stabilized

10. STABILITY AND REACTIVITY

- Conditions to avoid

Avoid direct exposure to sun or storage at temperature higher than 25°C when the inhibitor Content is lower than the advised quantity (see_sect 7.3).

-materials to avoid

Acids. Sodium hydroxide. Metal – halogen compound such as iron chloride or aluminium chloride.

Oxidizing materials cause strong reaction with possible fire or explosion.

-Hazardous decomposition products

Stable in the recommended storage and handling conditions.

-Chemical stability

Stable in recommended handling and storage condition if property inhibited.

Polymerises spontaneously, if not inhibited, with a fast increase in temperature, in closed containers there is also rapid increase in pressure.

Polymerises violently with a reaction that can become explosive caused by light, heat, strong acids or peroxides.

Inhibitors reduce – but do not eliminate – the tendency to polymerisation. (See also sect .7, Handling and Storage).

11.TOXICOLOGICAL INFORATION

ACUTE TOXICITY

-Inhalation

LC50 (4h) rat=11,8 mg/1 (2770ppm); Narcotic or anaesthetic effects may be a symptom of excessive exposure.

Excessive exposure may cause irritation of the upper respiratory tract and lungs. It inhaled. It can be rapidly absorbed through the lungs and cause damage to other organs and apparatus

-Ingestion

Toxicity of a single oral dose is low. LD50 oral rat is 5000 mg/kg.

Small quantities ingested accidentally during normal handling operation should not cause damage ingestion of larger quantities may cause damage to the liver and kidneys.

Ingestion may cause irritation of the mouth, throat and gastrointestinal tract.

-Contact with skin

Culaneous LD50 has not been determined Repeated exposure may cause absorption in dangerous quantities prolonged or repeated exposure may cause irritation of the skin it may cause dryness or leaking of the skin.

-Contact with eyes

May cause slight irritations with corneal damage Vapour may irritate eyes and or cause lachrymation.

Material Safety Data Sheet

Styrene monomer, stabilized

CHRONIC TOXICITY

- Sensitisation

The product does not show sensitisation effects.

-Carcinogenicity

Epidemiological. Studies on workers exposed to styrene do not show evidences that styrene is a carcinogen. Limited evidence of carcinogenicity (increase evidence of lung tumours in mice .but not in rats)

LARC classified styrene as 2B (possible carcinogen to man).

-Mutagenicity

Not considered to be a mutagenic hazard.

-Reproductive toxicity

The product does not show theralogenic effects and is not toxic for reproduction. Dose that are toxic for the mother can also produce **toxicity**.

-Other information

Repeated exposure to large quantities may cause effects o the central nervous system, imitation of the respiratory apparatus and eyes, liver and kidneys damages.

12. ECOLOTGICAL INFORMATION

12.1 ECOTOXICITY

- Aquatic toxicity

Acute LC50 (Fish- range): 10-12 mg/1.

Acute EC50 (Daphnia magna):4.7mg/1

Acute LC50 (96H) Amphipod (Halella Azteca):5mg/1.

Acute EC50 Algae: 4.9 mg/1.

Styrene is harmful to aquatic organisms (LC50/EC50 between 10 and 100 mg/1) but , in view of the high evaporation rate it is unlikely to pose a significant hazard to aquatic life.

Inhibitory effects on the microorganisms and impact on sewage treatment plants: N.A.

12.2 :MOBILITY

Floats on water and evaporates rapidly. If it enters soil, it will be mobile and may contaminate groundwater.

12.3 EFFECTS , BEHAVIOUR AND ENVIRONMENTAL FATE

-Biodegradability

Biodegradation rapidly in the closed bottle test after 20 days is 80%.

Styrene degrades rapidly in the atmosphere by photo – chemical reaction.

12.4 BIOACCUMULATIVE POTENTIAL

The bio concentration factor (BCF) Determined experimentally in fish is 13.5

It does not bio accumulate significantly.

12.5 OTHER ADVERSE EFFECTS: N.D.

Material Safety Data Sheet

Styrene monomer, stabilized

13. DISPOSAL CONSIDERATION

-Description and handling of residues:

Surplus and residues should be handed according to the recommendations in sect 7 and 8.

-Disposal of residues

Recover or recycle if possible. If this is not possible dispose in an approved incinerator.

Dispose in accordance with national/local regulations.

-National and Community provisions relating to waste:

Directive 91/156/EEC of 18 March 1991, Directive 91/689/EEC of 12 December 1991:

Directive 94/62/EEC OF 20 December 1994.

14. TRANSPORT INFORMATION

- Packing Group:III

- Shipping name : Styrene Monomer Stabilized

- classifications

ADR/RID Class: 3 Classification code: F1 Label:3

Orange plate Hazard identification N°(upper part):39

Hazard identification N°(lower part):2055

Term card TEC(R) N°:30 S 2055

IMO/IMDG Class:3.3 Label:3

Ems number F-E:S-D(#)

MARPOL :(#)(ANNEX II)Y technical name: STYRENE MONOMER

LATA Class:3 Label: FLAMMABLE LIQUID

Max quantity passenger cargo aircraft 60L.

Cargo aircraft 220L.

-Special precaution:

- handing of product inside the plant: according to the procedures in force.

15. REGULATORY INFORMATION

Classification according to Directive CEE 67/548 and subsequent amendments.

-Information on the label:

Designation or chemical name: STYRENE

Danger symbol/s :St. Andrew's cross

Indication/s of danger : Harmful

Risk Phrase/s (R) : Flammable(R10)

Harmful by inhalation (R20)

: harmful by eyes and skin (R36/38)

Safety advice/s (S)

: Do not breathe vapours (S23)

Material Safety Data Sheet

Styrene monomer, stabilized

16. OTHER INFORMATION

This safety data sheet has been drawn up according to the requirements of Regulation 1907/2006/EC.

- FULL text of Risk Phrases referred to under section 2 and 3:
R10. Flammable
R20: Harmful by inhalation

-INFORMATION RELEVANT TO WORKERS' SAFETY AND HEALTH:

It is important to control the inhibitor content level to ensure stability and avoid polymerization of the product during storage. See sect. 7. It is necessary a little quantity of oxygen dissolved into the product to ensure the inhibitor activity.

- Recommended restrictions on use :

The product is intended for professional users.

Data and information contained in this Safety data sheet are based on our available knowledge at the last revision date. NO guarantee can be given as to the sufficiency of any safety measures contained in this safety data sheet nor can it be assumed that other or additional measures may not be required under particular or exceptional circumstances. The user must make sure of the fitness and completeness of the information, according to the specific intended use.
