Material Safety Data Sheet

Styrene monomer

Section 1 - Chemical Product

MSDS Name: Styrene monomer
Synonyms: Ethenylbenzene; Cinnamene; Cinnamenol; Ethenylbenzene; Phenethylene; Styrol; Vinylbenzene; Vinylbenzol.

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
100-42-5	Styrene	>99	202-851-5

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid. Flash Point: 32 deg C.
Warning! May polymerize explosively on loss of inhibitor. **Flammable liquid and vapor.** May cause eye, skin, and respiratory tract irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause central nervous system depression. May cause cancer based on animal studies. This material has been reported to be susceptible to autoxidation and therefore should be classified as peroxidizable. Hazardous due to peroxide initiation of polymerization. May cause reproductive and fetal effects.
Target Organs: Central nervous system.

Potential Health Effects
Eye: Causes eye irritation.
Skin: May be absorbed through the skin in harmful amounts. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis.
Ingestion: May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.
Inhalation: Aspiration may cause respiratory swelling and pneumonitis. Causes narcotic effects including headache, dizziness, weakness, unconsciousness, and possible death.
Chronic: No information found.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
Ingestion: Call a poison control center. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures above the flashpoint. Containers may explode in the heat of a fire.
Extinguishing Media: This material is lighter than water and insoluble in water. The fire could easily be spread by the use of water in an area where the water cannot be contained. Use water fog, dry chemical, carbon dioxide, or regular foam.
Flash Point: 32 deg C (89.60 deg F)
Autoignition Temperature: 490 deg C (914.00 deg F)
Explosion Limits, Lower:1.1% v/v
Upper: 7.0% v/v
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 2

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with skin and eyes. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Take precautionary measures against static discharges. Avoid ingestion and inhalation. Wash clothing before reuse. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from sources of ignition. Store in a cool place in the original container and protect from sunlight. Keep refrigerated. (Store below 4蚓/39蚌.) Keep containers tightly closed.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Styrene	20 ppm TWA; 40 ppm STEL	50 ppm TWA; 215 mg/m3 TWA 700 ppm IDLH	100 ppm TWA; 200 ppm Ceiling

OSHA Vacated PELs: Styrene: 50 ppm TWA; 215 mg/m3 TWA
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to minimize contact with skin.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: pungent odor
pH: Not available.
Vapor Pressure: 568 mm Hg
Vapor Density: 1.22 Kg/m3
Evaporation Rate:0.5 (Butyl Acetate=1)
Viscosity: 0.751 mPa
Boiling Point: 145 deg C
Freezing/Melting Point:-31 deg C
Decomposition Temperature: Not available.
Solubility: Practically insoluble in water

Specific Gravity/Density:0.9060
Molecular Formula:C8 H8
Molecular Weight:104.1

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. May form peroxides in the absence of inhibitors.
Conditions to Avoid: Incompatible materials, ignition sources.
Incompatibilities with Other Materials: Vapor is explosive when exposed to heat or flame and reacts with oxygen at temperatures above 104 F, unhibited material may form explosive peroxides. Uninhibited material may polymerize which becomes self-sustaining at temperatures above 65 C. Exposure to butyllithium, dibenzoyl peroxide, azoisobutyronitrile or di-tert-butylperoxide may cause violent polymerization. Violent reaction with chlorosulfonic acid, oleum, sulfuric acid and oxidizers. Oxygen + heat is explosive.
Hazardous Decomposition Products: Carbon monoxide, carbon dioxide.
Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 100-42-5: WL3675000
LD50/LC50:
CAS# 100-42-5:
Draize test, rabbit, eye: 100 mg Severe;
Draize test, rabbit, eye: 100 mg/24H Moderate;
Draize test, rabbit, skin: 100% Moderate;
Inhalation, mouse: LC50 = 21000 mg/m3/2H;
Inhalation, mouse: LC50 = 9500 mg/m3/4H;
Inhalation, rat: LC50 = 11800 mg/m3/4H;
Oral, mouse: LD50 = 316 mg/kg;
Oral, rat: LD50 = 2650 mg/kg;
Oral, rat: LD50 = 5000 mg/kg;
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Carcinogenicity:
CAS# 100-42-5:

- **ACGIH:** Not listed.
- **California:** Not listed.
- **NTP:** Not listed.
- **IARC:** Group 2B carcinogen

Epidemiology: TCLo (Inhalation, rat) = 293 ppm/6H; Reproductive - Effects on Newborn - behavioral.
Teratogenicity: TCLo - Lowest published toxic concentration(Inhalation,rat)= 300 ppm/6H; Lungs, Thorax, or Respiration - structural or functional change in trachea or

bronchi; Lungs, Thorax, or Respiration - other changes; Liver - other changes.
Reproductive Effects: RTECs reports reproductive effects in animals such as effects on weaning/lactation index, naternal effects, fetoxitity, stillbirth and post-implantation mortality. TCLo (Inhalation, rat) = 293 ppm/6H; Reproductive - Effects on Newborn - behavioral.
Mutagenicity: An increased incidence of mutations such as chromosome aberrations and micronuclei in peripheral lymphocytes has been reported in workers exposed occupationally. Some studies have found a slight increase in the incidence of sister chromatid exchanges while no increase has been found in several other studies.Mutation in microorganisms(Salmonella typhimurium) =1 umol/plate(Yeast - Saccharomyces cerevisiae) =1 mmol/L.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. Cas# 100-42-5:LC50(96Hr.)Fathead Minnow = 46.4` mg/L; Static Bioassay Softwater.LC50(96Hr.)Fathead Minnow = 59.30 mg/L; Static Bioassay, Hardwater.LC50(96Hr.)Bluegill = 25.05 mg/L; Static Bioassay, Softwater.LC50(96Hr.)Goldfish = 64.74 mg/L; Static Bioassay, water.LC50(48Hr.) Water flea = 23.0 mg/L, Unspecified Bioassay.EC50(48Hr.) Water flea = 23.0 mg/L; Unspecified Bioassay.
Environmental: Styrene does not absorb solar radiation at wavelengths above the solar cutoff (approximately 300 nm); therefore, it will not be directly photolyzed in the lower atmosphere (troposphere) or surface water. However, styrene is expected to be involved in indirect photochemical reactions. Styrenes have been found to be very active generators of photochemical smog.
Physical: Styrene released to soil is subject to biodegradation. Volatilization and biodegradation are important transport and degradation processes respectively for styrene in water.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	STYRENE MONOMER, STABILIZED	STYRENE MONOMER STABILIZED
Hazard Class:	3	3
UN Number:	UN2055	UN2055

Packing Group:	III	III
Additional Info:		FLASHPOINT 32 C

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 100-42-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 100-42-5: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 100-42-5: immediate, delayed, fire, reactive.
Section 313
This material contains Styrene (CAS# 100-42-5, >99%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 100-42-5 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 100-42-5 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 100-42-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
XN
Risk Phrases:
R 10 Flammable.
R 36/38 Irritating to eyes and skin.

R 20 Harmful by inhalation.

Safety Phrases:

S 23 Do not inhale gas/fumes/vapour/spray.

WGK (Water Danger/Protection)

CAS# 100-42-5: 2

Canada - DSL/NDSL

CAS# 100-42-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of B2, D2B, D1B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 100-42-5 is listed on the Canadian Ingredient Disclosure List.