



Styrene Monomer, Inhibited

SAFETY DATA SHEET (SDS)

Section 1 - Identification of the Preparation and the Company

Product Name: **Styrene Monomer, Inhibited**
Other Names: None

This product is classified as hazardous according to the criteria of Safe Work Australia.
Classified as a Dangerous Good according to the Australian Dangerous Goods Code (ADG).

Uses: Monomer used in the manufacture of polystyrene and styrene copolymers, styrene-butadiene rubbers, unsaturated polyester resins and vinyl ester resins

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Poisons Information Centre	Australia 131 126; New Zealand 0800 764 766	

Section 2 – Hazards Identification

WARNING



Flammable



Harmful, acute



Health Hazard

Hazard Statements

Flammable Liquid Category 3
Acute Toxicity (inhalation) Category 4
Eye Irritant Category 2
Skin Irritant Category 2
Reproductive toxicity Category 2
Specific Target Organ Toxicity Category 2

H226: Flammable liquid and vapour.
H332: Harmful if inhaled.
H319: Causes serious eye irritation
H315: Causes skin irritation
H361d: Suspected of damaging the unborn child
H372: Causes damage to hearing organs through prolonged or repeated exposure

Precautionary Statements

Prevention

P202 Do not handle until all safety precautions have been read and understood
P210 Keep away from heat/sparks/open flames/hot surfaces – No smoking
P260 Do not breathe vapours / mists / spray
P264 Wash hands and exposed skin thoroughly after handling
P270 Do not eat, drink or smoke when using this product
P271 Use only outdoors or in a well-ventilated area
P272 Contaminated work clothes should not be allowed out of the workplace
P280 Wear protective gloves/eye protection/face protection See Section 8

Response

P302 + P352 IF ON SKIN: Wash with plenty of soap and water
P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P305 + P313 + P351 + P337 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention
P308 + P313 If exposed or concerned: Get medical advice/attention
P330 Rinse mouth
P331 Do not induce vomiting
P370 + P378 In case of fire: Use carbon dioxide, dry chemical or foam for extinction

Storage

P403 + P235 Store in a well-ventilated place. Keep cool



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Disposal

P501 Dispose of contents/container to approved landfill

Section 3 - Composition/Information on Ingredients

Ingredient(s)	CAS-number	%wt
Styrene monomer	100-42-5	99.5 – 100%
Tertiary Butyl Catechol (TBC) (polymerisation and oxidation inhibitor)	98-29-3	10-15 ppm wt.

Section 4 – First Aid Measures

Ingestion:

NEVER GIVE AN UNCONSCIOUS PERSON ANYTHING TO DRINK NOR ATTEMPT TO INDUCE VOMITING. If the person is conscious, rinse mouth out with water ensuring that mouthwash is not swallowed. Give about 250mL (2 glasses) of water to drink. DO NOT attempt to induce vomiting. Seek URGENT medical attention. For advice, contact a Poisons Information Centre (phone e.g. Australia 131 126; New Zealand 0800 764 766).

Inhalation:

Remove to fresh air. Keep warm and at rest. If breathing is laboured, hold in a half upright position (this assists respiration). Apply artificial respiration if breathing has stopped. Seek URGENT medical attention for all but the most minor cases of over-exposure.

Eye Contact:

If in eyes, IMMEDIATELY hold eyelids apart and flush the eye continuously with running water. Seek medical attention. Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.

Skin Contact:

Remove contaminated clothing. Rinse the affected area with water then wash thoroughly with soap and water. Use water alone, if soap is unavailable. Seek medical attention if any soreness or inflammation of the skin persists or develops later. Launder affected clothing before re-use.

Additional Information:

First Aid Facilities: Eye wash station. Safety shower if large volumes are being handled. .

Advice to Doctor: Treat symptomatically. This material is an aspiration hazard. Potential danger from aspiration must be weighed against possible oral toxicity when deciding whether to induce vomiting. Pre-existing disorders of the respiratory tract, skin, lung (for example, asthma-like conditions), liver, male reproductive system and auditory system may be aggravated by exposure to this material.

Entry Route(s): Inhalation, ingestion and skin contact.

Section 5 – Fire Fighting Measures

Flammable. Solvent vapours can form explosive mixtures with air in poorly ventilated conditions. Styrene will polymerise readily at elevated temperatures and containers may explode if heated. Vapour is heavier than air and may travel along the ground; distant ignition is possible. Keep away from sources of ignition such as open flames, sparks, hot surfaces or burning cigarettes.

In case of fire, evacuate personnel to safe areas. Avoid breathing vapours or fumes. Responders must be made aware of the nature of the hazard and must wear self-contained breathing apparatus and full protective clothing (including helmet, coat trousers, boots and gloves). If safe to do so, move undamaged containers from fire area but DO NOT approach containers suspected of being hot. Undamaged and sealed containers may be kept cool by spraying with water but direct contact with water should be avoided.

Extinguish using carbon dioxide; dry chemical; protein-based foam; or alcohol-resistant foam. Prevent, by any means possible, runoff from entering drains or water courses.

Section 6 – Accidental Release Measures

Avoid any contact. Barricade area. Evacuate non-emergency personnel from area. Only trained and properly protected personnel should be involved in clean-up operations. Keep upwind of spill. Ventilate area. Use appropriate personal protective equipment (refer to Section 8 - Exposure Controls / Personal Protection). Respiratory protection should be worn,



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including positive pressure self-contained breathing apparatus.

Contain liquid to prevent contamination of soil, surface water or ground water. Prevent from entering, sewers or drains. Cover with an absorbent such as earth, sand or a commercial oil absorber. Sweep up and collect in drums. Move drums to a well-ventilated area until disposed to an approved recycler, reclaimer, incinerator, or to approved land-fill. Test atmosphere for vapours to ensure safe working conditions before other personnel are allowed in the area.

Section 7 – Handling and Storage

Storage:

Store in a cool, area with adequate ventilation. Storage area should be bunded. Keep containers tightly closed when not in use. Protect containers against physical damage. Class 3 Flammable Liquids should not be transported or stored with goods of:

- Class 1 Explosives
- Class 2.1 Flammable Gases (where both flammable liquid and flammable gases are in bulk)
- Class 2.3 Poisonous Gases
- Class 4.2 Spontaneously Combustible Substances
- Class 5.1 Oxidising Agents
- Class 5.2 Organic Peroxides
- Class 6 Poisonous (toxic) Substances (where the flammable liquid is nitromethane)
- Class 7 Radioactive Substances

Do not store in open containers. Damaged or punctured drums should be emptied and disposed of properly.

Flammable Liquid according to AS1940 - Storage and Handling of Flammable and Combustible Liquids. Store in accordance with regulations for storage of flammable liquids.

Handling:

Use only with adequate ventilation. Provide general and / or local exhaust ventilation to ensure that the exposure standards for these materials are not exceeded. It is recommended that the styrene concentration in air be checked at regular intervals. Keep equipment clean. Use disposable containers and tools where possible. Do not eat, drink or smoke in the workplace.

For Personal Protective Equipment (PPE), see Section 8.

Section 8 – Exposure Controls/Personal Protection

Exposure standards: Exposure standards have not been allocated to this product. Information for the ingredients is:

Styrene TWA: 50 ppm, 213mg/m³
 STEL: 100ppm, 416mg/m³

Exposure standards represent airborne concentrations of individual chemical substances, which according to current knowledge, should neither impair the health nor cause undue discomfort to nearly all workers. Exposure standard may be a time-weighted average (TWA), a short-term exposure limit (STEL) or a peak level.

Engineering Controls:

Product may generate high vapour levels in confined or poorly ventilated areas.

Work should be undertaken in a purpose-built spray booth if available.

Ventilation systems should be installed and regularly monitored to ensure exposure to vapour/aerosol is minimised.

Exhaust systems should be designed in accordance with workplace conditions. The air should always be moved away from the source of vapour generation and the person working at this point. The odour and irritancy of this material are inadequate to warn of excessive exposure.

Personal Protection:

Requirements are dependent on working conditions, quantity of product in use and method of application. For minor use: safety goggles and gloves may be sufficient. If large quantities are in use: chemical resistant safety goggles, gloves or gauntlets and overalls. Polyvinyl alcohol (PVA), Nitrile Rubber, Neoprene Rubber or Viton may be suitable depending on brand. Latex rubber is not suitable for use. The suitability and durability of a glove is dependent on frequency and duration of contact, chemical resistance of glove material, glove thickness and dexterity. In all cases glove suppliers should be contacted for additional advice. Contaminated gloves should be replaced. Wear appropriate clothing including chemical resistant apron where clothing may be contaminated.

Avoid breathing of vapours/gases. Atmospheric levels should be maintained below the exposure standard. When atmospheric levels may exceed the exposure standard, use an approved air-purifying respirator equipped with an organic vapour sorbent and a particulate filter. For situations where the atmospheric levels may exceed the level for which an air-purifying respirator is effective, use a positive pressure air-supplying respirator (airline or self-contained breathing apparatus).



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SCBA). For emergency response, or for situations where the atmospheric level is unknown, use an approved positive-pressure self-contained breathing apparatus or positive-pressure airline with auxiliary self-contained air supply. Select and use respirators in accordance with AS/NZS 1715/1716. N.B. If using an air-purifying respirator, TAKE THE LIMITS OF ABSORPTION CAPACITY INTO ACCOUNT. CHANGE FILTERS REGULARLY. Contaminated personal protective equipment should be removed promptly and should not be re-used until decontaminated.

Section 9 – Physical and Chemical Properties

Appearance: Viscous liquid

Odour: Styrene

Colour: Transparent, light blue to light brown.

Specific gravity (H₂O = 1) >1.0

Boiling Point: BP 145°C based on styrene (styrene may polymerise below its boiling point)

Solubility in Water: Reacts with water

Vapour Pressure: 5mmHg @ 25°C

Vapour density (Air = 1): Heavier than air.

Flash Point: 31°C (Closed Cup)

Explosive limits (% By Volume in Air): LEL:1.1% UEL:6.1%

Section 10 – Stability and Reactivity

Stability: Stable under recommended storage and handling conditions. Flammable.

Hazardous Decomposition Products: Emits toxic fumes including oxides of carbon and nitrogen, if heated to decomposition or burned.

Hazardous polymerisation: Styrene will polymerise readily at elevated temperatures and containers may explode if heated.

Incompatibilities: The product may react with strong oxidising agents such as liquid or powdered chlorine.

Conditions to Avoid: Excessive heat, ignition sources and incompatible materials

Section 11 – Toxicological Information

Symptoms of Exposure:

Swallowed. Severely irritating. Ingestion may cause abdominal spasm, nausea and vomiting as well as symptoms similar to those for inhalation.

Eye: Severely irritating to the eyes.

Skin: Irritating.

Inhaled: Vapours are irritating to the eyes, nose and throat and have central nervous system effects. Inhalation may cause headache, nausea and dizziness. Higher concentrations may cause unconsciousness and coma. Styrene at 400ppm irritates all parts of the respiratory tract. At 10,000ppm it may be fatal.

Chronic Health Effects

The liquid defats the skin and prolonged or repeated contact may contribute to dermatitis

Classified by the International Agency for Research on Cancer (I.A.R.C.) in Group 2B i.e. possibly carcinogenic to humans (sufficient evidence in animals, inadequate data in humans).

Epidemiology studies involving workers in the styrene, polystyrene, and reinforced plastics industries do not show increased cancer risk from occupational exposure to styrene. A recent, well-conducted chronic study showed no incidence of cancer in rats from styrene exposure. In another recently, conducted chronic study, an increase of lung cancer was observed in mice. The relevance of the mouse lung cancers to humans is uncertain. Earlier studies in which rats and mice were exposed to styrene by inhalation or ingestion are considered inadequate for assessing human cancer risk because of deficiencies in design, conduct, or interpretation.

Repeated exposures to styrene vapour in animal studies have resulted in liver toxicity in mice at levels above 100 ppm. Also, nasal lesions were observed at 50ppm or higher in rats and 20ppm or higher in mice. Some evidence of hearing loss was observed in rats exposed to 800ppm styrene vapour, but not at 200ppm. No significant hearing loss is expected to occur in humans occupationally exposed to styrene. In addition it has been reported that some workers, primarily those with mean exposure levels greater than 50ppm, developed a small decrease in the ability to discriminate between colours. These effects were very subtle and not likely to be noticed.



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Styrene did not cause birth defects in laboratory animal studies, although other developmental effects have been reported. It should be noted that these developmental effects occurred at exposure levels that were maternally toxic. Human studies do not show any significant risk of reproductive toxicity or birth defects from styrene exposure.

Mixed results have been reported for styrene in vitro geno toxicity tests. However, there is no convincing evidence of cytogenic damage in laboratory animals exposed to styrene. Some cytogenetic studies on peripheral blood lymphocytes of workers exposed to styrene have reported increases in chromosomal damage, although there is no clear dose response relationship.

Toxicological Information

Acute Toxicity Data:

STYRENE MONOMER:

LCLo (inhaled, human): 10000ppm/30M,

TCLo (inhaled, human): 600ppm,

LD50 (oral, rat): 2650mg/Kg,

LC50 (inhaled, rat): 12g/m³/4H

Section 12 – Ecological Information

Ecotoxicity:

LC50-96hr: 10 mg/litre (Fathead minnow) moderately toxic

EC50-48hr: 4.7 mg/litre (Daphnia magna) moderately toxic

EC50-96hr: 0.72 mg/litre (Green algae) highly toxic (algistatic)

Mobility: Styrene is expected to bind to soils and sediments, and have low mobility. The estimated organic carbon/water partition coefficient (log K_{oc}) = 2.42-2.96.

Persistence / Degradability: Styrene has been shown to undergo slow, but nearly complete biodegradation in laboratory studies. If released to air, a vapour pressure of 6.40 mm Hg at 25 deg C indicates styrene will exist solely as a vapour in the ambient atmosphere. Vapour-phase styrene will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals and ozone; the half-life for these reactions in air are estimated to be 7 and 16 hours, respectively. Direct photochemical or photolytic reactions for styrene are slow. If released to soil, styrene is expected to have low mobility based upon an estimated K_{oc} of 960. Volatilization from moist soil surfaces is expected to be an important fate process. For example, in 1.5 cm deep samples of a loamy soil, 26% of 2 mg/kg styrene added volatilized in 31 days. Styrene may volatilize from dry soil surfaces based upon its vapour pressure. Biodegradation by aerobic microorganisms may lead to extensive or complete destruction of styrene in soil. It was found that 97 and 87% of 8-14C-styrene added to soil at levels of 2.0 g/kg was converted to 14C-CO₂ in 16 weeks in a landfill soil and sandy loam soil, respectively. If released into water, styrene is expected to adsorb to suspended solids and sediment based upon the estimated K_{oc}. In lake water, 10 to 20% mineralization was observed in 3 weeks with samples containing 2.5 ug to 1.0 mg/l styrene. Degradation of styrene is rapid in sewage under aerobic conditions. Volatilization from water surfaces is expected to be rapid. Under laboratory conditions, 50% of 2 to 10 mg styrene per litre (depth not specified) was lost by volatilization in 1 to 3 hrs in lake water samples and in 6 to 7 hrs in distilled water. A BCF of 13.5 for goldfish suggests bio concentration in aquatic organisms is low. Styrene is not expected to undergo hydrolysis in the environment due to the lack of hydrolysable functional groups. Styrene is not expected to persist in the environment.

Potential to Bio accumulate: Although the octanol/water partition coefficient (/og K_{ow}) for styrene has been determined to be 2.95, indicating a moderate potential to bio accumulate, the bio concentration factor (log BCF) in goldfish has been determined to be 0.83 to 1.13, indicating a reduced bio concentration potential in aquatic organisms.

Section 13 – Disposal Considerations

Do not allow into any sewers, drains, on the ground or into any body of water. Any disposal must be accordance with applicable State, Territory and/or Local government regulations. The preferred waste management option for unused, uncontaminated, unformulated, or not otherwise altered material is to send to an approved recycler, reclaimer, or incinerator. The same waste management options are recommended for used or contaminated material, although additional evaluation is required. Waste characterisation and disposal compliance are the responsibility solely of the party generating the waste or deciding to discard or dispose of the material. Chemical additions, processing, storage, or otherwise altering this material may make the waste management information presented here incomplete, inaccurate or otherwise inappropriate.

Any disposal of contaminated packaging and washings must be in accordance with State, Territory and/or Local government regulations. After container has been cleaned and labelling has been removed, empty containers can be sent



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for recycling or disposal. If the container is to be reconditioned, the reconditioning company should be made aware of the nature of the original contents.

Section 14 – Transport Information

This product is a Class 3 Flammable Liquid according to the Australian Code for the Transportation of Dangerous Goods by Road and Rail (ADG Code).

UN Number:	2055
Proper shipping name:	STYRENE MONOMER, INHIBITED
DG Class:	3
Hazchem code:	3Y
Packing group:	III
Emergency Information	1ERG 19P (AS/NZS HB:76) or EPG 3A1 (AS 2931)

Section 15 – Regulatory Information

Product is a schedule 5 Poison according to the requirements of the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

All ingredients are listed on the Australian Inventory of Chemical Substances (AICS).

Section 16 – Other Information

REFERENCES

1. List of Designated Hazardous Substances [NOHSC: 10005(1999)]
2. Safe Work Australia Code of Practice: Preparation of Safety Data Sheets for Hazardous Chemicals, 2016
3. Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC: 1003(1995)] and subsequent amendments
4. AS/NZS 1715 - Selection, use and maintenance of respiratory protective devices.
5. AS/NZS 1716 - Respiratory protective devices.
6. Australian Code for the Transportation of Dangerous Goods by Road and Rail (ADG Code), Edition, 7.4.
7. International Maritime Dangerous Goods Code (IMDG), and current amendments
8. Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) No. 15, November 2016

ABBREVIATIONS

LC50	Lethal dose for 50% of test population, by inhalation.
LDLo	Lowest documented lethal dose
LD50	Lethal dose for 50% of test population, by ingestion or skin contact
TDLo	Lowest published toxic dose

User should verify applicability of this data sheet if more than 5 years old.

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