

Material Safety Data Sheet

HAZARDOUS ACCORDING TO THE CRITERIA OF SAFE WORK AUSTRALIA (formerly ASCC and NOHSC)

Section 1 Identification of the Preparation and the Company

Identification of the preparation

Product name: Styrene Monomer, Inhibited
 Other Names: None
 Product code: None
 Intended use: Monomer used in the manufacture of polystyrene and styrene copolymers, styrene-butadiene rubbers, unsaturated polyester resins and vinyl ester resins

Identification of the Company

Manufacturer: Summit Composites Pty Ltd
 Address: 22 Port Kembla Drive
 Country: Bibra Lake WA 6163
 Telephone: + 61 8 9418 4555
 Facsimile: + 61 8 9434 1489
 Web site:
 Australian emergency phone number: Poisons Information Centre. Phone (eg Australia 13 1126; New Zealand 03 4747000).

Section 2 Hazard Identification

HAZARDOUS SUBSTANCE CLASSIFICATION The product is classified as hazardous according to the criteria of Safe Work Australia (formerly the Australian Safety and Compensation Council (ASCC), formerly NOHSC).
 The product is an unsaturated polyester resin dissolved in styrene

DANGEROUS GOODS CLASSIFICATION It is a dangerous good
 This product is a Class 3 Flammable Liquid.

HAZARD CLASSIFICATION Xn Harmful

RISK PHRASES
 R10 Flammable
 R20 Harmful by inhalation
 R36/38 Irritating to eyes and skin..

SAFETY PHRASES S23 Do not breathe vapour

Section 3 Composition/Information on Ingredients

Styrene monomer, inhibited.

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

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Section 4 First-aid Measures

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

SKIN: Remove contaminated clothing and wash thoroughly with soap and water. Use water alone, if soap is unavailable. Apply a moisturising hand cream, if available. Seek medical attention if any soreness or inflammation of the skin persists or develops later. Launder affected clothing before re-use.

INGESTION: Rinse mouth out with water ensuring that mouth wash is not swallowed. Give about 250mL (2 glasses) of water to drink. DO NOT attempt to induce vomiting. Seek URGENT medical attention.

INHALATION: Avoid becoming a casualty. DO NOT enter a hazardous area without adequate breathing protection. 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.

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. Preexisting 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.

Section 5 Fire-fighting Measures

FIRE HAZARD: 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.

PRECAUTIONS May evolve highly toxic fumes if heated to decomposition or burned in a fire situation.

Wear self contained breathing apparatus. If possible remove containers from the vicinity of the fire. Otherwise keep containers as cool as possible by spraying with water, from a protected position.

EXTINGUISHING MEDIA: . Water is not effective for fire fighting and direct contact with water should be avoided. Extinguish using foam, powder (bicarbonate or ammonium phosphate based) or carbon dioxide.

Section 6 Accidental Release Measures

Wear protective equipment as specified for handling. Cover with an absorbent such as earth, sand or a commercial oil absorber. Sweep up and collect in drums. Dispose of residue to approved land-fill or by controlled incineration. Prevent entry into ground water.

Section 7 Handling and Storage

STORAGE: Store in a flammable liquids area; designated no smoking, away from all sources of ignition, out of direct sunlight in a cool well ventilated area below 25° Celsius. Higher temperatures may cause pressure build up inside containers.

HANDLING 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

Section 8 Exposure Controls / Personal Protection

EXPOSURE STANDARDS:

Styrene		
Exposure Standard TWA	50 ppm	213mg/m ³
Exposure Standard STEL	100ppm	416mg/m ³

Exposure standard represents the airborne concentration of a particular substance in the worker's breathing zone, exposure to which, according to current knowledge, should not cause adverse health effects nor cause undue discomfort to nearly all workers. The exposure standard can be of three forms; time-weighted average (TWA), peak, or short term exposure limit (STEL).

BIOLOGICAL LIMIT VALUES: None allocated.

ENGINEERING CONTROLS

Ventilation requirements depend on the quantity of pro in use and the method of application. Ventilation should be sufficient to maintain vapour levels below the appropriate exposure standard. Use only in well ventilated areas unless forced air ventilation is employed, this is due to the fire hazard as well as the risks from inhalation. Local exhaust ventilation may be required.

PERSONAL PROTECTIVE EQUIPMENT

Requirements are dependant on working conditions, quantity of product in use and method of application. For minor use: safety goggles and rubber gloves may be sufficient. If large quantities are in use: chemical resistant safety goggles, gloves or gauntlets and overalls. A half face respirator with organic vapour filter is required unless the area is well ventilated. In confined or poorly ventilated areas: air supplied breathing apparatus. N.B. TAKE THE LIMITS OF ABSORPTION CAPACITY INTO ACCOUNT. CHANGE FILTERS REGULARLY.

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Section 9 Physical and Chemical Properties

Appearance	Viscous liquid
Odour	Styrene
Colour	Transparent, light blue to light brown.
Solubility	Insoluble
Partition coefficient: n-octanol/water	Not applicable
pH	Not applicable
Boiling point	145°C based on styrene (styrene may polymerise below its boiling point)
Flash point	31°C (Closed Cup)
Explosive limits	LEL:1.1% UEL:6.1%
Vapour pressure	5mmHg @ 25°C
Specific gravity	>1.0

Section 10 Stability and Reactivity

STABILITY: Stable under recommended storage and handling conditions. Flammable. Styrene will polymerise readily at elevated temperatures and containers may explode if heated.

HAZARDOUS DECOMPOSITION PRODUCTS: Burning can produce carbon monoxide and/or carbon dioxide.

CONDITIONS TO AVOID: Avoid all sources of ignition such as open flames, sparks, hot surfaces or burning cigarettes

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

Section 11 Toxicological Information

HEALTH HAZARDS ACUTE

INGESTION: 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.

INHALATION: 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.

HEALTH HAZARDS CHRONIC

Inhalation, ingestion and skin contact are the routes of entry into the body. The liquid defats the skin and prolonged or repeated contact may contribute to dermatitis.

STYRENE MONOMER:

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

TCLo (inhaled, human): 600ppm,

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

LC50 (inhaled, rat): 12g/m³/4H

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 show no incidence of cancer in rats from styrene exposure. In another recently, well-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 i

100 ppm. Also,

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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.

Styrene did not cause birth defects in laboratory animal studies. However, some developmental and mental 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 genotoxicity tests. However, there is no convincing evidence of cytogenetic 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.

Section 12 Ecological Information

Do not allow to contaminate waterways, sewers, soil or vegetation.

AQUATIC TOXICITY:

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 Koc) = 2.42-2.96.

PERSISTENCE and BIODEGRADABILITY:

Styrene has been shown to undergo slow, but nearly complete biodegradation in laboratory studies.

If released to air, a vapor pressure of 6.40 mm Hg at 25 deg C indicates styrene will exist solely as a vapor in the ambient atmosphere. Vapor-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 hrs, 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 Koc 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 vapor 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 Koc. 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 liter (depth not specified) was lost by volatilization in 1 to 3 hrs in lakewater samples and in 6 to 7 hrs in distilled water. A BCF of 13.5 for goldfish suggests bioconcentration in aquatic organisms is low. Styrene is not expected to undergo hydrolysis in the environment due to the lack of hydrolyzable functional groups.

Styrene is not expected to persist in the environment.

POTENTIAL TO BIOACCUMULATE:

Although the octanol/water partition coefficient (log Kow) for styrene has been determined to be 2.95, indicating a moderate potential to bioaccumulate, the bioconcentration factor (log BCF) in goldfish has been determined to be 0.83 to 1.13, indicating a reduced bioconcentration potential in aquatic organisms.

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Section 13 Disposal Considerations

Dispose by controlled incineration or to approved land-fill.
Product and container must be disposed as hazardous waste.

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 Scheduled 5 (S5) Poison according to the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

Section 16 Further Information

REFERENCES

1. List of Designated Hazardous Substances [NOHSC: 10005(1999)]
2. National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edition [NOHSC: 2011(2003)]
3. Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC: 1003(1995)] and subsequent amendments
4. Australian Code for the Transportation of Dangerous Goods by Road and Rail (ADG Code), 6th Edition, 1998
5. International Maritime Dangerous Goods Code (IMDG), and current amendments

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

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