

1. PRODUCT NAME: Styrene Monomer, Stabilized
2. CHEMICAL NAME:
3. SYNONYMS:
4. CAS NUMBER: 100-42-5
5. COMPOSITION: Styrene (100-42-5), 100%  
4-tert-Butyl catechol (TBC) (inhibitor), <0.006

IN CASE OF  
TRANSPORT EMERGENCY  
CONTACT CHEMTREC  
USA: 1-800-424-9300  
INTERNATIONAL: 1-703-527-3887

6. PROPERTIES: PHYSICAL STATE AND APPEARANCE: Colorless to light yellow liquid.  
COLOR: Colorless to light yellow.  
ODOR: Sweet, almost floral odor at low concentrations; sharp, penetrating, disagreeable at high concentrations.  
SOLUBILITY (H<sub>2</sub>O): Very slightly; Easily soluble in methanol, diethyl ether, acetone.  
ODOR THRESHOLD: 0.009 ppm (perception); 0.05-0.96 ppm (recognition)  
EVAPORATION RATE (n-Butyl Acetate=1): 0.5  
VAPOR DENSITY: 3.6  
VAPOR PRESSURE: 4.5 mmHg (at 20 c)  
MELTING POINT: -30.6 c (-23.1 F)  
BOILING POINT: 145.2 c (293.4F)  
SPECIFIC GRAVITY (Water = 1): 0.906  
PH: Not Available.  
LONICITY (in water): Not applicable  
OCTANOL/H<sub>2</sub>O COEFF.: 2.95  
FLAMMABILITY CLASS: Flammable  
FLASH POINT: 31 C (87.8 F)  
UPPER FLAMMABILITY LIMIT: 6.8%  
FLASH POINT METHOD: Closed Cup (Tagliabue)  
LOWER FLAMMABILITY: 0.9%  
AUTO IGNITION: 490 C (914 F)

7. HAZARDS: Health Hazard: HMIS – 2\*  
Fire Hazard: HMIS – 3  
Physical Hazard: HMIS – 3  
Hazard Scale: 0 = Minimal 1 = Slight 2 = moderate 3 = Serious 4 = Severe \* = Chronic hazard  
Health Hazard: NFPA - 2  
Fire Hazard: NFPA – 3  
Physical Hazard: NFPA – 2  
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

EMERGENCY OVERVIEW: WARNING: FLAMMABLE. Styrene is a clear, colorless, oily, flammable liquid with a sweet aromatic odor at low concentrations and a sharp, penetrating, disagreeable odor at higher concentrations. Hazardous polymerization leading to explosion hazard is possible under fire conditions. Monitor and maintain inhibitor (TBC) level between 10 ppm – 50 ppm to help reduce the risk of polymerization. Store below 90 F (32 c), away from moisture, rust and other impurities, and other impurities, and only for short periods of time. High concentrations will cause eye, nose, and throat irritation, dizziness and light-headedness. POTENTIAL CARCINOGEN. POTENTIAL HEALTH EFFECTS: EYES: Liquid and vapor are very irritating to the eyes.  
POTENTIAL HEALTH EFFECTS: SKIN: Product contains components that may be absorbed through, and irritating to, skin. Prolonged and/or repeated skin contact with this product may cause irritation/der-



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matitis.

**POTENTIAL HEALTH EFFECTS: INGESTION:** If swallowed, this product may be fatal. Ingestion can cause gastrointestinal irritation, nausea, vomiting and diarrhea. Ingestion of this product may also result in adverse central nervous system effects including headache, sleepiness, dizziness, slurred speech and blurred vision.

**POTENTIAL HEALTH EFFECTS: INHALATION:** This product is irritating to the respiratory system. Repeated inhalation may be harmful; lung irritation and serious central nervous system disorders may result.

**8. FIRE FIGHTING INFORMATION:** **GENERAL FIRE HAZARDS:** Highly flammable in presence of open flame, sparks, and heat. Highly reactive with oxidizing agents and acids. Styrene is a flammable liquid subject to polymerization, which may cause an explosion hazard if the inhibitor becomes depleted. Monitor TBC inhibitor levels and maintain levels between 10 ppm – 50 ppm. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. **EXPLOSION HAZARDS:** Vapors may form explosive mixture with air. Keep containers away from heat or fire. Containers may explode when involved in a fire. **HAZARDOUS COMBUSTION PRODUCTS:** Upon decomposition, this product emits carbon monoxide, carbon dioxide, and/or low molecular weight hydrocarbons. **EXSTINGUISHING MEDIA:** Dry chemical, foam, carbon dioxide, or water fog or spray. **FIRE FIGHTING EQUIPMENT/INSTRUCTIONS:** Evacuate the area promptly. Keep unnecessary personnel away. Stay upwind of spilled material and isolate exposure. Fire fighter should wear full-face, self-contained breathing apparatus and thermal protective clothing. Move containers from fire area if you can do it without risk. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after the fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Use of water spray when fighting fire may be inefficient. Avoid inhaling any smoke and combustion products. Remove and clean or destroy any contaminated clothing. Control runoff waters to prevent entry into sewers, drains, underground or confined spaces and waterways.

**9. PERSONAL PROTECTION MEASURES:** **GENERAL MATERIAL INFORMATION:** Refer to published exposure limits – utilize effective control measures and PPE to maintain worker exposure to concentrations that are these limits. Ensure that eye-wash stations and safety showers are proximal to the workstation location. **ENGINEERING CONTROLS:** Maintain worker exposure below recommended exposure limits by providing adequate local exhaust ventilation. Use non-sparking grounded ventilation systems separate from exhaust systems. Ensure that eyewash stations and safety showers are proximal to the workstation location. **PERSONAL PROTECTIVE EQUIPMENT: EYES/FACE:** Wear safety glasses; chemical goggles are recommended if splashing is possible, or to prevent eye irritation from vapors. **PERSONAL PROTECTIVE EQUIPMENT: SKIN/HANDS/FEET:** Use impervious gloves. Wear chemical-resistant safety footwear with good traction to prevent slipping. Work clothing sufficient to prevent all skin contact should be worn, such as coveralls and long sleeves. Fire resistant (i.e. NOMEX) or natural fiber clothing (i.e., cotton or wool) is recommended. Synthetic clothing can generate static electricity and is not recommended where flammable vapors release may occur. **PERSONAL PROTECTIVE EQUIPMENT: RESPIRATORY:** If engineering controls and ventilation is not sufficient to prevent buildup of aerosols, vapors or dusts, appropriate NIOSH/MSHA approved air-purifying respirators or self-contained breathing apparatus (SCBA) appropriate for exposure potential should be used. Air supplied breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air purifying respirators. **PROTECTIVE PROTECTION EQUIPMENT: GENERAL:** Personal protective equipment (PPE) should not be considered a long-term solution to exposure control. Employer programs to properly select, fit, maintain, and train employees to use equipment must accompany PPE. Consult a competent industrial hy-



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giene resource, the PPE manufacture's recommendation, and/or applicable regulations to determine hazard potential and ensure adequate protection.

10. FIRST AID PROCEDURES: FIRST AID: EYES: Remove contact lenses, if it can be done safely. Immediately flush eyes with water for at least 15 minutes, while holding eyelids open. Seek medical attention if symptoms develop or persist. FIRST AID: SKIN: Remove contaminated clothing and shoes. Wash immediately with soap and water. Seek attention if symptoms develop or persist. FIRST AID: INHALATION: Move affected individual to non-contaminated air. Loosen tight clothing such as a collar, tie, belt, or waistband. Assist breathing if necessary. Seek immediate medical attention. WARNING: Contact through mouth-to-mouth resuscitation may pose a secondary risk to the rescuer. Avoid mouth-to-mouth contact by using a mouth shield or guard to perform artificial respiration. FIRST AID: INGESTION: DO NOT INDUCE VOMITING. If vomiting occurs naturally, lean affected individual forward to reduce the risk of aspiration. Loosen tight clothing such as a collar, tie, belt or waistband. Seek immediate medical attention. FIRST AID: NOTES TO PHYSICIAN: An Emergency Medical Response Protocol is available for this product. These are available to first responders and medical personnel. 1-800-561-6682, 1-403-314-8767 (24 hours NOVA Chemicals Emergency Responders) Styrene is rapidly absorbed by the lungs and gastrointestinal tract. Inhalation of high concentrations will produce CNS depression: headache, nausea, vomiting, dizziness, euphoria, poor judgment, slurred speech and behavioral disturbances: Severe effects include blurred vision, delirium, tremors, shallow and rapid respiration, unconsciousness, coma and death. There is no specific antidote for styrene poisoning. Treatment consists of supportive measures such as oxygen (by mask). Sympathomimetics or catecholamines should be avoided or used with caution to avoid inducing ventricular fibrillation.

11. EXPOSURE LIMITS: ACGIH, OSHA, NOISH, EPA, TSCA, Alberta, and Ontario exposure limit lists have been checked for those components with CAS registry numbers. State and/or exposure limits may apply, check with proper authorities.

Styrene (100-42-5): ACGIH: 20 ppm TWA, 40 ppm STEL  
OSHA: 50 ppm TWA: 215 mg/m<sup>3</sup> TWA, 100 ppm STEL; 425 Mg/m<sup>3</sup> STEL  
NIOSH: 50 ppm TWA: 215 mg/m<sup>3</sup> TWA, 100 ppm STEL; 425 Mg/m<sup>3</sup> STEL, 700 ppm IDLH  
Alberta: 50 ppm TWA; 213 mg/m<sup>3</sup> TWA, 100 ppm STEL; 426 Mg/m<sup>3</sup> STEL  
Ontario: 50 ppm TWAEV: 213 mg/m<sup>3</sup> TWAEV (special Exceptions may apply to this substance, 200 ppm STEV; 852 Mg/m<sup>3</sup> STEV

12. TOXICOLOGICAL INFORMATION: A: ACUTE TOXICITY – GENERAL MATERIAL INFORMATION: Styrene liquid and vapors are irritating to the eyes. Styrene may cause skin irritation and defatting of the skin. Exposure by inhalation may cause respiratory irritation, and central nervous system depression known as “styrene sickness”. B: ACUTE TOXICITY – LD50/LC50. STYRENE (100-42-5). Inhalation LC50 Rat: 11.8 mg/L/4H; Oral LD50 Rat: 1000 mg/kg. 4-TERT-BUTYL CATECHOL (TBC) (INHIBITOR) (98-29-3): Oral LD50 Rat: 2820 mg/kg; Dermal LD50 Rabbit: 630 uL/kg. C: TOXICITY – GENERAL MATERIAL INFORMATION: Chronic or prolonged styrene overexposure may cause neurological defects and impaired lung, kidney, and liver function. Prolonged skin contact may produce dermatitis. Styrene is metabolized in the human body to styrene 7,8 –oxide (a probable human carcinogen (IARC Group 2A) and hazardous substance). Styrene has been shown to be mutagenic in in-vitro assays. D: CHRONIC TOXICITY – CARINOGENIC EFFECTS: ACGIH, IARC, OSHA, and NTP carcinogen lists have been checked for selected similar materials or those components with CAS registry numbers. Styrene (100-42-5): ACGIH: A4 – Not Classifiable as a Human Carcinogen  
IARC: Monograph 60, 1994; Monograph 82, 2002 (Overall evaluation upgraded from 3 to 2B with supporting evidence from other data relevant to the evaluation of carcinogenicity and its mechanisms) (Group

2B (possible carcinogenic to humans))

13. ECOLOGICAL ECOTOXICITY

INFORMATION: A: GENERAL MATERIAL INFORMATION: Toxic to aquatic life.  
B: COMPONENT ANALYSIS – ECOTOXICITY – AQUATIC/TERRESTRIAL TOXICITY STYRENE (100-42-5): 96 Hr LC50 fathhead minnow: 4.02 mg/L (flow-through); 96 Hr LC50 bluegill: 25.05 mg/L (Static); 96 Hr LC50 goldfish: 64.74 mg/L (Static); 48 Hr EC50 water flea: 23.0 mg/L; 5 min EC50 Photobacterium phosphoreum: 5.4 mg/L. ENVIRONMENTAL FATE/MOBILITY: the atmospheric half-life for styrene vapor is estimated between 0.5 and 17 hours. Styrene is primarily removed by photochemical reactions in air and evaporation in water. The half-life in moving water has been estimated at approximately 6 hours and in ponds and leaks it ranges from 3 to 13 days. In soils with high organic content, styrene moves slowly. It will volatilize from surface soil at a much slower rate than from water. PERSISTANCE/DEGRADABILITY: The BOD for styrene is 1.29 (5 days) g/g; 2.45 (20 days)g/g. Styrene is readily biodegradable in surface water-immediate biodegradation products are phenylethanol and phenylacetic acid. In groundwater, the rate of biodegradation is slow (half-life between 6 and 32 weeks). Sub-surface biodegradation accounts for more styrene loss than volatilization. In soil, the immediate breakdown products are phenylethanol and phenylacetic acid, which undergo further degradation. BIOACCUMULATION/ACCUMULATION: Styrene will partition from water to organisms, depositing in fatty tissues. Elimination is rapid and not likely to bioconcentrate through the food chain: The bioconcentration factor (BCF) in goldfish has been measured at 13.5, which suggests low bioconcentrating potential. DISPOSAL: GENERAL MATERIAL INFORMATION: This product is known to be hazardous waste according to US and Canadian regulations. The use, mixing or processing of this material may alter this product. Contact federal, provincial/state and local authorities in order to generate or ship a waste material associated with this product to ensure materials are handled appropriately and meet all criteria for disposal of hazardous waste. Vent to a burning flame at an approved facility. DO NOT ATTEMPT TO DISPOSE OF BY UNCONTROLLED IGNITION. Since emptied containers retain product residue, follow safe handling/label warnings even after container is emptied. Waste generator is advised to carefully consider hazardous properties and control measures needed for other materials that may be found in the waste. B: COMPONENT WASTE NUMBERS: No EPA Waste Numbers are applicable for this product's components. WASTE DISPOSAL: If discarded, this product is considered a US RCRA ignitable waste: D001

14. DISPOSAL CONSIDERATIONS: Follow all applicable laws and regulations. If discarded, this product is considered a US RCRA ignitable waste: D001

15. CARCINOGENIC POTENTIAL CARCINOGEN. PROPERTIES & NOTIFICATIONS:

16. TRANSPORT INFORMATION: US DOT INFORMATION:  
SHIPPING NAME: Styrene monomer, stabilized  
UN #: 2055  
Hazard class: 3  
PACKING GROUP: III  
REQUIRED LABELS: Flammable Liquid  
ADDITIONAL INFORMATION: NOTE: The Reportable quantity for styrene is 1000 lbs (454kg). The letters RQ must appear in the proper shipping name for shipments in a single container that exceed the RQ for styrene. 2004 Emergency Response Guide No. 128P  
CANADIAN TDG INFORMATION:  
SHIPPING NAME: Styrene monomer, stabilized  
UN #: 2055  
Hazard class: 3



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PACKING GROUP: III  
REQUIRED LABELS: Flammable Liquid  
ADDITIONAL INFORMATION: 2004 Emergency Response Guide No. 128P  
INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA) and ICAO REGULATIONS:  
SHIPPING NAME: Styrene monomer, stabilized  
UN #: 2055  
Hazard class: 3  
PACKING GROUP: III  
REQUIRED LABELS: Flammable Liquid  
INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG) REGULATIONS  
SHIPPING NAME: Styrene monomer, stabilized  
UN #: 2055  
Hazard class: 3  
PACKING GROUP: III  
REQUIRED LABELS: Flammable Liquid  
ADDITIONAL INFORMATION: EmS Code: F-E, S-D

17. HANDLING & STORAGE: HANDLING PROCEDURES: Wear appropriate personal protective equipment when working with this product. Keep locked up and away from heat, sources of ignition, direct sunlight, strong incandescent light and incompatible materials. Ground all equipment that contains this material. Use spark-resistant tools. Use non-sparking, grounded ventilation systems separate from other exhaust systems. Avoid shock and friction. Dissipate static electricity during transfer by grounding and bonding containers and equipment. Keep away from incompatible materials such as oxidizing agents and acids. Do not inhale product gas, fumes, vapor, or spray. In case of insufficient ventilation, wear suitable respiratory equipment. Do not ingest. If ingested, seek medical advice immediately and show the product MSDS or label to EMS personnel. Avoid contact with skin and eyes. Wash hands thoroughly with soap and water after handling. STORAGE PROCEDURES: Store according to applicable regulations for flammable materials in storage tanks, containers, buildings, rooms, cabinets, and allowable quantities and minimum storage distances. Store below 90 F (32 c) in a dry, well-ventilated area away from incompatible materials such as strong oxidizing agents. Store and use away from heat, sparks, open flame, or any other ignition source. Storage area should be clearly identified, well illuminated, and clear of obstructions. Store away from process and production areas, elevators, and building and room exists. Store in labeled containers in areas appropriate for flammable liquids – bond and ground metal containers. All storage containers should be aboveground, over an impermeable base, and diked to hold entire contents. Avoid bulk storage indoors. Equip storage tank vents with a flame arrestor. Consider leak detection and alarm equipment for storage area. Keep absorbents for leaks and spills readily available. Maintain appropriate extinguishing capability in storage area (e.g. sprinkler system, portable fire extinguishers). Provide adequate security so that unauthorized personnel do not have access to product. Hazardous polymerization may lead to an explosion. Complete elimination of dissolved oxygen in monomer rapidly causes polymerization. Monitor and maintain inhibitor (TBC) level between 10 ppm –50 ppm to help reduce the risk of polymerization. Inhibitor depletion and risk of polymerization will increase if product is stored under high temperatures, in the presence of moisture, rust, or other impurities, or for extended periods.
18. ACCIDENTAL RELEASE MEASURES: EVACUATION PROCEDURES: Isolate area. Keep unnecessary away. Alert stand-by emergency and fire fighting personnel. SMALL SPILLS: Isolate spill or leak area immediately for at least 25-50 meters (80 – 160 feet) in all directions. Restrict access of material. Stop source of leak if possible and eliminate sources of ignition. Ventilate closed spaces before entering. Use water to dispose flammable vapors. Clean up spills using appropriate techniques such as inert sorbent materials. CAUTION. Hazardous polymerization may be inhibited by some sorbents – preventing of available sorbents for compatibility under controlled conditions is recommended. Absorb spill with inert material. Use appropriate, non-sparking tools/shovel to put the spilled material in an appropriate waste disposal container. Recover as much



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styrene as possible and prevent it from entering sewer, drains, or waterways. **LARGE SPILLS:** As above, but consider initial downwind evacuation for at least 300 meters (1000 feet) Monitor surrounding area for build-up of flammable air concentrations. Consider use of foam to suppress flammable vapors. **SPECIAL PROCEDURES:** Contact local police/emergency services and appropriate emergency telephone numbers provided. Ensure that statutory reporting requirements in the applicable jurisdiction are met. Wear appropriate protective equipment and clothing during clean-up. Individuals without appropriate protective equipment should be excluded from area of spill until clean-up has been completed. Styrene is a flammable liquid subject to polymerization under heat, acidic or basic conditions, or if the inhibitor becomes depleted. Maintain t-Butyl catechol levels between 10 ppm and 50 ppm.

19. REGULATORY INFORMATION: A: INTERNATIONAL REGULATIONS: Components of this product have been checked against the following Chemical Control Inventories.

COMPONENT ANALYSIS – INTERNATIONAL INVENTORY STATUS:

COMPONENT	CAS#	US-TSCA	CANADA-DSL	EU EINECS
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Styrene:	100-42-5	Yes	Yes	Yes
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4-tert-Butyl catechol:	98-29-3	Yes	Yes	Yes
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(TBC) (inhibitor):

B: USA FEDERAL & STATE REGULATIONS: Ongoing occupational hygiene, medical surveillance programs, or site emission or spill reporting may be required by Federal or State regulations. Check for applicable regulations.

USA OSHA HAZARD COMMUNICATIONS CLASS: This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication). HCS Class: Highly Toxic. HCS Class: MAY CAUSE CANCER. HCS Class: Flammable liquid with a flash point lower than 37.8 c (100 F).

USA RIGHT-TO-KNOW – FEDERAL: This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Styrene (100-42-5): SARA 313: 0.1 percent de minimis concentration

CERCLA: 1000lb final RQ; 454 kg final RQ

USA RIGHT-TO-KNOW – STATE: The following components appear on one or more of the following state hazardous substances lists. Some components (including those percent only in trace quantities, and therefore not listed in this document) may be included on the Right To Know lists of other U.S states. The reader is therefore cautioned to contact his or her NOVA Chemicals representative or NOVA Chemicals' Product Integrity group for further U.S State Right To Know information.

Styrene (100-42-5): NJ – Yes, PA – Yes

4-tert-Butyl catechol (TBC (inhibitor) (98-29-3): NJ – No, PA – Yes

C: CANADIAN REGULATIONS – FEDERAL AND PROVINCIAL: Canadian Environmental Protection Act(CEPA): All components of this product are on the Domestic Substances List (DSL), and are acceptable for use under the provisions of CEPA.

WHMIS INGREDIENT DISCLOSURE LIST (IDL): This material is a controlled product under Canadian WHMIS regulations. Workplace Hazardous Materials Information Systems (WHMIS): This product has been classified in accordance with Canadian Controlled Product Regulations (CPR) hazard criteria and this MSDS contains complete CPR-required information.

WHMIS Class B2: Flammable liquid with a flash point lower than 37.8 c (100 F).

WHMIS Class D2A: very toxic

WHMIS Class F: Dangerously Reactive Material

PROVINCIAL REGULATIONS : Ongoing occupational hygiene, medical surveillance programs, or site emission or spill reporting may be required by Federal or Provincial regulations. Check for applicable regulations.