## Chemical Fact Sheet

<table>
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<tr>
<th>Chemical Abstract Number (CAS #)</th>
<th>100425</th>
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<td>CASRN</td>
<td>100-42-5</td>
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### Synonyms
- Styrene
- Benzene, ethenyl-
- Vinylbenzene
- Phenylethylene
- Styrol
- Styrolene
- Cinnamene
- Cinnamol

### Analytical Methods
- EPA Method 502.2
- EPA Method 503.1
- EPA Method 524.2
- EPA Method 8021
- EPA Method 8260

[Link to the National Library of Medicine's Hazardous Substances Database for more details on this compound.](http://www.nlm.nih.gov/databases/hdb/)

### Molecular Formula
- **C₈H₈**

### Use
- MANUFACTURE OF PLASTICS; SYNTHETIC RUBBER; INSULATOR USED IN PREPN OF ACRYLONITRILE-BUTADIENE-STYRENE & STYRENE-ACRYLONITRILE POLYMER RESINS; MANUFACTURE OF PROTECTIVE COATINGS (STYRENE-BUTADIENE LATEX; ALKYDS); IN MANUFACTURE OF STYRENATED POLYESTERS, RUBBER-MODIFIED POLYSTYRENE, COPOLYMER RESINS USED AS A DILUENT TO REDUCE VISCOSITY OF UNCURED RESIN SYSTEMS GLASS FIBER-REINFORCED, UNSATURATED POLYESTER RESINS USED IN CONSTRUCTION MATERIALS & BOATS; USED IN SYNTHESIS OF STYRENE-DIVINYLBENZENE COPOLYMERS AS MATRIX FOR ION-EXCHANGE RESINS; AS SYNTHETIC FLAVORING SUBSTANCE & ADJUVANT; AS CROSS-LINKING AGENT IN POLYESTER RESINS; IN RUBBER ARTICLES (5% WT MAX), WHEN INTENDED FOR USE IN CONTACT WITH FOOD MONOMER FOR STRAIGHT & IMPACT POLYSTYRENE; COMONOMER FOR STYRENE-BUTADIENE ELASTOMERS & FOR OTHER COPOLYMERS, EG, ACRYLIC ESTER-STYRENE; CHEM INTERMID FOR STYRENATED PHENOLS & STYRENE OXIDE, STYRENATED OILS; CROSS-LINKING AGENT IN UNSATURATED POLYESTER RESIN MANUFACTURE. FDA-APPROVED FLAVORING AGENT, EG, FOR ICE CREAM & CANDY It is used to make paints.

- MONOMER OR COMONOMER FOR POLYSTYRENES, 67%; FOR ACRYLONITRILE-BUTADIENE/STYRENE RESINS, 9%; FOR STYRENE-BUTADIENE ELASTOMERS, 7%; FOR STYRENE-
### Consumption Patterns

BUTADIENE COPOLYMER LATEXES, 6%; FOR STYRENE-ACRYLONITRILE RESINS, 1%; CROSS-LINKING AGENT IN POLYESTER MANUFACTURING, 5%; OTHER USES, 5% (1982) Polystyrene, 55%; acrylonitrile-butadiene-styrene (ABS), 9%; styrene-butadiene rubber, 7%; styrene-butadiene latex, 6%; unsaturated polyester resins, 6%; miscellaneous uses including other copolymers and styrene-acrylonitrile (SAN), 4%; export, 13% (1985) Polystyrene, 58%; ABS and SAN resins, 12%; SB elastomer, 8%; SB Latex, 7%; unsaturated polyester, 7%; miscellaneous, 8% (1984) estimate Initially, styrene was used primarily in the synthetic rubber industry, but currently most styrene is consumed in plastics, resin, coatings, & paints. To date, all commercial uses are based on chemical reactions that polymerize or copolymerize styrene. CHEMICAL PROFILE: Styrene. Polystyrene, 55%; acrylonitrile-butadiene-styrene (ABS), 9%; styrene-butadiene rubber (SBR), 7%; styrene-butadiene latex, 6%; unsaturated polyester resins, 6%; miscellaneous uses, including other copolymers and styrene-acrylonitrile (SAN), 4%; exports, 13%. CHEMICAL PROFILE: Styrene. Demand: 1985: 7.6 billion lb; 1986: 7.8 billion lb; 1990 /projected/: 8.65 billion lb. (Represents total apparent domestic consumption, including production of about 1 billion lb per year for export sales and imports of 200 million lb per year.) CHEMICAL PROFILE: Styrene. Polystyrene, 55%; acrylonitrile-butadiene-styrene (ABS), 10%; styrene-butadiene rubber (SBR), 5%; styrene-butadiene latex, 5%; unsaturated polyester resins, 5%; miscellaneous uses, including other copolymers and styrene-acrylonitrile (SAN), 7%; exports, 13%. CHEMICAL PROFILE: Styrene. Demand: 1988: 8,580 million lb; 1989: 8,700 million lb; 1993 /projected/: 9,950 million lb. (Includes exports, but not imports, which totaled 470 million lb last year.)

### Apparent Color

COLORLESS TO YELLOWISH, OILY LIQUID ; VISCOUS LIQUID ; Solventy, rubbery

### Odor

CHARACTERISTIC SWEET, BALSAMIC, ALMOST FLORAL ODOR, EXTREMELY PENETRATING ; An aromatic odor

### Boiling Point

145.2 DEG C

### Melting Point

-30.63 deg C

### Molecular Weight

104.14

### Density

0.9059 AT 20 DEG C

### Odor Threshold Concentration

Detection in water: 0.73 ppm; Chemically pure Recognition in air: 0.047 ppm; Chemically pure Odor Threshold Range: 0.15 to 25 ppm Odor detection in air, 0.05 ppm (purity not specified) Odor detection in water, 37 ppm (purity not specified) Odor (low) 0.4300 mg/m; Odor (high) 860.00 mg/m; Irritating concn 4300.00 mg/m. Styrene, inhibited During acute inhalation exposures to >10 ppm (0.04 mg/l), odor is not detectable; at 60 ppm (0.26 mg/l), odor is detectable, but nonirritant; at 100 ppm (0.43 mg/l), odor is strong, but without excessive discomfort; at 200-400 ppm (0.85-1.7 mg/l), odor is objectionably strong; at 376 ppm (1.6 mg/l) for 1 hr, neurological impairment is noted; at 600 ppm (2.6 mg/l), odor is very strong, producing strong eye & nasal irritation. From table

### Sensitivity Data

Acute exposure to high concn of styrene may produce irritation of the mucous membranes of the upper respiratory tract, nose and mouth. Primary irritant to mucosal surfaces at vapor concn above 200 ppm. Irritating to skin

### Environmental Impact

Significant amounts of styrene may be released to the environment from emissions generated by its production and use and from automobile exhaust. If released to the atmosphere, styrene will react rapidly with both hydroxyl radicals and ozone with a combined, calculated half-life of about 2.5 hours. If released to environmental bodies of water, styrene will volatilize relatively rapidly and may be subject to biodegradation, but is not expected to hydrolyze. If released to soil it will biodegrade and leach with a low-to-moderate soil mobility. While styrene has been detected in various US drinking waters, it was not detected in a groundwater supply survey of 945 US finished water supplies which use groundwater sources. Styrene has been detected in various US chemical, textile, latex, oil refinery and industrial wastewater effluents. Styrene has been frequently detected in the ambient air of source dominated locations and urban areas, has been detected in the air of a national forest in Alabama, and has been detected in the vicinity of oil fires. Food packaged in polystyrene containers has been found to contain small amounts of styrene.

TERRESTRIAL FATE: Styrene released to soils is subject to biodegradation. Degradation of 87-95% has been observed in sandy loam and landfill soil over a 16 week incubation and degradation of 2.3-12% per week has been observed with two subsurface aquifers. Styrene may exhibit low to moderate soil mobility depending on soil conditions. It has been demonstrated that styrene buried in soil can leach into underlying groundwater . Styrene
Environmental Fate

which leaked into surrounding soil from buried drums persisted in the soil for up to two years. AQUATIC FATE: Volatilization and biodegradation may be dominant transport and transformation processes respectively, for styrene in water. The volatilization half-life of styrene from a model river (1 m deep with a current speed of 1 m/sec and wind velocity of 3 m/sec) is about 3 hours. Although biodegradation studies utilizing only ambient waters are not available, various BOD and other studies have shown styrene to be biodegradable. Sufficient quantitative kinetic data are not available to predict the relative significance of aquatic photolysis. Hydrolysis is not expected to be important. Adsorption to particulate matter and sediment may have some significance (KOC of 270-550).

ATMOSPHERIC FATE: Styrene vapor in the atmosphere will react rapidly with hydroxyl radicals and with ozone. The reaction half-lives of styrene with hydroxyl radicals and ozone are calculated to be 3.5 and 9 hours, respectively (see also ABIO). Atmospheric wash-out of styrene is not expected to be an important process due to the rapid reaction of styrene with hydroxyl radicals and ozone and the high Henry's Law Constant. ATMOSPHERIC FATE: 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. AQUATIC FATE: The evaporation half-life of styrene from a well-mixed pool of water 1 meter deep is estimated to be approximately 5.9 hours. ATMOSPHERIC FATE: A considerable amount of styrene released into the environment is expected to partition into the atmosphere because of its high vapor pressure, low density, and low water solubility. Styrene was found to be among the most active generators of photochemical smog.

Drinking Water Impact

DRINKING WATER: Water supply, Cincinnati, OH - 0.024 ppb. Detected, but not quantified, in Evansville, IN and Cleveland, OH(2,3). Not detected in 945 finished water supplies throughout USA which use ground water sources. Detected, but not quantified, in finished drinking water in Louisiana; Cincinnati, OH; Indiana; Grand Forks, ND; NY. GROUNDWATER: Detected in Iowa well water at 1.0 ppb. Detected but not quantified in a private well in Wisconsin. Detected but not quantified in ground water in England. Maximum concentrations of 10 ppb found in Netherlands. Well water adjacent to landfill containing buried styrene in drums at Gales Ferry, CT had concentrations of 100-200 ppb in 1962. SURFACE WATER: Water sample from lower TN River - 4.2 ppb. Detected, but not quantified, in Delaware River, Waal River (Netherlands), England surface waters, and Great Lakes(2,4,5,6). Concentrations of 1 ppb found in Kanawha River, WV and Scheldt River, Netherlands. Drinking Water: Styrene has been detected in New Orleans drinking water after passing through commercial charcoal-filter units. SRP: Contamination may be caused by filter/. Ground Water: Styrene has been found in ground water as a result of leaching from a surface impoundment in Walbro Corp, Cass City, MI. Ground Water: Ground water contamination with styrene have occurred at the Valley of Drums - Taylor site, Shepardsville, KY. Leachate, leaks, and spills from discarded drums, as well as other mismanagement incidents contributed to these contaminations. Ground Water: Reicht Farm Site is a landfill located in Dover TWP, NJ. Leaks from waste containers and "midnight dumping" contaminated the ground water in the area with styrene at a concentration of 0.012 ppm. /Styrene was detected in treated water collected from Torressdale Treatment Plant in Philadelphia, PA, in November, 1976. /Detected styrene in drinking water passed through commercial charcoal filtered units. EFFL: Detected, but not quantified, in various chemical, textile, and latex effluents in Louisville, KY, Calvert City, KY, Collierville, TN, Memphis, TN and other USA locations. Wastewater effluent from LA oil refinery contained 31 ppb. Unspecified industrial wastewater in USA - less than 10 ppb. Air in vicinity of oil fire contained 0.5 ppm styrene.

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