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Styrene
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Styrene:

A Building Block for Essential Products

Styrene

has been used for over 70 years to create products which transform our quality of life.

Styrene has shaped and enhanced our daily lives for many years. From the time each of us awakes in the morning to the time we go to bed, styrene-based products are adding convenience, comfort, and safety our lives. We're depending on styrene-based products while taking a shower, fixing meals, commuting, working on a computer, driving a car, making calls from our smartphones, and enjoying an evening watching television.

Styrene is an essential chemical building block that occurs naturally in a number of foods, including cinnamon, strawberries, coffee, beer, and nuts. It can also be derived from petroleum and natural gas by-products, and then used to make thousands of essential commercial, industrial, and personal products we benefit from every day, including: food containers, rubber tires, building insulation, carpet backing, and reinforced fiberglass composites (used in tub and shower enclosures, automobile body panels, boat hulls, wind turbine parts, and residential kitchen countertops).

The product most people readily associate with styrene is polystyrene, often encountered as expanded poly-styrene foam (EPS). Other styrene-based materials include acrylonitrile-butadiene styrene (ABS), styrene-acrylonitrile (SAN), styrenebutadiene rubber (SBR), and unsaturated polyester resin (UPR), which is better known as fiberglass.

Styrene is so widely used today because it's derivatives are lightweight and cost-efficient (as compared to possible alternatives), and the products made from styrene are characterized by their quality, strength, durability, high performance, versatility, and simplicity of production. Styrene-based products deliver excellent hygiene, sanitation, and safety benefits. They are also frequently used to help conserve energy and other natural resources, and can be recycled. Also, styrene often helps create products for which there are few, if any, reasonable substitutes.

Because styrene occurs naturally and is a commercially important raw material, nearly everyone encounters styrene in some form on a daily basis. In fact, you've likely already benefited from several styrene-based products today.

Helping Save Lives

- › Today's small, sleek bicycle helmets made from impact-absorbing styrene-based plastics and composites can prevent an estimated 75 percent of bicycle fatalities among children.¹
- › The thermal properties of EPS containers allow donated organs and many vaccines that must be kept at low temperatures to be transported long distances, yet arrive in the required condition for use.
- › ABS resin is used for the housing of a state-of-the-art blood analyzer because of its proven performance in applications that require strength, durability, and a high-gloss surface to help ensure cleanliness in hospital settings.
- › While EPS is used for a variety of floatation devices, including docks and buoys, it is also commonly used in life-saving flotation devices.
- › Car and booster seats made from styrenic plastics components that meet crash-test standards have helped reduce the death rate from motor vehicle occupant-related injuries among children age 14 and under, despite a significant increase in vehicle miles travelled.
- › Styrene-based materials are enhancing motoring safety worldwide, including composites used to build bridge components that are rust-resistant and last longer, road safety barriers that transmit energy away from the source of the impact, and SBR tires that improve fuel efficiency and grip the pavement better, whether wet or dry.



1. <http://www.thinkfirst.org/teens/BicycleSafety.asp>

Keeping Us Healthy

- › Meat, poultry, and seafood are commonly packaged on polystyrene foam trays to keep liquids and potentially harmful bacteria from leaking onto display surfaces and consumers' hands.
- › Polystyrene single serve containers are preferred for use in many healthcare and educational food service settings because it is strong yet lightweight, provides excellent insulation, enhances food service sanitation, and contributes to protecting public health.
- › Styrene is used to produce long-lasting septic tanks, provide corrosion-resistant components for wastewater treatment plants, and to reline municipal sewer pipes without needing to dig up streets.
- › Styrene-polyester composite stack liners allow utilities to treat exhaust from coal-fired plants and reduce acid rain.
- › Gas stations across the United States have styrene-polyester composite tanks to prevent rust, corrosion, and leakage of fuel into groundwater.



Enhancing Work and Play

- › Styrenic plastics are used in many entertainment and communication devices we depend on every day, including computer and TV housings, keyboards, videogame consoles, smartphones, and MP3 players.
- › ABS is commonly used to produce toys that require rigidity, yet are flexible enough to be used by children.
- › Components of many common household items are produced using styrene-based products, including the inner linings of fridges and freezers and the housing, exterior components, and accessories of smaller appliances, such as blenders and toasters.
- › At the office, styrenic plastics make staplers resilient enough to withstand repeated impacts and your desktop scratch resistant despite years of use, while SB Latex (SBL) is used in many paper coatings.
- › SAN plastic optical fibers are commonly used in medical, automotive, and home networks, as well as digital audio and video interfaces, as a low-cost optical fiber alternative that is easier to use than glass optical fiber and faster than traditional copper wire.



Conserving Resources

Styrene composites are central to the production of “green” energy, including solar panels and wind-power turbines.

The lightweight and durability of styrene-polyester composite components used in automobile bodies saves fuel for owners of cars, trucks, and farm equipment.

Expanded polystyrene (EPS) packaging offers a range of properties, including superior insulation and exceptional cushioning to protect against shock and compression, thus reducing waste due to damage during shipment. EPS has less environmental impact during its manufacture than paperboard products and its light weight reduces shipping costs and associated fuel consumption.

Expanded (EPS) or extruded (XPS) polystyrene insulation provides excellent

thermal insulating properties in both residential and commercial construction—for foundations, walls, and roofs. The light, yet effective, structure of polystyrene insulation boards keeps cold air out in winter and warm air out in summer, lowering heating and cooling costs and, as a result, reducing greenhouse gas emissions.

SB latexes (SBL) made with styrene are flexible and durable, and are commonly used to attach carpet fibers to backing material, extend the life of carpet, and consequently decrease the cost of maintenance over time.

Styrene composites reduce dependence on costly natural resources, such as tropical hardwoods used in boats, natural rubbers used in car tires, and marble and granite used in homes and buildings.



Where can I get more information?

YouKnowStyrene.org serves as a reliable, one-stop source of information on styrene and styrene-based products for consumers, educators, the media, industry employees, and communities.

Additional information about styrene and styrenics may also be found at **Styrene.org** or through trade associations representing various segments of the styrene industry:

- Plastics Foodservice Packaging Group (PFPG) – plasticfoodservicefacts.com
- American Chemistry Council (ACC) – americanchemistry.org
- National Marine Manufacturers Association (NMMA) – nmma.org
- American Composite Manufacturers Association (ACMA) – acmanet.org
- International Institute of Synthetic Rubber Producers (IISRP) – iisrp.com
- EPS Industry Alliance – epsindustry.org

