

Polystyrene

Polystyrene is a versatile plastic used to make a wide variety of consumer products. As a hard, solid plastic, it is often used in products that require clarity, such as food packaging and laboratory ware. When combined with various colorants, additives or other plastics, polystyrene is used to make appliances, electronics, automobile parts, toys, gardening pots and equipment and more.

Polystyrene also is made into a foam material, called expanded polystyrene (EPS) or extruded polystyrene (XPS), which is valued for its insulating and cushioning properties. Foam polystyrene can be more than 95 percent air and is widely used to make home and appliance insulation, lightweight protective packaging, surfboards, foodservice and food packaging, automobile parts, roadway and roadbank stabilization systems and more.

Polystyrene is made by stringing together, or polymerizing, styrene, a building-block chemical used in the manufacture of many products. Styrene also occurs naturally in foods such as strawberries, cinnamon, coffee and beef.

Uses & Benefits

Polystyrene in Appliances

Refrigerators, air conditioners, ovens, microwaves, vacuum cleaners, blenders – these and other appliances often are made with polystyrene (solid and foam) because it is inert (doesn't react with other materials), cost-effective and long-lasting.

Polystyrene in Automotive

Polystyrene (solid and foam) is used to make many car parts, including knobs, instrument panels, trim, energy absorbing door panels and sound dampening foam. Foam polystyrene also is widely used in child protective seats.

Polystyrene in Electronics

Polystyrene is used for the housing and other parts for televisions, computers and all types of IT equipment, where the combination of form, function and aesthetics are essential.

Polystyrene in Foodservice

Polystyrene foodservice packaging typically insulates better, keeps food fresher longer and costs less than alternatives.

Polystyrene in Insulation

Lightweight polystyrene foam provides excellent thermal insulation in numerous applications, such as building walls and roofing, refrigerators and freezers, and industrial cold storage facilities. Polystyrene insulation is inert, durable and resistant to water damage.

Polystyrene in Medical

Due to its clarity and ease of sterilization, polystyrene is used for a wide range of medical applications, including tissue culture trays, test tubes, petri dishes, diagnostic components, housings for test kits and medical devices.

Polystyrene in Packaging

Polystyrene (solid and foam) is widely used to protect consumer products. CD and DVD cases, foam packaging peanuts for shipping, food packaging, meat/poultry trays and egg cartons typically are made with polystyrene to protect against damage or spoilage.

Safety Information

In the United States, the U.S. Food and Drug Administration (FDA) strictly regulates all food packaging materials, including polystyrene. All food packaging – glass, aluminum, paper and plastics (such as polystyrene) – contains substances that can “migrate” in very tiny amounts to foods or beverages. That’s one of the reasons why FDA regulates food packaging in the first place – to be confident that the amount of substances that might actually migrate is safe.

For every material used in food contact, there must be sufficient scientific information to demonstrate that its use is safe. FDA’s safety evaluations focus on three factors:

- Material(s) used in the packaging,
- Cumulative exposure to substances that may migrate into foods and beverages, and
- Safe levels of that exposure.

Tiny amounts of styrene may remain in polystyrene following manufacture, so FDA has evaluated both the safety of the food contact material itself (polystyrene) and the safety of the substance that may migrate (styrene). The result of these evaluations: FDA for decades has determined that polystyrene is safe for use in contact with food.

The U.S. National Toxicology Program Director Dr. Linda Birnbaum, Ph.D., was quoted widely in Associated Press reports in June 2011: “Let me put your mind at ease right away about Styrofoam ... [the levels of styrene from polystyrene containers] are hundreds if not thousands of times lower than have occurred in the occupational setting...In finished products, certainly styrene is not an issue.”

In 2013, the Plastics Foodservice Packaging Group provided updated styrene migration data to FDA. The data show that current exposures to styrene from the use of polystyrene food contact products remain extremely low, with the estimated daily intake calculated at 6.6 micrograms per person per day. This is more than 10,000 times below the safety limit set by FDA (FDA's acceptable daily intake value of styrene is calculated to be 90,000 micrograms per person per day).

Polystyrene Safety in Food Packaging

- FDA has for decades stated that polystyrene is safe for use in contact with food. The European Commission/European Food Safety Authority and other regulatory agencies have reached similar conclusions.
- Polystyrene foodservice packaging can help reduce food-borne illness in homes, hospitals, schools, nursing homes, cafeterias and restaurants.
- Polystyrene foodservice packaging is preferred by the foodservice industry because it works better than alternatives. Hot foods stay hot, cold foods stay cold, and fresh foods stay fresh. From organic salads to spicy chili, polystyrene packaging offers more convenience and dining enjoyment for people on the go.
- Polystyrene foodservice packaging generally is more economical – wholesale costs can be up to five times less than paper-based or reusable counterparts (reusable containers require extra equipment, labor, water, electricity, detergent, etc.).
- Commonly used cups, plates and sandwich containers made of foam polystyrene use significantly less energy and water than comparable paper-based or corn-based alternatives, primarily due to foam polystyrene's much lower weight.

Answering Questions

What do public health organizations say about polystyrene foodservice packaging?

Public health officials encourage the use of sanitary, single-use foodservice packaging (such as polystyrene) in appropriate settings. Single-use foodservice packaging can help reduce food-borne illness in homes, hospitals, schools, nursing homes, cafeterias and restaurants.

What do regulatory agencies say about the safety of polystyrene foodservice packaging?

In the United States, FDA strictly regulates all food packaging materials, including polystyrene. FDA has for decades stated that polystyrene is safe for use in contact with food. The European Commission/European Food Safety Authority and other regulatory agencies have reached similar conclusions.

What do scientific experts say about the safety of polystyrene foodservice packaging?

From 1999 to 2002, a 12-member international expert panel selected by the Harvard Center for Risk Analysis conducted a comprehensive review of potential health risks associated with workplace and environmental exposure to styrene.

The scientists reviewed all of the published data on the quantity of styrene contributed to the diet due to migration from food contact packaging. The scientists concluded that there is no cause for concern from exposure to styrene from food or from polystyrene used in food contact applications, such as packaging and foodservice containers.

Is it common for substances from packaging to "migrate" into food?

All packaging – glass, aluminum, paper and plastics (such as polystyrene) – contains substances that can "migrate" in very tiny amounts to foods or beverages. That's one of the reasons why FDA regulates food packaging in the first place – to be confident that the amount of substances that might actually migrate is safe.

Test data submitted to FDA indicated that the migration of styrene from polystyrene foodservice products is tiny and expected to be significantly below the safety limits set by FDA itself – 10,000 times less than FDA's acceptable daily intake level.

Where does styrene come from?

Styrene occurs naturally in many foods and beverages. Its chemical structure is similar to cinnamic aldehyde, the chemical component that creates cinnamon's flavor. Styrene also is manufactured as a building block for materials used to make automobiles, electronics, boats, recreational vehicles, toys and countless other consumer products.

How can people come into contact with styrene?

People can come into contact with styrene from the small amounts that may be present in air (primarily from automobile exhaust and cigarette smoke) and in foods and packaging. Styrene is naturally present in many foods, such as cinnamon, beef, coffee beans, peanuts, wheat, oats, strawberries and peaches. In addition, FDA has approved styrene as a food additive – it can be added in small amounts to baked goods, frozen dairy products, candy, gelatins, puddings and other food.

What is Styrofoam made of?

Many people incorrectly use the name STYROFOAM® to refer to polystyrene in food service; STYROFOAM® is a registered trademark of The Dow Chemical Company that refers to its branded building material products.

What are styrene uses?

For more than 70 years, styrene has been used as a chemical building block to make the materials used in a wide variety of finished consumer products, such as food containers, rubber tires, building insulation, carpet backing and boat hulls, surfboards, residential kitchen countertops, bathtubs and shower enclosures.