Polystyrene and Styrofoam

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Polystyrene is a strong plastic created from erethylene and benzine. It can be injected, extruded or blow molded. This makes it a very useful and versatile manufacturing material.

Most of us recognize polystyrene in the form of styrofoam used for beverage cups and packaging peanuts. However, polystyrene is also used as a building material, with electrical appliances (light switches and plates) and in other household items.

Eduard Simon & Hermann Staudinger Polymer Research

Keystone/Stringer/Getty Images

German apothecary Eduard Simon discovered polystyrene in 1839 when he isolated the substance from natural resin. However, he did not know what he had discovered. It took another organic chemist named Hermann Staudinger to realize that Simon's discovery, comprised of long chains of styrene molecules, was a plastic polymer.

In 1922, Staudinger published his theories on polymers. They stated that natural rubbers were made up of long repetitive chains of monomers that gave rubber its elasticity. He went on to write that the materials manufactured by the thermal processing of styrene were similar to rubber. They were the high polymers, including polystyrene. In 1953, Staudinger won the Nobel Prize for Chemistry for his research.

BASF Commercial Use of Polystyrene

Badische Anilin & Soda-Fabrik or BASF was founded in 1861. BASF has a long history of being innovative due to having invented synthetic coal tar dyes, ammonia, nitrogenous fertilizers as well as developing polystyrene, PVC, magnetic tape and synthetic rubber.

In 1930, the scientists at BASF developed a way to commercially manufacture polystyrene. A company called I.G. Farben is often listed as the developer of polystyrene because BASF was under trust to I G. Farben in 1930. In 1937, the Dow Chemical company introduced polystyrene products to the U.S. market.

What we commonly call styrofoam, is actually the most recognizable form of foam polystyrene packaging. Styrofoam is the trademark of the Dow Chemical Company while the technical name of the product is foamed polystyrene.

Ray McIntire - Styrofoam Inventor

Dow Chemical Company scientist Ray McIntire invented foamed polystyrene aka Styrofoam. McIntire said his invention of foamed polystyrene was purely accidental. His invention came about as he was trying to find a flexible electrical insulator around the time of World War II.

Polystyrene, which already had been invented, was a good insulator but too brittle. McIntire tried to make a new rubber-like polymer by combining styrene with a volatile liquid called isobutylene under pressure. The result was a foam polystyrene with bubble and was 30 times lighter than regular polystyrene. The Dow Chemical Company introduced Styrofoam products to the United State in 1954.

How Are Foamed Polystyrene or Styrofoam Products Made?

Foamed polystyrene starts as small spherical beads that contain an expanding agent called hydrocarbon.
The polystyrene beads are heated with steam. As the expanding agent boils, the beads soften and expand up to forty times their original size.
The expanded beads are left to cool down before being heated again. However, this time the beads are expanded within a mold.
The molds are designed in a variety of shapes depending on the desired end product. Examples are things such as styrofoam cups, cartons, wig stands and more.
The beads completely fill the mold and also fuse together.
Styrofoam is about 98% percent air.

Dissolve Styrofoam or Polystyrene in Acetone

by Anne Marie Helmenstine, Ph.D.

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Dissolving Styrofoam or another polystyrene product in acetone is a spectacular demonstration of the solubility of this plastic in an organic solvent. It also illustrates just how much air is in the Styrofoam. All you need to do is to pour a bit of acetone into a bowl, and place Styrofoam beads, packing peanuts, chunks of foam, or even a Styrofoam cup in the container. The Styrofoam will dissolve in the acetone much like sugar dissolves in hot water. Since Styrofoam is mostly air, you may be surprised by how much (or, in the end, how little) foam will dissolve in the acetone. A cup of acetone is enough to dissolve an entire bean bag's worth of styrofoam beads.

How It Works

Styrofoam is made of polystyrene foam. When the polystyrene dissolves in the acetone, the air in the foam is released. This makes it look like you're dissolving a massive quantity of material into a small volume of liquid.

You can see a less-dramatic version of the same effect by dissolving other polystyrene items in acetone. Common polystyrene products include disposable razors, plastic yogurt containers, plastic mailers, and CD jewel cases. The plastic dissolves in just about any organic solvent, not just acetone. Acetone is found in some nail polish removers. If you can't find this product, you could dissolve styrofoam in gasoline just as easily. It's best to do this project outdoors because acetone, gasoline, and other organic solvents tend to be toxic when inhaled.