The Chemical Mechanism of the Reduction and Recycling of Polystyrene using an Organic, Eco-Friendly Solvent

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Polystyrene, or Styrofoam, is a common household and commercial waste product that naturally decomposes in approximately 1000 years. United States landfills receive around 2.5 million tons of Styrofoam annually because recycling is not currently an efficient option for this lightweight, bulky material. The goal of our research was to develop a recycling process for polystyrene that is both financially viable and environmentally friendly. D-limonene, a chemical naturally found in the peel of citrus fruit, which condenses polystyrene to one-thirtieth of its original volume alleviating the heavy toll this material has on the environment. The experimentation conducted proved that with the addition of water, the polystyrene can be separated, cooled, and recycled because of an induced polarity in the d-limonene. After discovering water to be a separation catalyst- a previously unknown, scientifically significant phenomenon- a prototype was designed to apply this original research at a local commercial level enabling companies to condense and recycle polystyrene. This onsite machine can benefit companies as well as contribute to the conservation of natural resources, preventing harmful waste materials from entering the environment.

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