

# Polymers— Demonstration Summaries and Concepts



## *Preparation of Nylon—The First Synthetic Fiber*

Make your own nylon! Demonstrate the synthesis and properties of the first synthetic fiber, a true wonder fiber “as strong as steel, as fine as a spider’s web, yet more elastic than any of the common natural fibers!” Simply layer two immiscible solutions in a beaker, insert the hooked end of a paper clip, and withdraw the nylon in long strands from the film that forms at the boundary between the two liquids.

## *Polyurethane Foam—Physical and Chemical Changes*

Chances are, sometime today you have used a product containing polyurethane foam. Polyurethane foams provide cushioning, support, and insulation in a wide range of products from seat cushions to running shoes. Use this polymer demonstration to teach students about physical and chemical changes and to introduce polymers and their applications. The final product—a rigid yet lightweight foam—never fails to amaze!

## *Properties of a Superabsorbent Polymer—Sodium Polyacrylate*

It would be hard to argue that any polymer has had a greater impact in the past 40 years than sodium polyacrylate, the main ingredient in disposable diapers. Find out why sodium polyacrylate has many “absorbing” applications with this two-part demonstration. Compare and contrast the traditional formulation, which absorbs up to 800 times its weight in water to form a solid gel, and PolySnow™, which produces an avalanche of fresh powdered “snow” when water is added.

## *Oh, the Memories!—Polystyrene Returns to Form*

Does a simple polystyrene cup have a memory? Yes! Many plastic objects that have been made by stretching and then cooling a heated (softened) polymer exhibit what is called plastic memory—they will return to their original shapes or dimensions when reheated. “Release the memories” of a polystyrene cup by heating it above its glass transition temperature. The polymer molecules recoil from their frozen, stretched out configuration, and the object returns to its original shape.

## *Polymethyl Methacrylate—Clearly, an Outstanding Polymer*

Polymethyl methacrylate, which is more commonly known by its trade names, Lucite® and Plexiglass®, is a hard, crystal-clear polymer. It is lighter and stronger than glass, less likely to break or shatter, and easily molded into different shapes. Demonstrate the synthesis of addition polymers and the properties of free-radical chain reactions with the preparation of polymethyl methacrylate.

## Concepts

- Condensation polymers
- Polyamides
  
- Polymers
- Physical and chemical changes
  
- Superabsorbent polymers
- Cross-linking
- Osmosis
  
- Thermoplastic polymers
- Glass transition temperature
- Plastic memory
  
- Addition polymers
- Chain reactions
- Free-radical catalysts