Polyester Encyclopedia Article

Polyester

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Polyester

Commercial polyesters are long chain molecules, or polymers, of which eighty percent consist of an ester derived from a dihydric alcohol and terephalic acid. A great deal of the groundwork for the development of polyesters as textile fibers was prepared by Wallace Carothers and his research staff. Carothers went to work at DuPont as the head of a basic research program in 1928. One of the goals of the program was to develop a synthetic fiber. He began to study diamines and carboxylic acids. Through this search, he eventually discovered neoprene, a synthetic rubber, and nylon.

Carothers and his staff also investigated polyesters, which are polymers resulting from the interaction of dialcohols and dihydric acids. The researchers eventually abandoned polyesters as useless synthetic fibers--finding them lacking in strength and possessing melting points that were too low. However, Carothers's group had not tried the polyester formed from the combination of a dihydric alcohol and terephalic acid.

John Whinfield and J. T. Dickson, two British chemists, began their research where Carothers left off. They discovered that by making a polyester with terephalic acid and by using a fiber-forming method (pioneered by Carothers's group) called *cold drawing*, a fiber suitable for use in textiles was formed. They called the new fiber Terylene.

In cold drawing, the polymer is heated and forced through a metal plate with small holes. The polymer fibers are solidified with cool air as they emerge from the holes. They are then passed through a pair of rollers that rotate at different speeds. The greater the difference in the rollers' speeds the stronger the fiber becomes. The drawing process aligns the molecular chains in the polymer. The fiber was marketed by the Imperial Chemical Industries in Great Britain and by DuPont in the United States under the names Fibre V and Dacron. Polyesters are used mostly in textile applications, both alone and in blends. Like many discoveries, polyester was developed by one group building upon the research of another.