

Industrial Polymers

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Preface

Industrial Polymers provides an in depth look at the most frequently used thermoplastic, thermoplastic elastomers, liquid injection molding silicone and thermoset polymers found in plastic products today. Virtually every industry uses plastics in one form or another. The transportation, electronics, construction, medical and aircraft industries rely on plastics to provide a higher quality product at lower cost than conventional materials, such as metals, wood, concrete or rubber. This book includes descriptions of basic polymer characteristics, diagrams showing the chemical structure of the resin, advantages and disadvantages associated with the use of the polymer and color illustrations showing applications and end use products.

Industrial polymers are true man made materials. Their structure is based on chemical elements such as carbon, oxygen, hydrogen, nitrogen, chlorine and sulfur. These elements are extracted from the air, water, gas, oil, coal, and even from living plants. It was man who took these elements and combined them through various chemical reactions to create an almost unending series of combinations to produce the wide variety of polymers known today as plastics.

Many polymers were created as a substitute for materials that were in short supply, such as rubber, wood and metal. The very first “plastic” was invented as a result of a contest offering a \$10,000 reward for a patentable material to replace the ivory used in billiard balls. Although this prize was never awarded, the result was the invention of cellulose nitrate (celluloid), which is still in use today.

With over 26,000 polymer compounds available today, it can be an overwhelming task to select the optimum polymer for the application at hand. *Industrial Polymers* was written to provide plastics engineers and product designers with a quick and comprehensive reference for selecting a polymer for a particular application.

Chapter 1 A brief history of plastics and their evolution into the polymers in use today is explored. The differences among the polymer families are explained, including their characteristics, performance and processing conditions.

Chapter 2 A description of the most widely used thermoplastic polymers is given, including chemical, thermal, mechanical, processing and wear characteristics. Advantages and disadvantages of using the polymer for a particular application are given, as well as, various end uses for the polymer.

Chapter 3 Provides information on melt processible rubber (MPR), thermoplastic polyurethane elastomers (TPU), styrenic block copolymer (TPE), polyolefin thermoplastic elastomers (TPO), and various others.

Chapter 4 Includes information on liquid injection molding silicone (LIM®). Equipment requirements, injection molding machine changes for using LIM® and mold modifications are all discussed.

Chapter 5 Covers the thermoset polymers which are widely used in the plastics industry. Because of their chemical structure, they require different processing techniques and can not be recycled like the thermoplastics.