

Preface

MODERN ORGANIC CHEMISTRY OF POLYMERIZATION

In recent years synthetic polymer chemistry has been undergoing a renaissance. Using (and originating) modern organic transformations, polymer synthesis chemists have advanced their capabilities into a new era of clean high polymers possessing well-defined structures, molecular weights and distributions. The purpose of this volume is to present a representative collection of articles by experts in the field.

In earlier days, reactions suitable for synthesizing high-polymers were somewhat limited. Polycondensation reactions were limited to various reactions at carbonyl centers. Most of them, such as polyester and polyamide formation, only proceeded at very high temperatures with long reaction times. Both vinyl and cyclic monomers underwent addition polymerization. However, the conversions, molecular weights, and molecular weight distribution were poorly controlled. As to polymer molecular architecture, linear polymers were synthesized for processable thermal plastics, while highly branched gelled polymers were studied as thermosets. Little was known about supramolecular architecture in synthetic polymers.

In recent years the picture has been changing rapidly and continues to do so. Today various polycondensation reactions can be carried out cleanly and effectively at room temperature using transition metal catalysts. In this way highly conjugated polyphenylenes and polyphenylenevinylenes have become available for study as electrically conducting and optoelectronic materials. Free radical polymerization has been tamed, either through the use of transition metals or stable nitroxyl radicals. Clean well-defined polymers with very low polydispersity indexes can be routinely synthesized and can be used further as polymeric reagents or initiators. Novel uncatalyzed ring-opening polymerizations have also made their appearance.

The introduction of dendrimeric and hyperbranched polymers has provided an intermediate area between the polymer structures available earlier. Finally, the field of supramolecular polymer architecture is undergoing rapid development.

A representative collection of active research is offered in the present volume. I hope the excitement and novelty of this work will communicate itself to the organic chemistry community, and that further dramatic advances in the field of modern organic chemistry of polymerization can be anticipated.

I wish to thank my Secretary, Mr. James H. Meredith for his effective, patient, and conscientious collection of, and organization of, the material in this volume.

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