PREFACE

Since the beginning of existence, man has strongly relied on the use of natural organic polymers for food, clothing and shelter, which all belong to the large family of organic polymers such that cellulose, protein, lignin and polyterpenes.

This fundamental and embarrassing difference between the natural organic materials and the ordinary organic chemicals warned the chemists of the last century that there might be some essential and basic differences between these two class of substances and that one would have to develop special, new and improved experimental methods to force the second class into the realm of truly scientific studies.

The breakthrough came in the early decades of this century, mainly through the adoption of physical methods, such as improved optical devices like the ultramicroscope and the one for the ultracentrifuge, new viscometers, osmometers, diffusion cells and, most of all, through the application of x-ray diffraction to fibres, membranes and tissues. A decade of intense research on cellulose, proteins, rubber and starch wound up with the following fundamental results.

1. All investigated materials consist of very large molecules, the molecular weight ranges from 50,000 to several millions, through H. Staundinger, the name “giant molecules” or “macromolecules”.

[1]
2. Most of them have the shape of long flexible chains which were formed by the multifold repetition of base units referred "monomer" and to the macromolecules themselves as a "polymer".

As soon as the study of natural polymer had started to establish these ground rules, chemists were strongly tempted to synthesize equivalent system from simple, available and inexpensive raw materials. The years from 1920 to 1940 brought ever increasing successful efforts to:

(i) Provide more and cheaper basic building units for the synthesis of new monomers.

(ii) Work out efficient reactions to string them up into link chains and mechanisms of polymerization.

(iii) Establish quantitatively the molecular weight and molecular structure polymer characterization.

(iv) Explore the influence of the structural details on the different ultimate properties by molecular engineering.

Learning originally from nature and following, the established principles, scientists and engineers succeeded in producing wide spectrum of polymeric materials which were their original native examples in many ways and, in most cases, are much more accessible and less expensive. All this gave a tremendous lift to the important industries of man made fibres, films, plastics, rubber coatings and adhesive which made everybody's life richer, safer and more comfortable.
The rapidity of all around development in polymer science and technology and the preceded pace of applications development necessitates fresh efforts in organising new ideas, concepts and practices and updating them in the light of latest unfoldings. Today, economically attractive raw materials and processes support synthesis or identification of new monomer(s).

The present monograph entitled "Kinetics and Mechanism of copolymerization of moncyclic monoterpenoids with electron donor/acceptor monomers using radical initiators" demonstrate both fundamental and theoretical studies of the -co-, -ter- and star polymers of vinyl monomers like MMA, styrene, acrylonitrile, vinyl pyrrolidinone, butyl methacrylate and introducing α-terpineol as new novel monomer in each system using AIBN, and BPO as radical initiators in xylene/DMF/toluene at 60 to 100°C under nitrogen blanket for 1-4 hours. The thesis consists of five chapters, followed by the list of publications.

(I) INTRODUCTION
(II) LITERATURE SURVEY
(III) EXPERIMENTAL
(IV) RESULTS & DISCUSSION
(V) BIBLIOGRAPHY

The fourth chapter (Results & Discussion) has been further divided into eight subchapters which presents and accounts of
• kinetics and mechanism of copolymerization of α-terpineol with methyl methacrylate in presence of α,α'-azobisisobutyronitrile as an initiator.(IV.1).

[III]
• Copolymerization of α-terpineol with styrene: synthesis and characterization. (IV-2).

• Synthesis and characterization of terpolymer of α-terpineol, styrene and methyl methacrylate: A kinetic study. (IV-3).

• Synthesis and characterization of functional copolymers of α-terpineol with acrylonitrile (IV-4).

• Benzoyl peroxide initiated copolymerization of α-terpineol with butyl methacrylate (IV-5).

• Monomer reactivities and kinetics in radical terpolymerization of α-terpineol, styrene and acrylonitrile (IV-6).

• Photoinitiated copolymerization of α-terpineol with methyl methacrylate (IV-7).

• Synthesis and characterization of novel star-shaped copolymer having six branches (IV-8).

Bibliography provides the list of references used in the text of the thesis. These have been arranged as the serial of author(s) name, journal name, volume number, page number, publication year (in bracket of the subchapters).

While every due care has been taken to give proper credit to other authors in the literature, the authors would like to apologize for many omission, which might have occurred due to an oversight or error in judgement. My research investigations are based on the fundamental research, focused on polymers from terpenes & star polymers. I am very hopeful that my findings will be very useful, helpful and applicable to the readers.