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Name of the Department : Chemistry

Topic of Research : Synthesis of Aldehydic Monomers and their Polymerization

Findings

The thesis comprises six chapters. Chapter 1, titled "*Introduction and Literature Review*," provides an extensive literature review on the antimicrobial properties of derivatives from salicylaldehyde and indole-3-carboxaldehyde, detailing their applications and polymerization techniques alongside an analysis of polymers like PMMA, polyvinyl alcohol, and gelatin. Chapter 2, titled "*Synthesis and Characterization of O-acyl Salicylaldehyde Derivatives and Copolymerization of Bis-(2-formylphenyl) Fumarate with Methyl Methacrylate*," discusses the acylation of salicylaldehyde with di- and tri-acyl chlorides under basic conditions, structural confirmation through spectroscopic methods (^{1}H and ^{13}C NMR, FT-IR, HRMS, SC-XRD), and the free-radical copolymerization of one derivative with MMA, resulting in a thermally stable copolymer with crystalline morphology. Chapter 3, titled "*Synthesis and Characterization of O-alkyl/Aryl Salicylaldehyde Derivatives and Free-Radical Homopolymerization of 3-(2-formylphenoxy)-2-hydroxypropyl Methacrylate*," focuses on O-alkyl/aryl salicylaldehyde derivatives synthesized using modified Ullmann and Mitsunobu reactions, with structural elucidation through spectroscopic techniques and a homopolymer exhibiting enhanced thermal stability and smoother morphology. Chapter 4, titled "*Synthesis and Characterization of N-acyl Indole-3-carboxaldehyde Derivatives and Polyvinyl Alcohol Acetalization with 1-propionylindole-3-carboxaldehyde*," explores the acylation of indole-3-carboxaldehyde, structural confirmation via spectroscopic analyses, and polyvinyl alcohol acetalization,

producing a water-insoluble polymer with superior thermal stability. Chapter 5, titled "*Study on N-alkylation/Arylation of Indole-3-carboxaldehyde and Gelatin Functionalization via Schiff Base Formation*," examines the N-alkylation/arylation of indole-3-carboxaldehyde via modified Ullmann reactions and gelatin functionalization through Schiff base formation, yielding a water-soluble polymer with improved thermal stability. Finally, Chapter 6, titled "*Exploring the Synthesis of Poly(azomethine-ester) through Oxidative Polycondensation of Salicylaldehyde Schiff Bases*," explores the synthesis of Schiff base derivatives from salicylaldehyde and their oxidative polycondensation using a green oxidant, resulting in a thermally stable polymer suitable for high-temperature applications. Overall, the thesis involves the synthesis of 23 aldehydic monomers, 19 of which are novel organic compounds, along with the polymerization of selected monomers.