Kajian Rasio Monomer Stirena dengan Asam Akrilat terhadap Nilai Temperatur Transisi Gelas Kopolimer St/AA melalui Metoda Sintesa Polimerisasi Emulsi = Study of the Ratio of Styrene Monomer to Acrylic Acid on the Glass Transition Temperature Value of St/AA Copolymer using the Emulsion Polymerization Synthesis Method

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Abstrak

Penelitian ini menggambarkan proses polimerisasi semi-kontinyu untuk pembuatan kopolimer stiren/asam akrilat (St/AA) dengan menggunakan metode polimerisasi emulsi. Tahapan kegiatan percobaan melibatkan persiapan larutan inisiator dan pre-emulsi monomer, diikuti oleh pemanasan dan penambahan larutan inisiator dan pre-emulsi selama 5 jam , pada temperatur reaksi suhu 70-80°C, dan kecepatan pengadukan polimerisasi emulsi 300 rpm. Karakterisasi polimerisasi berupa transisi temperatur gelas, kandungan padatan, kekentalan, dan identifikasi gugus fungsi menggunakan spektrofotometer FTIR. Bahan-bahan yang digunakan monomer stirena, inisiator amonium persulfat, surfaktan sodium lauril sulfat, dan air demineral. Lima variasi formulasi yang berbeda yaitu polimerisasi stirena tanpa surfaktan, penambahan surfaktan, dan dengan penambahan asam akrilat pada rasio yang berbeda yaitu stiren dengan asam akrilat (20%) dengan komposisi 9:1, 8:2, 7:3. Diperoleh nilai transisi temperatur gelas kopolimer St/AA menurun pada komposisi kopolimer Jika dilakukan penambahan asam akrilat pada rasio tersebut. Nilai temperatur transisi gelas pada komposisi kopolimer St/AA 9:1, 8:2, dan 7:2 secara berturut-turut adalah 64,24 °C, 50,97 °C, dan 37,28°C. Studi ini berguna untuk pemahaman lebih baik terkait kontrol polimerisasi dan karakteristik produk akhir dalam sintesis lateks terstruktur.

.....This study details a semi-continuous polymerization process approach employed in copolymerization reaction of styrene/acrylic acid (St/AA) copolymers through the emulsion polymerization technique. The method encompasses several stages: preparing the initiator solution and monomer pre-emulsion, then subjecting them to a 5-hour process of heating and initiator solution and pre-emulsion addition within the temperature range of 70-80°C, with continue stirring of reaction maintained at 300 rpm. Polymerization characterization entails assessing glass transition temperature, solids content, viscosity, and finger print identification by FTIR spectrophotometer. Key components include styrene monomer, ammonium persulphate as the initiator, sodium lauryl sulfate as the surfactant, and demineralized water. There are five of distinct formulations were explored, spanning styrene without surfactant, with surfactant, and incorporating varying ratios of acrylic acid, specifically styrene with acrylic acid (20%) in compositions of 9:1, 8:2, and 7:3. Results indicate a reduction in the glass transition temperature value of the St/AA copolymer with the inclusion of acrylic acid at these ratios. Specifically, the glass transition temperature values for the St/AA copolymer compositions of 9:1, 8:2, and 7:2 stand at 64.24°C, 50.97°C, and 37.28°C, respectively. This study provides valuable insights into polymerization control and resultant product characteristics in latex synthesis.