Sintesis dan karakterisasi homopolimer polistirena dengan metode atom transfer radical polymerization (ATRP) = Synthesis and characterization of homopolymer polystyrene by atom transfer radical polymerization (ATRP)

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Abstrak

Pada penelitian ini telah dilakukan sintesis polistirena melalui polimerisasi radikal terkontrol menggunakan metode Atom Transfer Radical Polymerization (ATRP) serta mempelajari pengaruh variasi waktu reaksi, variasi konsentrasi ligan, katalis, dan inisiator terhadap persen konversi, distribusi berat molekul, dan indeks polidispersitas. Variasi kondisi reaksi dilakukan untuk mendapatkan komposisi optimum sintesis polistirena dengan persen konversi tinggi, distribusi berat molekul sempit, dan indeks polidispersitas kecil (1). Polistirena telah berhasil disintesis dengan metode ATRP menggunakan ligan PMDETA, katalis CuBr, inisiator EBiB, dan pelarut sikloheksanon. Parameter keberhasilan dilihat dari persen konversi dan berbagai hasil karakterisasi seperti FTIR, GPC, dan DSC. Komposisi optimum sintesis polistirena yaitu pada konsentrasi ligan 4%, katalis 2%, dan inisiator 4% terhadap 100% mol stirena. Persen konversi polistirena pada komposisi optimum mencapai 91,4% dan diperoleh nilai indeks polidispersitas sebesar 1,17, rata-rata berat molekul 3.526 g/mol, dan suhu transisi gelas 72,42°C.

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This research has been conducted synthesis of polystyrene through controlled radical polymerization by using Atom Transfer Radical Polymerization (ATRP) method and also studied about the influence of variation of time reactions, variation of ligand, catalyst, and initiator concentrations toward conversion percentage, molecular weight distribution, and polydispersity index. The condition of variation reactions has been done to obtain the optimum composition of reaction thus it got polystyrene with higher conversion percentage, a narrow range of molecular weight distribution, and small index of polydispersity (1). Polystyrene has been successfully synthesized by ATRP method using PMDETA as ligand, CuBr as catalyst, EBiB as initiator, and cyclohexanone as solvent. The parameter of successful can be seen from the percentage of conversion and various results of characterization such as FTIR, GPC, and DSC. The optimum composition to synthesis of polystyrene where the concentration of ligand is 4%, catalyst is 2%, and initiator is 4% against 100% mol of styrene. The conversion percentage of polystyrene at the optimum composition reached 91.4% and obtained the result of polydispersity index by 1.17, the average molecular weight is 3.526 g/mol, and the glass transition temperature is 72.42°C.