Sintesis polimer konduktif berbasiskan polipirol (ppy) melalui proses polimerisasi emulsi = Synthesis of polymer conductive polypyrrole (ppy) throught emulsion polymerization processes

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Abstrak

Telah dilakukan sintesis dan karakterisasi polimerisasi oksidasi kimia dari monomer pirol menggunakan oksidan amonium persulfat (APS) dalam media pelarut air, melalui teknik polimerisasi emulsi metode batch selama 4 jam dengan kecepatan agitasi 900 rpm dalam temperatur ruang. Surfaktan yang digunakan diantaranya, surfaktan anionik: Sodium dedocyl sulfate (SDS) dan surfaktan nonionik: Nonylphenol Ethoxylate (NP.EO) dengan 10 mol EO. Senyawa PPy dalam penelitian ini berbentuk padatan (serbuk) berwarna hitam. Terbentuknya PPy dapat diindentifikasi berdasarkan hasil spektra FTIR terlihat munculnya serapan puncak polimer konduktif PPy dengan intensitas yang kuat pada bilangan gelombang 3001 cm-1, 1503 cm-1, 1428 cm-1, 1175 cm-1 dan 1087 cm-1.
Berdasarkan profil perubahan temperatur dan perubahan warna selama proses polimerisasi terlihat polimerisasi emulsi relatif lebih lama kecepatan reaksinya dibandingkan dengan polimerisasi sedimentasi. Nilai pH sistem reaksi polimerisasi dengan surfaktan lebih tinggi (penambahan larutan SDS pH sistem 3.3) dibandingkan polimerisasi tanpa surfakan (1.8). Nilai konduktifitas () PPy dengan surfaktan lebih tinggi (mencapai 186 kali) dibandingkan tanpa surfaktan. Polimerisasi emulsi menggunakan surfaktan anionik, SDS sangat efektif meningkatkan nilai konduktivitas PPy.
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A conductive Polypyrrole (PPy) has been successfully synthesized and characterized. The PPy was prepared through oxidative chemical polymerization using ammonium persulfate (APS) as an oxidizing agent in aqueous media. Anionic and non-ionic emulsifiers, sodium dodecyl sulfate (SDS), nonylphenol (NP) ethoxylate (EO) with 10 mole EO were respectively used during polymerization to increase the electrical conductivity. In this research is produced PPy which is formed as black powder. The FTIR spectrum of PPy indicates a change in the absorbance peaks of pyrrole monomer, emergence of strong absorbtion peaks specially at 3001 cm-1, 1503 cm-1, 1428 cm-1, 1175 cm-1 and 1087 cm-1 which is indicating the conductive polymer polypyrrole is formed.
Based on color changing and temperature changing during the polimerization process, the reaction rate of emulsion polymerization is shown relatively slower than sedimentation polymerization. The pH value of SDS added solution was 3.3 higher than that of SDS free solution (1.8). The final characteristic of PPy was carry out by measuring the electrical conductivity () value. It is concluded that the presence of surfactant in a polymerization reaction increased the electrical conductivity of PPy (reached 186 times higher) compared with that obtained of emulsifier free solution. Anionic surfactant, SDS is more effective to enhance the electrical conductivity value of PPy.