

Pengaruh variasi temperatur polimerisasi terhadap sifat konduktivitas polianilin yang didoping dengan asam klorida dan asam perklorat = Effect of temperature variation in polymerization reaction to the electrical conductivity of polyaniline doped with hydrochloric acid and perchloric acid

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Abstrak

Polianilin PANi adalah salah satu polimer konduktif yang paling banyak dipelajari. Pada penelitian ini, PANi telah berhasil disintesis melalui reaksi polimerisasi oksidatif kimia yang dilangsungkan pada 3 temperatur larutan berbeda yaitu masing-masing pada 17 0C, 27 0C dan 57 0C. Selama proses polimerisasi anilin berjalan terlihat adanya peningkatan temperatur larutan meskipun tidak signifikan sehingga selama durasi 500 menit reaksi berjalan, temperatur larutan relatif sama. Hasil dari reaksi polimerisasi oksidatif adalah berupa emeraldine base polyaniline atau PANi-EB. Struktur PANi dikonfirmasi dengan FTIR ditandai dengan adanya vibrasi stretching C-N bilangan gelombang 1144 cm⁻¹ dan vibrasi stretching C=C dari benzenoid pada bilangan gelombang 1493 cm⁻¹. Sifat konduktif PANi diperoleh melalui pemberian protonasi menggunakan asam kuat masing-masing HCl dan HClO₄. Diperoleh hasil, nilai konduktivitas PANi-EB sebesar 0,92-4,67 x 10⁻⁶ S/cm. Nilai konduktivitas ini mengalami peningkatan 102 kali pasca doping menggunakan HCl dan 106 kali pasca doping HClO₄. Nilai konduktivitas listrik tertinggi adalah sebesar 4,678 S/cm. Semua PANi hasil sintesis memiliki kemampuan penyerapan gelombang elektromagnetik pada rentang frekuensi 10 GHz-15 GHz. Nilai RL tertinggi sekitar -11 dB pada frekuensi 10,5 GHz dan 12,5 GHz diperoleh dari PANi-EB hasil polimerasi pasca deprotonasi.

.....Polyaniline PANi is one of the most studied conductive polymers. In this study, PANi has been successfully synthesized through chemical oxidative polymerization reactions that were carried out at 3 different solution temperatures, respectively at 17 0C, 27 0C and 57 0C. During the aniline polymerization reaction, there was an increase in the temperature of the solution, although not significant, hence, during a duration of 500 minutes reaction time, the solution temperature was relatively un changed. Polymerization reaction has resulted PANi in the form of emeraldine base polyaniline or PANi EB. The formation of PANi was confirmed by FTIR, which characterized by vibration stretching C N at wave number 1144 cm⁻¹ and vibration stretching C C of benzenoid at wave number 1493 cm⁻¹. The conductive property of PANi was obtained through doping by a protonation using strong acids HCl and HClO₄. It was found that conductivity value PANi EB was 0.92 4.67 x 10⁻⁶ S cm. This conductivity value increased 102 times after doped with HCl and 106 times after doped with HClO₄. The highest electrical conductivity value was 4.678 S cm. All synthesized PANi has the ability to absorb electromagnetic waves in the frequency range 10 GHz 15 GHz. The highest RL values of about 11 dB at frequencies 10.5 GHz and 12.5 GHz were obtained from PANi EB.