Sintesis dan karakterisasi material hasil polimerisasi kationik minyak kelapa sawit berbantuan gelombang mikro = Synthesis and characterization of micro waves assisted cationic polymerization of palm oil product material

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Abstrak

Riset polimerisasi kationik minyak sawit berbantuan gelombang mikro belum pernah dilakukan. Dalam penelitian ini, minyak sawit dan hasil olahannya dipolimerisasi kationik dengan katalis borontriflorida eteral berbantuan gelombang mikro menggunakan oven gelombang mikro komersial. Komposisi bahan baku prekursor dianalisis menggunakan kromatografi gas. Bilangan iodin, gugus fungsi, serapan ultraviolet prekursor dan produk polimerisasinya dianalisis masing-masing dengan titrimetri, dan spektrofotometri inframerah Transformasi Fourier dan spektrofotometri ultraviolet. Pemindaian kalorimetrik diferensial (DSC) digunakan untuk mengamati ciri termal polimer yang terbentuk. Proses inklusi urea terhadap minyak sawit meningkatkan komponen asam lemak tak jenuh seperti yang ditunjukkan oleh peningkatan fraksi asam lemak tidak jenuh, bilangan iod, intensitas penyerapan pita alkena dalam spektrum inframerah, dan absorbansi spektrum ultraviolet. Polimerisasi kationik minyak sawit terkatalisis borontrifluorida eteral menghasilkan padatan. Pembentukan polimer mengubah gugus C=C menjadi C-C, hal ini ditunjukkan dengan menurunnya bilangan iodin dari produk polimer yang dihasilkan dan menurunnya intensitas pita alkena pada bilangan gelombang 3025 cm-1 (regang =C-Hcis, 1654 cm-1 dan 1648 cm-1 (regang C=C), dan 723 cm-1 (tekuk -HC=CH-) pada spektrum inframerah. Disamping itu terjadi reaksi isomerisasi cis-trans yang ditunjukkan munculnya serapan pada bilangan gelombang 968 cm-1 (regang C=C trans). Kurva termogram DSC membuktikan bahwa produk polimerisasi adalah polimer termoplastik dan memerlukan perlakuan curing. Perlakuan panas dapat menyebabkan deformasi polimer yang terbentuk, yang ditunjukkan oleh penurunan bilangan iod, penurunan serapan ultraviolet dan perubahan serapan inframerah serta kurva termogram DSC. Kopolimerisasinya bersama divinyil benzena menghasilkan polimer termoset.
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Microwave assisted cationic polymerization of palm oil study has never been done yet. In this study, palm oil, and processed products have been cationic polymerized with borontrifluoride-etheral catalyst under microwave irradiation using commercial microwave ovens. The composition of the feedstock was analyzed with gas chromatography. Iodine number, functional groups, ultraviolet absorption of precursor and the polymerization products were analyzed respectively by titrimetry, and Fourier transform infrared spectrophotometry and ultraviolet spectrophotometry. Differential Scaning Calorimetric (DSC) is used to observe the thermal characteristics of polymers. The process of inclusion of Urea to palm oil increases the component of unsaturated fatty acids as indicated by the increase in the fraction of unsaturated fatty acids, iodine numbers, the intensity of alkene band absorption in the infrared spectrum, and the absorbance of the ultraviolet spectrum. The cationic polymerization of oil palm catalyzed by borontrifluoride etheral produces solids. The formation of the polymer converts the C=C group to C-C, this is indicated by the decrease of the iodine number of the resulting polymer product and the decrease of the intensity of the alkene band at wave number 3025 cm-1 (streching =C-Hcis), 1654 cm-1 and 1648 cm (streching C=C), and 723 cm-1 (bending -

HC=CH-) in the infrared spectrum. The other process was cis-trans isomerization reaction showed absorption band at wave number 968 cm-1 (streching C=Ctrans. The DSC thermogram curve proves that polymerization products are thermoplastic polymers and require curing treatment. The heat treatment can cause the deformation of the formed polymer shown by changes in iodine number, infrared absorption spectrum, ultra-violet absorption spectrum and DSC thermogram curve. Copolymerization with divinyl benzene produces thermoset polymers.