Sintesis dan uji dekomposisi nanokomposit selulosa asetat-organoclay bentonit tapanuli terinterkalasi heksadesiltrimetil amonium bromida (HDTMA-Br) sebagai nanofiller = Synthesis and decomposition test of nanocomposite cellulose acetate organoclay bentonit tapanuli intercalated hexadecyltrimethyl ammonium bromide (HDTMA-Br) as nanofiller

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Abstrak

Meningkatnya limbah plastik di Indonesia menjadi salah satu masalah di Indonesia. Tujuan dari penelitian ini adalah membuat membran plastik nanokomposit yang memiliki kemampuan terdekomposisi di alam. Sintesis selulosa asetat murni dan nanokomposit SA/OCT-C16 dengan variasi komposisi organoclay 1 wt%, 3 wt%, 5 wt%, dan 7 wt% telah berhasil dibuat dengan metode solvent casting. Struktur bentonit tetap sama meskipun telah mengalami reaksi pertukaran kation hingga menjadi organoclay.
Hal tersebut dapat dilihat dengan adanya pita serapan khas bentonit berupa deformasi SI-O-Si pada bilangan gelombang 500-400 cm-1 dan adanya pita serapan khas dari karbon CH2 yang berasal dari surfaktan heksadesiltrimetil amonium bromida (HDTMA-Br) pada bilangan gelombang 2930 cm-1 dan 2842 cm-1. Difraktogram organoclay menunjukkan peningkatan nilai basal spacing dari 15,19 Å menjadi 20,14 Å. Hasil uji tarik menunjukkan bahwa nanokomposit dengan komposisi organoclay 1 wt% memiliki kuat tarik tertinggi yaitu 44,56 MPa dengan kenaikan sebesar 16% dibandingkan dengan selulosa asetat murni. Hasil uji dekomposisi menunjukkan bahwa selulosa asetat mempunyai kemampuan terdekomposisi paling tinggi, yaitu sebanyak 37% sedangkan nanokomposit dengan 1 wt% organoclay terdekomposisi sebanyak 25% selama 60 hari penguburan. Secara umum massa terdekomposisi nanokomposit lebih tinggi daripada massa terdekomposisi plastik komersial.
<hr><i>This research is based on the increasing problem of plastic waste in Indonesia. The focus of this research is to produce a nanocomposite plastic membranes that have the ability to decompose in nature better than commercial plastic. Synthesis of cellulose acetate and nanocomposite SA/OCT-C16 with variation in composition of 1 wt%, 3 wt%, 5 wt%, and 7 wt% of organoclay has been successfully created with a solvent casting method. Bentonite structure remain visible although it has undergone a cation exchange reaction to be an organoclay.
It can be seen with their typical absorption bands of bentonite on the form of the deformation of the Si-O-Si at wave number 500-400 cm-1 and the typical absorption band of carbon CH2 derived surfactant hexadecyltrimethylammonium bromide (HDTMA-Br) at wave number 2930 cm-1 and 2842 cm-1. Difractogram on organoclay show the increase of the value of basal spacing of organoclay from 15,19 Å up to 20,14 Å.
The tensile strength test shows that nanocomposite with 1 wt% composition of organoclay has the graetest tensile strength that is equal 44.56 MPa with an increase of 16% compared to pure cellulose acetate. The result of decomposition test shows that pure cellulose acetate has the ability to decompose the highest, which is about 37% whereas nanocomposite with 1 wt% of organoclay only able to decompose as much as 25% during 60 days of burial. In general, the mass of decomposed nanocomposite is higher than the mass of

commercial plastic decomposes.</i>