Mechanical and thermal properties of polypropylene reinforced by calcined and uncalcined zeolite = Sifat mekanik dan termal dari polipropilena diperkuat dengan zeolit tanpa kalsinasi dan zeolit kalsinasi

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Abstrak

Penelitian ini bertujuan untuk membandingkan zeolite tanpa kalsinasi dan yang dikalsinasi sebagai penguat polipropilena (PP). Sampel PP diperkuat dengan zeolite dengan jumlah yang berbeda, yakni 2, 4, dan 6% berat. Sifat mekanik yang diamati adalah kekuatan tarik, perpanjangan putus dan modulus Young. Sifat termal dianalisis dengan
menggunakan DSC dan DTA/TGA. Dari hasil penelitian ini diperoleh kekuatan tarik dan modulus Young zeolit kalsinasi meningkat. Perpanjangan putus pada penambahan zeolit sampai 4% mengalami peningkatan namun terjadi penurunan pada penambahan 6%. Zeolit tanpa kalsinasi menunjukan perpanjangan putus lebih rendah dari zeolit kalsinasi. Analisis termal dengan DT A/TGA pada zeolit kalsinasi memiliki daya tahan termal lebih tinggi dibandingkan dengan zeolit tanpa kalsinasi, yang ditandai dengan peningkatan temperatur dekomposisi zeolit kalsinasi. Dari analisis DSC didapatkan bahwa tidak ada perbedaan yang sigifikan antara titik lebur sampel, namun sampel yang diberi zeolite kalsinasi memiliki entalpi yang relatif lebih rendah.
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Abstract
This study was carried out to compare mechanical and thermal properties of polypropylene (PP) reinforced with uncalcined and calcined zeolites. The PP samples were reinforced with zeolites at various quantities of 2, 4, and 6 (wt%). The comparison of the two types of zeolite was based on mechanical properties, including tensile strength, elongation at break, and Young?s modulus, and thermal characteristics analyzed using DSC, and DTA/TGA technique. The results obtained clearly revealed that both zeolites were able to significantly increase tensile strength and Young?s modulus of the samples, with calcined zeolite was found to work better. Addition
of calcined zeolite was found to result in increased fracture elongation of the samples reinforced with up to 4 wt% zeolite but decreased sharply for the sample reinforced with 6 wt% zeolite, while for the samples reinforced with uncalcined zeolite, no consistent trend was observed. Thermal analyses demonstrated that the samples reinforced with calcined zeolite are more resistant to thermal treatment than those reinforced with uncalcined zeolite, as
indicated by their higher decomposition temperature. DSC
analysis revealed that there was no significant difference
of the melting points of the samples was observed, but the effect of the quantity of zeolite on enthalphy was quite evident, in which the enthalpies of the samples reinforced with calcined zeolites were relatively lower than those of the samples reinforced with uncalcined zeolites.