

## ABSTRAK

**Claudia Feberiana Br Tarigan, NIM 4191240004 (2019). Pengaruh Komposisi Nanopartikel Abu Boiler Kelapa Sawit (ABKS) Hasil Sintesis Dengan PEG-6000 Pada Termoplastik HDPE Terhadap Sifat Mekanik**

Abu Boiler Kelapa Sawit (ABKS) merupakan limbah padat dari kelapa sawit yang penanganannya terbatas. ABKS memiliki kandungan silika ( $\text{SiO}_2$ ) yang dapat dimanfaatkan sebagai *filler* pada termoplastik *High Density Polyethylene* (HDPE). Tujuan penelitian ini menganalisis ukuran partikel ABKS (XRD) dan gugus fungsi ABKS (FTIR) serta menganalisis sifat mekanis nanokomposit termoplastik HDPE dengan campuran ABKS (UTM). Pembuatan nanokomposit yakni HDPE dengan ABKS dicampurkan menggunakan rheomixer pada kecepatan 60 rpm dan suhu  $150^\circ\text{C}$  selama 10 menit, dengan variasi komposisi *filler* ABKS (2, 4, 6, 8, 10) %wt. Hasil dari internal mixer di *injection molding* untuk membuat sampel uji tarik dengan ASTM 638 *type V*. Hasil analisa XRD menghasilkan ukuran partikel nanopartikel ABKS sebesar 8,51 nm dan nanokomposit HDPE dan ABKS 8% sebesar 6,97 nm. Hasil analisa FTIR nanopartikel ABKS menghasilkan gugus fungsi CH, CO, C=C, dan OH, dan gugus fungsi nanokomposit HDPE dengan ABKS berupa CH, CO, C=O dan OH. Hasil pengujian sifat mekanik terhadap termoplastik HDPE dengan *filler* ABKS masing-masing kekuatan tarik sebesar 101,2 MPa, perpanjangan putus sebesar 40,07% dan modulus elastisitas 898,4 MPa. Dimana hasil pengujian mekanik nanokomposit HDPE dan ABKS mengalami peningkatan pada *filler* 8%.

**Kata kunci :** Abu Boiler Kelapa Sawit, Termoplastik HDPE, PEG 6000, Uji Sifat Mekanik

## ABSTRACT

**Claudia Feberiana Br Tarigan, NIM 4191240004 (2019). Effect of Composition of Palm Oil Boiler Ash Nanoparticles Synthesized with PEG-6000 on HDPE Thermoplastic on Mechanical Properties**

Palm Oil Boiler Ash (POBA) is a solid waste from oil palm which has limited handling. ABKS contains silica (SiO<sub>2</sub>) which can be used as a filler for High Density Polyethylene (HDPE) thermoplastics. The purpose of this study was to analyze the particle size of ABKS (XRD) and ABKS functional groups (FTIR) and to analyze the mechanical properties of HDPE thermoplastic nanocomposites with ABKS mixture (UTM). The preparation of nanocomposite, namely HDPE and ABKS, was mixed using a rheomixer at a speed of 60 rpm and a temperature of 150°C for 10 minutes, with a variation of the ABKS filler composition (2, 4, 6, 8, 10) %wt. The results of the internal mixer were in injection molding to make tensile test samples with ASTM 638 type V. The results of the XRD analysis produced a particle size of 8,51 nm for ABKS nanoparticles and 6,97 nm for HDPE and ABKS nanocomposites. The results of FTIR analysis of ABKS nanoparticles yielded the functional groups CH, CO, C=C, and OH, and the functional groups of HDPE nanocomposites with ABKS were CH, CO, C=O and OH. The results of testing the mechanical properties of HDPE thermoplastic with ABKS filler each had a tensile strength of 101.2 MPa, elongation at break of 40.07% and modulus of elasticity of 898.4 MPa. Where the results of the mechanical testing of HDPE and ABKS nanocomposites experienced an increase in 8% filler.

**Keyword :** Palm Oil Boiler Ash, HDPE Thermoplastic, PEG 6000, Mechanical Properties Test