PREPARATION AND CHARACTERIZATION OF (Al/POTASSIUM – PROTEIN – PHOSPHATE) COMPOSITE FROM ALUMINIUM OXIDE (Al_2O_3) / CHICKEN FEATHER HYDROLYSATE BY CV. HUMUS

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ABSTRACT

Characterization study of aluminium oxide (Al_2O_3) composite/potassium – protein – phosphate from chicken feather waste hydrolysate has been carried out. This research aimed to characterized the Al/Potassium – Protein – Phosphate composite using FT-IR , XRD , metal contents analysis by AAS , and the swelling ability of the composite in various pH.

This research was started with preparing the hydrolysate obtained from CV. Humus. The hydrolysate was produced from hydrothermal carbonization around 190 °C and under 10 atm in 3 hours. Then, the process was continued to phosphorylation with phospic acid until it reached hydrolysate pH around 7. The as-product of hydrolysate was reacted with aluminium oxide (Al_2O_3) and adjusted at pH level at 5,6,7,8, and 9. The composites were dried in 2 hours. The dried product was characterized using *Fourier-Transform Infrared* (FT-IR) for determining the functional groups, crystallinity test using X-Ray Diffraction (XRD), the determination of its metal contents using AAS, and its swelling ability using weighing samples in tea-bag method.

The chemical reaction of hydrolysate and aluminium oxide produced composites with functional groups of $–CH_2$, -OH, -NH, and C=O and Al-O functional groups. Diffractogram of sample showed the amorphous structure. Meanwhile, the analysis of AAS in various pH level showed the presence of metals (Ca, K, and Fe) in both liquid and dry samples. The liquid samples showed higher value than the dry ones. The analysis of swelling test showed a higher value in samples containing a liquid hydrogel (hydrolysate) rather than distillate water. The highest result of swelling test occurred at pH 6.

Keywords : Aluminium oxide, humic substances, hydrolysate

PREPARASI DAN KARATERISASI KOMPOSIT (Al/KALIUM - PROTEIN - FOSFAT) DARI ALUMINIUM OKSIDA (Al_2O_3)/HIDROLISAT BULU AYAM CV. HUMUS

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INTISARI

Studi karakterisasi komposit aluminium oksida (Al_2O_3) / kalium – protein - fosfat dari hidrolisat limbah bulu ayam telah dilakukan. Penelitian ini bertujuan untuk mengkarakterisasi komposit Al/Kalium – Protein – Fosfat dengan FT-IR , XRD , analisis kandungan metal dengan AAS, serta kemampuan swelling dari komposit dalam berbagai pH.

Penelitian ini dimulai dengan menyiapkan sample hidrogel cair yang didapatkan dari CV. Humus yang diproduksi melalui karbonisasi hidrotermal (HTC) pada suhu 190 °C dan tekanan 10 atm dalam waktu 3 jam. Proses selanjutnya phosporilasi dengan asam fosfat hingga mencapai pH hidrolisat sebesar 7. Hidrolisat direaksikan dengan aluminium oksida (Al_2O_3) dan diatur level pH pada 5, 6, 7, 8 dan 9. Komposit Al/ kalium – protein - fosfat dikeringkan selama 2 jam. Karaketrisasi komposit dilakukan melalui *Fourier-Transform Infrared* (FT-IR) untuk melihat gugus fungsi, uji kristalinitas melalui *X-Ray Diffraction (XRD)*, penentuan kandungan kandungan logam melalui uji AAS dan uji kemampun *swelling* melalui penimbangan sampel dengan metode kantung teh.

Reaksi kimia antara hidrolisat dan aluminium oksida menghasilakn komposit dengan gugus $–CH_2$, -OH, -NH, and C=O dan Al-O. Difraktogram menunjukkan komposit memiliki struktur amorf. Sedangkan, uji AAS dalam berbagai pH membuktikan adanya kandungan logam (Ca, K, dan Fe) dalam sampel fasa padat dan cair dengan konsentrasi logam pada fasa cair lebih tinggi daripada fasa padat. Uji *swelling* menunjukkan hasil dimana sampel yang mengandung hidrolisat memiliki nilai yang yang lebih tinggi daripada sampel yang mengandung akuades. Uji swelling tertinggi terjadi ketika pH larutan 6.

Kata kunci : Aluminium oksida, hidrolisat, senyawa humat