KARAKTERISASI GAMBUT ASAL KALIMANTAN YANG DIMODIFIKASI MENGGUNAKAN NATRIUM HIDROKSIDA SEBAGAI KANDIDAT ADSORBEN

SKRIPSI

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ABSTRAK

Gambut merupakan material karbon berpori yang berpotensi sebagai material adsorben karena mengandung berbagai jenis gugus fungsi polar yang dapat ditingkatkan ketersediaannya melalui metode pretreatment kimia berbiaya rendah. Oleh sebab itu, tujuan dari penelitian ini adalah untuk meningkatkan ketersediaan gugus fungsi pada permukaan gambut alam melalui metode modifikasi menggunakan Natrium Hidroksida (NaOH). Metode modifikasi dilakukan dengan penambahan NaOH 0,1 M dengan perbandingan impregnasi (gambut : NaOH) 1:10 (wt%). Hasil analisis XRF menunjukan unsur yang paling mendominasi material gambut alam berturut-turut adalah sebagai berikut: Si (13,5%) > Al (4,60%) > P (1,03%). Analisis FTIR menunjukan adanya perubahan penting terutama pada wilayah spektra gugus hidroksil (3449,04 menjadi 3444,22 cm^{-1}) dan gugus karbonil (1626,09 menjadi 1629,22 cm^{-1}) setelah gambut dimodifikasi. Analisis BET menunjukan luas permukaan gambut termodifikasi mengalami penurunan dari 10,036 menjadi 2,768 m^2/g. Hasil analisis SEM menunjukan adanya perubahan morfologi gambut termodifikasi berupa terbentuknya agregat garam natrium. Hal ini dikonfirmasi melalui hasil analisis EDS yang menunjukan kemunculan unsur natrium pada permukaan gambut termodifikasi sebesar 0,35% dan kenaikan persen massa oksigen dari 39,27 menjadi 40,27%. Dengan demikian, modifikasi gambut menggunakan NaOH menghasilkan material gambut yang permukaanya termodifikasi, namun dengan luas permukaan yang lebih kecil. Meskipun terdapat penurunan luas permukaan, adanya peningkatan ketersediaan gugus aktif seperti gugus karboksilat pada permukaan gambut, mengindikasikan potensinya sebagai kandidat adsorben dalam proses adsorpsi secara kimia, misalnya melalui mekanisme pertukaran ion.

Kata kunci | Karakterisasi, Gambut, Modifikasi, Adsorben

ABSTRACT

Peat is a porous carbon material that has potentially useful as an adsorbent material because it naturally contains a wide variety of polar functional groups whose availability can be increased using low-cost chemical pretreatment methods. This study aims to increase the availability of the functional groups with modifications using sodium hydroxide (NaOH) without significantly altering the natural peat conformation. The method was carried out by adding 0.1 M NaOH with an impregnation ratio of (peat: NaOH) 1:10 (wt%). The results of XRF analysis showed that the most dominant element in natural peat was Si (13.5%) > Al (4.60%) > P (1.03%). The FTIR analysis showed that the most important changes were observed in the spectral region, especially the bands of hydroxyl groups (3449.04-3444.22 cm^{-1}) and carbonyl groups (1626.09-1629.22 cm^{-1}) after peat was modified. BET analysis shows that the surface area of modified peat has decreased from 10,036 to 2,768 m^2/g. SEM photos confirmed the formation of sodium salt aggregates on the peat surface morphology after modification. This is in line with EDS analysis which shows the presence of sodium element by 0.35% on the modified peat surface and the oxygen content increase from an initial value of 39.27 to 40.27%. Thus, peat modification using NaOH resulting a modified surface morphology and increased functional groups, but with a smaller surface area. Although a decrease in surface area is not advantageous, an increase in the availability of active groups such as carboxylate on the surface indicates the possibility of modified peat to facilitate adsorption in chemical adsorption mechanism, for example via an ion-exchange mechanism.

Keywords | *Characterization, Peat, Modification, Adsorbent*

DAFTAR ISI

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