

SELULOSA PADA KLOBOT JAGUNG TERMODIFIKASI ASAM MALEAT SEBAGAI ADSORBEN ZAT WARNA BIRU METILENA

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INTISARI

Telah dilakukan penelitian tentang selulosa pada klobot jagung termodifikasi asam maleat sebagai adsorben zat warna biru metilena. Modifikasi klobot jagung diawali dengan proses preparasi dan aktivasi klobot jagung dengan menggunakan NaOH yang kemudian diaduk selama 1 jam. Setelah diaduk kemudian larutan campuran disaring dan dicuci dengan menggunakan akuades. Padatan adsorben yang telah diperoleh selanjutnya dilakukan proses modifikasi dengan menggunakan anhidrida maleat sebagai *coupling agent*, dan dicampurkan piridin sebagai katalis. Larutan campuran diaduk selama 3 jam dan disaring, kemudian padatan yang diperoleh dicuci dengan menggunakan aseton hingga pH netral (pH=7) dan dikeringkan. Padatan yang diperoleh dikarakterisasi dengan menggunakan FTIR, XRD dan SEM. Uji kemampuan adsorpsi dilakukan pada berbagai variasi keadaan seperti variasi pH larutan, variasi dosis adsorben, variasi waktu kontak dan variasi konsentrasi larutan zat warna serta dilakukan kajian terhadap kinetika dan isotherm adsorpsi dan kajian desorpsi.

Hasil karakterisasi FTIR yang diperoleh menunjukkan terjadinya proses pencangkakan asam maleat ke dalam adsorben selulosa, tingkat kristalinitas adsorben menurun setelah terjadinya penyerapan biru metilena oleh selulosa termodifikasi. Pada proses adsorpsi keadaan optimum terjadi pada pH 6, dosis adsorben 100 mg dengan waktu kontak 60 menit dan konsentrasi zat warna optimum pada 300 ppm. Proses adsorpsi berlangsung mengikuti orde reaksi pseudo orde 2 dan sesuai dengan isotherm Langmuir dengan kapasitas adsorpsi maksimum 11.610,55 L mol⁻¹. Desorpsi biru metilena mencapai kondisi optimum jika digunakan pelarut NaCl 1,0 M. Interaksi antara MB dan selulosa didominasi oleh interaksi elektrostatik, dan ikatan hidrogen.

Kata kunci: Adsorpsi, asam maleat, biru metilena, desorpsi, klobot jagung.

MALEIC ACID-MODIFIED CORN HUSK CELLULOSE AS ADSORBENT FOR METHYLENE BLUE

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ABSTRACT

A study on corn husk cellulose modified with maleic acid anhydride as an adsorbent of methylene blue dye had been conducted. The modification of the corn husk was initiated with the preparation and the activation of the corn husk using NaOH and mixed them in one hour. After mixing, the solution is then filtered and washed with distilled water. The obtained adsorbent material was then modified with coupling agent of maleic acid substance using pyridine as a catalyst. The mixture solution was stirred for three hours and filtered. The solid adsorbent obtained from modification was washed with acetone until the pH level is neutral (pH = 7) and then dried. The obtained solids were characterized by using FTIR, XRD, and SEM. The adsorption ability of the adsorbent was tested at different conditions, including variations of the pH solution, adsorbent doses, contact times, and initial concentrations of the dye. A study of the kinetics and isotherm of adsorption as well as desorption was also conducted.

The FTIR characterization result shows that the grafting process of maleic acid anhydrous on the cellulose adsorbent has been successfully accomplished. Crystallinity levels of the adsorbent decreases after the adsorption of methylene blue dye on the modified cellulose. In the adsorption process, optimum conditions are achieved at the pH level of 6, with the adsorbent dose of 100 mg, 60 minutes of contact time and initial concentration of dye at 300 ppm. The adsorption process follows the pseudo 2nd order reactions and best described by the Langmuir isotherm model with a maximum adsorption capacity of 11,610.55 L mol⁻¹. The desorption of the methylene blue dye from the adsorbent reaches its optimum condition using the NaCl 1.0 M. The interaction between MB and cellulose is dominated by electrostatic interaction, and hydrogen bonds.

Keywords: Adsorption, blue methylene dye, corn husk, desorption, maleic acid