

SINTESIS MANIK ASAM HUMAT/ALGINAT/KARBON AKTIF DAN APLIKASINYA SEBAGAI ADSORBEN METILEN BIRU

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INTISARI

Sintesis manik asam humat/alginate/karbon aktif dan aplikasinya sebagai adsorben metilen biru telah dilakukan. Isolasi tanah gambut dilakukan dengan metode ekstraksi alkali menggunakan NaOH dan pengasaman dengan HCl. Pemurnian dengan HCl dan HF dilakukan untuk mendapatkan asam humat murni. Asam humat hasil isolasi kemudian dikompositkan dengan alginate dan karbon aktif menggunakan teknik ekstruksi jarum suntik dengan larutan CaCl₂ sebagai agen *crosslink* sehingga komposit yang disintesis berbentuk manik. Manik yang berhasil disintesis kemudian dikarakterisasi gugus fungsinya menggunakan Spektrofotometer FTIR, luas permukaan porinya menggunakan *Surface Area Analyzer* (SAA) dan dilakukan uji kestabilan pada medium asam basa. Uji adsorpsi manik pada metilen biru dilakukan dengan pengkajian komposisi optimum, pH optimum, waktu kontak optimum dan pengaruh konsentrasi awal metilen biru. Pengukuran absorbansi dilakukan menggunakan Spektrofotometer UV-Vis.

Hasil penelitian menunjukkan manik AH/AG/KA memiliki struktur tiga dimensi menyerupai kotak telur dengan gugus -COOH dan -OH pada permukannya yang dapat dimanfaatkan sebagai adsorben. Manik memiliki struktur mesopori dan stabil pada pH 2-12. Uji adsorpsi manik pada metilen biru menunjukkan kapasitas adsorpsi optimum untuk komposisi 1:1:1 (b/b/b), pH 4, waktu kontak 150 menit dengan nilai kapasitas adsorpsi sebesar 2,9137 mg g⁻¹ dan semakin tinggi konsentrasi adsorbat maka semakin tinggi pula nilai kapasitas adsorpsinya. Proses adsorpsi mengikuti kinetika orde kedua semu dan isoterm adsorpsi Freundlich.

Kata kunci: adsorpsi, asam humat, mesopori, metilen biru, tanah gambut.

SYNTHESIS OF HUMIC ACID/ALGINATE/ACTIVATED CARBON BEADS AND ITS APPLICATION AS A METHYLENE BLUE ADSORBENT

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ABSTRACT

Synthesis of humic acid/alginate/activated carbon beads and their application as methylene blue adsorbents have been carried out. Peat soil isolation is carried out using the alkaline extraction method using NaOH and acidification with HCl. Purification with HCl and HF was carried out to obtain pure humic acid. The isolated humic acid was then composited with alginate and activated carbon using a syringe extrusion technique with CaCl₂ solution as a crosslink agent so that the synthesized composite was in the form of beads. The beads that were successfully synthesized were then characterized for their functional groups using an FTIR spectrophotometer, their pore surface area using a Surface Area Analyzer (SAA) and a stability test was carried out in an acid-base medium. The bead adsorption test on methylene blue was carried out by assessing the optimum composition, optimum pH, optimum contact time and the influence of the initial concentration of methylene blue. Absorbance measurements were carried out using a UV-Vis Spectrophotometer.

The research results show that AH/AG/KA beads have a three-dimensional structure resembling an egg box with –COOH and –OH groups on the surface which can be used as an adsorbent. The beads have a mesoporous structure and are stable at pH 2-12. The bead adsorption test on methylene blue showed optimum adsorption capacity for a composition of 1:1:1 (w/w/w), pH 4, contact time of 150 minutes with an adsorption capacity value of 2.9137 mg g⁻¹ and the higher the adsorbate concentration, the higher the adsorption capacity value. The adsorption process follows pseudo second order kinetics and Freundlich adsorption isotherm.

Key words: adsorption, humic acid, mesopores, methylene blue peat soil.