



SINTESIS KOMPOSIT MAGNETIT/KARBON AKTIF/KITOSAN DAN APLIKASINYA SEBAGAI ADSORBEN KADMIUM(II)

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INTISARI

Sintesis komposit magnetit/karbon aktif/kitosan dan aplikasinya sebagai adsorben logam Cd(II) telah dilakukan. Penelitian diawali dengan isolasi kitosan dari cangkang udang serta sintesis karbon aktif dari ampas tebu. Sintesis komposit dilakukan dengan metode kopresipitasi. Material dikarakterisasi dengan *Fourier Transform Infra-Red Spectroscopy* (FTIR) untuk identifikasi gugus fungsional, *X-Ray Diffraction* (XRD) untuk uji kristalinitas, dan *Scanning Electron Microscope-Energy Dispersive X-Ray Spectrometer* (SEM-EDX) untuk analisis morfologi. Kajian adsorpsi logam Cd(II) adalah variasi pH, kinetika adsorpsi, dan isoterm adsorpsi. Kandungan logam Cd(II) pada larutan dianalisis dengan *Atomic Absorption Spectrophotometer* (AAS).

Hasil karakterisasi menunjukkan bahwa sintesis komposit magnetit/karbon aktif/kitosan berhasil disintesis dengan metode kopresipitasi. Kajian adsorpsi logam Cd(II) terhadap komposit terjadi secara optimum pada pH 6. Adsorpsi Cd(II) mengikuti model kinetika orde kedua semu dengan nilai k sebesar 0,0127 g mg⁻¹ menit⁻¹. Isoterm adsorpsi Cd(II) mengikuti isoterm Freundlich dengan nilai K_f 2,83 mg g⁻¹ dan n sebesar 0,93.

Kata Kunci: komposit magnetit/karbon aktif/kitosan, adsorpsi, Cd(II)



SYNTHESIS OF MAGNETITE/ACTIVATED CARBON/CHITOSAN COMPOSITE AS ADSORBENT OF CADMIUM(II)

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ABSTRACT

Synthesis of magnetite/activated carbon/chitosan composite as adsorbent of cadmium(II) has been conducted. Experiment was firstly initiated by isolation of chitosan from shrimp shell and then synthesis of activated carbon from sugarcane bagasse. The composite was synthesized by coprecipitation method. Material characterized by Fourier Transform Infra-Red Spectroscopy to identify the functional groups, X-Ray Diffraction used to analyzed the crystallinity and Scanning Electron Microscope-Energy Dispersive X-Ray Spectrometer used to know the morphology of material. Adsorption study of Cd(II) consist of variations of pH, adsorption kinetic and adsorption isotherm. Amount of Cd(II) in aqueous solution after adsorption was analyzed by Atomic Absorption Spectrophotometer.

The characterization of material showed that the synthesis of magnetite/activated carbon/chitosan composite as adsorbent of cadmium(II) was succesfully carried out through the coprecipitation method. Adsorption of Cd(II) by magnetite/activated carbon/chitosan composite showed optimum condition at pH 6. Adsorption kinetic followed pseudo second order with the value of $k = 0.0127 \text{ g mg}^{-1} \text{ minutes}^{-1}$. Isotherm adsorption followed Freundlich isotherm with $K_f = 2.83 \text{ mg g}^{-1}$ and $n = 0.93$.

Keywords: magnetite/activated carbon/chitosan composite, adsorption, Cd(II)