



ADSORPSI TOLUENA DAN SILENA PADA BAHAN MAGNETIK PASIR BESI TERLAPIS SILIKA-AGEN HIDROFOBİK

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INTISARI

Perilaku adsorpsi toluena dan silena yang mewakili komponen minyak bumi yang terdapat dalam air dengan bahan magnetik pasir besi terlapis silika-agen hidrofobik (BMPB@SiO₂/hf) telah diteliti. Penelitian diawali dengan mensintesis BMPB@SiO₂/hf dengan melapisi BMPB dengan silika termodifikasi agen hidrofobik melalui proses *sol-gel*. BMPB ditambahkan dengan larutan Na₂SiO₃ dan organosilan (agen hidrofobik). Organosilan yang digunakan adalah heksadesiltrimetoksisilan (HDTMS), metiltrietoksisilan (MTES) dan feniltrietoksisilan (PTES); dan efek dari perbandingan mol antara silika dan organosilan dalam karakter produk telah dievaluasi. Adsorben dikarakterisasi dengan *Fourier Transform Infrared Spectrophotometer (FT-IR)*, *X-ray Diffraction (XRD)* dan *Scanning Electron Microscope- Energy Dispersive Spectroscopy (SEM-EDS)*. Adsorben tersebut digunakan untuk menyerap toluena dan silena yang terdapat dalam air dengan sistem *batch* dengan variasi waktu kontak dan konsentrasi. Konsentrasi sebelum dan sesudah adsorpsi larutan toluena dan silena dianalisis dengan spektrofotometer UV-Vis.

Hasil dari karakterisasi menunjukkan bahwa BMPB@SiO₂/hf berhasil disintesis. Adsorpsi toluena dan silena dengan BMPB@SiO₂/hf mengikuti kinetika reaksi orde dua semu dan isotherm adsorpsi Freundlich. Kapasitas adsorpsi dari toluena dengan BMPB@SiO₂/HDTMS, BMPB@SiO₂/PTES dan BMPB@SiO₂/MTES, yaitu 77, 77 dan 79 mg/g; 127, 136 serta 123 mg/g untuk silena. Berdasarkan nilai-nilai tersebut, adsorben mempunyai potensi untuk diaplikasikan dalam menghilangkan pencemaran minyak bumi di perairan.

Kata kunci: adsorpsi, BMPB/SiO₂/hf, silena dan toluena.



ADSORPTION OF TOLUENE AND XYLENE ON IRON SAND MAGNETIC PARTICLES COATED WITH SILICA-HYDROPHOBIC

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ABSTRACT

Adsorption characteristics in water of toluene and xylene as representatives of petroleum oil components on iron sand magnetic particle coated hydrophobic-silica (BMPB@SiO₂/hf) has been investigated. The initial works was synthesis of BMPB@SiO₂/hf by coating BMPBs with hydrophobic groups modified silica through sol-gel process. BMPBs were added with Na₂SiO₃ solution, and hydrophobic organosilane. The organosilanes used were hexadecyltrimethoxysilane (HDTMS), methyltriethoxysilane (MTES) and phenyltriethoxysilane (PTES); the effect of mole ratio of silica to organosilane on the product characters was evaluated. Adsorbent characterized by Fourier Transform Infrared Spectrophotometer (FT-IR), X-ray Diffraction (XRD) and Scanning Electron Microscope-Energy Dispersive Spectroscopy (SEM-EDS). The products were used to adsorb toluene and xylene from aqueous solution in a batch system at various contact time and concentration. The concentration before and after adsorption of toluene and xylene in the solution was analyzed by ultraviolet-visible spectrophotometer.

The result of the characterization showed that BMPB@SiO₂/hf was successfully produced. The adsorption of the toluene and xylene on BMPB@SiO₂/hf followed a kinetics model of pseudo-second order and Freundlich isotherm adsorption. The adsorption capacity of toluene on BMPB@SiO₂/HDTMS, BMPB@SiO₂/PTES and BMPB@SiO₂/MTES, namely 77, 77 and 79 mg/g, respectively; 127, 136 and 123 mg/g, respectively for xylene. Those values lead to potential of the adsorbents to be applied for removal of petroleum pollutants from the aquatic environments.

Key words: adsorption, BMPB/SiO₂/hf, toluene and xylene.