

## **STUDI ADSORPSI ION Cd(II) PADA KOMPOSIT SELULOSA-ASAM HUMAT**

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### **INTISARI**

Telah dilakukan studi adsorpsi ion Cd(II) dengan menggunakan komposit selulosa-asam humat. Penelitian ini didahului dengan membuat komposit selulosa-asam humat, dilanjutkan dengan penentuan pH optimum, isotherm dan kinetika adsorpsi Cd(II) pada komposit selulosa-asam humat.

Pada penelitian ini asam humat diisolasi dari tanah gambut dan selulosa dari kapas. Gugus fungsi adsorben dikarakterisasi dengan spektrofotometer FTIR dan morfologi permukaan ditentukan dengan SEM-EDX. Kinerja adsorben dalam adsorpsi ion Cd(II) ditentukan oleh pengaruh keasaman terhadap adsorpsi yang dilakukan pada pH 1 - 8, pola isotherm adsorpsi pada rentang konsentrasi 5 - 100 mg L<sup>-1</sup> dan kinetika adsorpsi pada rentang waktu 5 - 360 menit.

Hasil penelitian menunjukkan bahwa adanya kemiripan antara puncak serapan FTIR komposit S-AH dengan puncak material penyusunnya, di antaranya pada daerah 3410 cm<sup>-1</sup> dan 2900 cm<sup>-1</sup> menunjukkan gugus -OH dan ulur C-H serta gugus CH<sub>2</sub> tekuk yang teridentifikasi pada daerah 1427 cm<sup>-1</sup>. Data SEM komposit selulosa-asam humat menunjukkan bahwa selulosa tetap berbentuk serat yang memanjang dengan ukuran pori sebesar 0,144 – 0,382 µm, tetapi terdapat tonjolan atau butiran yang dimungkinkan merupakan asam humat. Adsorpsi ion Cd(II) pada komposit selulosa-asam humat optimum pada pH 6. Model isotherm adsorpsi mengikuti model isotherm Freundlich dengan konstanta Freundlich (K<sub>F</sub>) sebesar 4,718. Model kinetika adsorpsi mengikuti model McKay & Ho dengan harga konstanta laju adsorpsi (k<sub>2</sub>): 9,06 x 10<sup>-3</sup> g mg<sup>-1</sup> menit<sup>-1</sup>.

Kata kunci: Adsorpsi, asam humat, selulosa.

## ***STUDY OF Cd(II) ADSORPTION ON CELLULOSE-HUMIC ACID COMPOSITE***

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### **ABSTRACT**

Study of Cd(II) ion adsorption on cellulose-humic acid composite has been conducted. This research was preceded by making cellulose-humic acid composite, followed by determining the optimum pH, isotherm and kinetics adsorption of Cd(II) by cellulose-humic acid composite.

In this study, humic acid was isolated from peat soil and cellulose from cotton. The functional groups of the adsorbent were characterized using FTIR spectrophotometer and the surface morphology was determined by SEM-EDX. The performance of the adsorbent in the adsorption of Cd(II) ions was determined by the effect of acidity on the adsorption carried out at pH 1 - 8, the adsorption isotherm patterns in the concentration range 5 - 100 mg L<sup>-1</sup> and the adsorption kinetics in the time range 5 - 360 minutes.

Result of the study showed that there was a similarity between the FTIR absorption peaks of S-AH composite and the peaks of starting materials. The adsorption peaks in the 3410 cm<sup>-1</sup> and 2900 cm<sup>-1</sup> wavenumbers indicated the existence of -OH and O-H stretching and the CH<sub>2</sub> bending groups were detected in the 1427 cm<sup>-1</sup> wavenumbers. The SEM images of the cellulose-humic acid composite showed that the cellulose remained in the form of elongated fibers with a pore size of 0.144 – 0.382 µm, but there were bulges or granules that might be humic acid. Adsorption of Cd(II) by cellulose-humic acid composite was optimum at pH 6. Isotherm model of Cd(II) adsorption follows Freundlich's model with Freundlich constant (K<sub>F</sub>) of 4.718. Kinetics model of Cd(II) adsorptions follows the McKay & Ho model with rate constant (k<sub>2</sub>) of 9.06 x 10<sup>-3</sup> g mg<sup>-1</sup> menit<sup>-1</sup>.

Keywords: Adsorption, cellulose, humic acid.