ABSTRAK

SINTESIS KARBON AKTIF DARI TONGKOL JAGUNG *(Zea Mays L)* SEBAGAI ADSORBEN ION LOGAM KADMIUM

Kadmium(II) termasuk jenis logam berat yang berbahaya karena sifat karsinogenik yang tinggi serta memiliki kontribusi toksisitas di dalam air. Konsentrasi kadmium(II) yang melebihi nilai ambang batas berpotensi merugikan kualitas lingkungan dan kesehatan manusia. Untuk mengurangi kadar logam kadmium(II) dilakukan proses adsorpsi menggunakan karbon aktif sebagai adsorben. Pada penelitian ini, karbon aktif disintesis dari tongkol jagung. Sintesis karbon aktif dilakukan dengan karbonisasi pada suhu 300 ℃ selama 1 jam dan aktivasi kimia dengan H_3PO_4 10% selama 24 jam. Karbon aktif diaplikasikan dalam proses adsorpsi logam kadmium(II) menggunakan metode statis (*batch).* Penentuan kondisi optimum adsorpsi kadmium(II) dilakukan menggunakan *Atomic Absorption Spectrophotometry* (AAS) dengan variasi massa (0,03–0,15 gram), variasi pH (4–8), variasi waktu kontak (15–75 menit) dan variasi konsentrasi awal (0,5–2,5 ppm). Karakteristik karbon aktif yang dianalisis menggunakan *Fourier Transform Infrared Spectroscopy* (FTIR) menunjukkan adanya ikatan gugus fungsi C-C, O-H, C-H, C=C, C=O dan P=O. Sedangkan, karakteristik karbon aktif menggunakan SEM memperlihatkan pori-pori dengan ukuran bervariasi dan permukaan yang kasar. Berdasarkan hasil analisis, menunjukkan bahwa kondisi optimum adsorpsi kadmium(II) terjadi pada massa adsorben 0,12 gram selama 45 menit waktu kontak dengan pH larutan 8 pada konsentrasi awal kadmium(II) 1 ppm. Pada kondisi optimum, karbon aktif mampu mengadsorpsi hingga 84% kadmium(II). Isoterm adsorpsi dari logam kadmium(II) pada karbon aktif tongkol jagung mengikuti model isoterm Freundlich dengan nilai K_F mencapai 1,4031 $mg.g^{-1}$ dan nilai R^2 sebesar 0,9576.

Kata-kata kunci: adsorpsi; isoterm; kadmium(II); karbon aktif; tongkol jagung.

ABSTRACT

SYNTHESIS OF ACTIVATED CARBON FROM CORN COBS (Zea Mays L) AS CADMIUM METAL ION ADSORBENTS

Cadmium(II) is a dangerous type of heavy metal because it has high carcinogenic characteristic and toxicity contribution in water. Cadmium(II) concentrations that exceed the threshold value has the potential to harm the quality of the environment and human health. To reduce the metal cadmium(II) content was carried out adsorption process using activated carbon as adsorbent. In this study, activated carbon was synthesized from corn cobs. The synthesis of activated carbon was carried out by carbonization at 300 ℃ for 1 hour and chemical activation with H_3PO_4 10% for 24 hour. Activated carbon is applied in cadmium(II) metal adsorption process using batch method. Determination of optimum conditions on the adsorption of cadmium(II) was performed using Atomic Absorption Spectrophotometry (AAS) with adsorbent mass variations (0.03–0.15 g), pH variation (4–8), variations in contact time (15–75 minutes), and initial concentration variation (0.5–2.5 ppm). Activated carbon characteristics analyzed using Fourier Transform Infrared Spectroscopy (FTIR) indicates the existence of functional groups such as C-C, O-H, C-H, C=C, C=O and P=O. Meanwhile, the characteristics of activated carbon using SEM show pores with varying sizes and rough surfaces. Based on the results of the analysis showed that the adsorption of cadmium(II) in optimum condition occurs adsorbent mass of 0,12 g, for 45 minutes contact time with pH 8 at initial concentration of 1 ppm. In optimum conditions, activated carbon is able to adsorption up to 84% cadmium(II). Adsorption isoterm of cadmium(II) metal in the activated carbon corn cob followed freundlich isoterm with K_F value of 1.4031 mg/g and R^2 value of 0.9576.

Keywords: activated carbon; adsorption; cadmium(II); corncob; isoterm.