



## **ADSORPSI ION Pb(II) OLEH SELULOSA/ALGINAT YANG TERTAUT SILANG-EPIKLOROHIDRIN**

Adetya Arif Wijaksono  
16/398533/PA/17494

### **INTISARI**

Logam Pb(II) merupakan salah satu logam yang berbahaya bagi manusia jika paparannya besar di lingkungan. Salah satu metode untuk mengurangi cemaran logam Pb(II) di perairan adalah dengan cara adsorpsi menggunakan adsorben selulosa termodifikasi. Tujuan penelitian ini untuk melakukan sintesis adsorben selulosa/alginat tertaut silang epiklorohidrin (Sel-EPI-Alg) serta menentukan pH optimum, waktu kontak, dan isoterm adsorpsi ion Pb(II) menggunakan adsorben Sel-EPI-Alg.

Selulosa diisolasi dari tanaman eceng gondok melalui proses hidrolisis, delignifikasi, dan *bleaching*. Adsorben disintesis dengan menaut silangkan selulosa dengan natrium alginat menggunakan agen penaut silang epiklorohidrin. Adsorben hasil sintesis di karakterisasi menggunakan spektroskopi FTIR, XRD, SEM-EDX dan uji stabilitas pada pH larutan 2-8. Studi desorpsi ion Pb(II) dilakukan pada larutan akuades, Na<sub>2</sub>EDTA 0,1 M, NH<sub>4</sub>Cl 0,1 M, dan HCl 0,1 M. Penelitian menghasilkan adsorben Sel-EPI-Alg yang stabil pada pada pH 2-8. Kapasitas adsorpsi ion Pb(II) pada adsorben Sel-EPI-Alg optimum pada pH 5, dengan waktu kontak 120 menit, dan konsentrasi awal ion Pb(II) 200 ppm. Adsorpsi mengikuti model kinetika orde dua semu dengan konstanta laju reaksi sebesar  $3,729 \times 10^{-3} \text{ g mg}^{-1} \text{ menit}^{-1}$  dan model isoterm yang sesuai yaitu model Langmuir dengan  $q_{\text{max}} 0,44 \text{ mmol g}^{-1}$ . Hasil desorpsi menunjukkan bahwa larutan HCl 0,1 M merupakan larutan yang paling efektif untuk mendesorpsi ion Pb(II).

Kata kunci: adsorpsi, alginat, Pb(II), selulosa, Sel-EPI-Alg



## **ADSORPTION OF Pb(II) ION BY EPICHLOROHYDRIN-CROSSLINKED CELLULOSE/ALGINATE**

Adetya Arif Wijaksono  
16/398533/PA/17494

### **ABSTRACT**

Lead(II) is one of the metals that is harmful to humans if large amount present in environments. One method for reducing metal contamination of Pb(II) in aqueous is by adsorption using modified cellulose adsorbent. The aims of this research were to synthesize of cellulose/alginate crosslinked by epichlorohydrin (Sel-EPI-Alg) as an adsorbent and to determine the optimum pH, contact time, and isotherms model for the adsorption of Pb(II) ion using Sel-EPI-Alg adsorbent.

Cellulose was isolated from water hyacinth plants using hydrolysis, delignification and bleaching processes. The adsorbent synthesis was started with crosslinking the cellulose with sodium alginate using epichlorohydrin as crosslinker agent. The adsorbent of Sel-EPI-Alg was characterized using FTIR, XRD, SEM-EDX spectroscopies, and stability test in solutions of pH 2-8. The desorption study of Pb(II) ion was carried out in distilled water, Na<sub>2</sub>EDTA 0.1 M, NH<sub>4</sub>Cl 0.1 M, and HCl 0.1 M solutions. The results showed that the Sel-EPI-Alg adsorbent was stable in solutions of pH 2-8. The adsorption capacity of the adsorbent towards the Pb(II) ions was optimum at pH 5, 120 min of contact time, and 200 ppm of the Pb(II) ions concentration. The adsorption of Pb(II) ion by Sel-EPI-Alg adsorbent followed pseudo-second-order kinetic models with a rate constant of  $3,29 \times 10^{-3} \text{ g mg}^{-1} \text{ min}^{-1}$  and isotherm adsorption followed the Langmuir adsorption isotherm model with  $q_{\text{max}} 0,44 \text{ mmol g}^{-1}$ . Desorption studies showed that HCl 0.1 M was the most effective solution for desorbing Pb(II) ions.

Keywords: adsorption, alginate, cellulose, Pb(II), Sel-EPI-Alg