PEMANFAATAN STIROFOAM LIMBAH SEBAGAI ADSORBEN TERSULFONASI DAN BERMAGNET UNTUK PENGHILANGAN ION Pb(II) DALAM LARUTAN

Zenitha Margie Cahyani
16/398611/PA/17572

INTISARI

Pada penelitian ini dilakukan pembuatan adsorben stirofoam tersulfonasi dan bermagnet untuk penghilangan ion Pb(II) dalam larutan. Pembuatan adsorben diawali dengan pembuatan stirofoam tersulfonasi melalui reaksi sulfonasi pada stirofoam. Stirofoam tersulfonasi kemudian ditambahkan partikel magnetit melalui metode kopresipitasi. Massa magnetit yang ditambahkan ke dalam stirofoam tersulfonasi dilakukan variasi sehingga menghasilkan adsorben stirofoam tersulfonasi/magnetit (stirofoam-SO_3/Fe_3O_4) dengan fraksi 25%, 33,3%, dan 50%. Adsorben stirofoam-SO_3/Fe_3O_4 setiap fraksi diuji sifat separabilitas dan kemampuan adsorpsinya. Adsorben dengan sifat pemisahan terbaik dan kapasitas adsorpsi terbesar dipilih sebagai adsorben stirofoam-SO_3/Fe_3O_4 fraksi optimum terbaik. Adsorben terbaik kemudian dilakukan adsorpsi pada larutan ion Pb(II) untuk menentukan pH, massa adsorben, waktu kontak adsorpsi, dan konsentrasi awal larutan optimum. Karakterisasi adsorben dilakukan menggunakan instrumen FT-IR, XRD, dan SEM.

Hasil dari penelitian ini diperoleh adsorben stirofoam-SO_3/Fe_3O_4 50% dipilih sebagai adsorben terbaik. Adsorben stirofoam-SO_3/Fe_3O_4 50% memiliki nilai kapasitas adsorpsi paling tinggi dan sifat separabilitas paling baik. Adsorpsi ion Pb(II) dalam larutan menggunakan adsorben stirofoam-SO_3/Fe_3O_4 50% optimum pada pH larutan 5, massa adsorben 25 mg/30 mL larutan, waktu kontak adsorpsi 60 menit, dan konsentrasi awal larutan 40 mg/L. Model kinetika adsorpsi yang sesuai pada penelitian ini yaitu model kinetika pseudo orde kedua Ho dengan kapasitas adsorpsi sebesar 1,90 mg/g dan konstanta laju reaksi adsorpsi sebesar 0,6803 g/mg.menit. Model isoterm adsorpsi yang sesuai yaitu model isoterm adsorpsi Langmuir dengan kapasitas adsorpsi maksimal sebesar 26,67 mg/g.

Kata kunci: adsorpsi, Fe_3O_4, ion Pb(II), stirofoam tersulfonasi.

UTILIZATION OF WASTE STYROFOAM AS A SULFONATED AND MAGNETIC ADSORBENT FOR REMOVAL OF Pb(II) ION IN SOLUTION

Zenitha Margie Cahyani
16/398611/PA/17572

ABSTRACT

In this study, a sulfonated and magnetic Styrofoam adsorbent was made for removal Pb(II) ion in solution. The adsorbent preparation was begun with making sulfonated Styrofoam through the sulfonation reaction on Styrofoam. The sulfonated Styrofoam then was added with magnetite particles through the coprecipitation method. The mass of magnetite added to the sulfonated Styrofoam was varied to produce magnetite sulfonated Styrofoam adsorbent (Styrofoam-SO_3/Fe_3O_4) with fractions of 25%, 33.3%, and 50%. The adsorbent Styrofoam-SO_3/Fe_3O_4 for each fraction were tested for its separability and adsorption capability. The adsorbent with the best separation properties and the largest adsorption capacity was chosen as the best optimum Styrofoam-SO_3/Fe_3O_4 adsorbent fraction. The best adsorbent then carried out an adsorption process for Pb(II) ion solution to determine the optimum pH, adsorbent mass, adsorption contact time, and initial concentration of the solution. The adsorbent characterization was carried out using FT-IR, XRD, and SEM instruments.

The result of this study obtained Styrofoam-SO_3/Fe_3O_4 50% adsorbent as the best adsorbent. The adsorbent had the highest adsorption capacity and the best separability properties. Adsorption of Pb (II) ion in solution had an optimum condition with Styrofoam-SO_3/Fe_3O_4 adsorbent at solution pH 5, adsorbent mass 25 mg/30 mL solution, adsorption contact time 60 minutes, and initial solution concentration of 40 mg/L. The suitable adsorption kinetics model in this study was Ho's second-order pseudo kinetics model with an adsorption capacity of 1.90 mg/g and an adsorption reaction rate constant of 0.6803 g/mg.minutes. The suitable adsorption isotherm model was the Langmuir adsorption isotherm model with a maximum adsorption capacity of 26.67 mg/g.

Keywords: adsorption, Fe_3O_4, Pb(II) ions , sulfonated Styrofoam.