

SINTESIS HIBRIDA PROPILDIELENTRIAMIN-SILIKA TERLAPIS PADA BAHAN MAGNETIK PASIR BESI UNTUK ADSORPSI Au(III)

Ricka Prasdiantika
13/350728/PPA/04116

INTISARI

Telah dilakukan sintesis hibrida propildietilentrriamin-silika yang terlapis pada bahan magnetik pasir besi (PB/SiO₂/PDETA) untuk adsorpsi Au(III). Bahan magnetik dipisahkan dari pasir besi dengan menggunakan magnet eksternal dan diaktivasi menggunakan larutan HCl. Aktivasi dilakukan dengan variasi konsentrasi larutan HCl 0,5; 1,0; 2,0; dan 4,0 M selama 30 menit. Bahan magnetik yang diperoleh direndam dengan larutan natrium sitrat 0,5 M sebagai media pendispersi. PB/SiO₂/PDETA disintesis melalui proses sol gel dengan mencampurkan bahan magnetik dengan prekursor larutan natrium silikat (NaSiO₃) dari abu sekam padi dan N-(3-trimetoksisililpropil)dietilentrriamin (TMSPDETA). Pada penelitian ini, PB/SiO₂/PDETA disintesis dengan variasi rasio mol NaSiO₃ dan TMSPDETA yaitu 0:1; 1:0; 1:0,5; 1:1; 1:2; dan 1:3. Karakterisasi bahan dilakukan dengan *X-Ray Fluoresence* (XRF), *X-Ray Difraktometer* (XRD), *Fourier Transform Infrared* (FT-IR) *Spectrophotometer*, dan *Transmission Electron Microscopy* (TEM). Kemampuan adsorpsi bahan terhadap Au(III) dilakukan pada larutan HAuCl₄ dengan konsentrasi Au(III) 200 ppm dan pH 3 selama 120 menit. Analisis kadar Au(III) yang tidak teradsorpsi dianalisis dengan *Atomic Absorption Spectroscopy* (AAS).

Hasil karakterisasi XRD menunjukkan bahwa semakin besar konsentrasi larutan HCl yang digunakan untuk aktivasi, intensitas XRD dan kristalinitas bahan magnetik pasir besi semakin meningkat. Aktivasi optimum dicapai pada pencucian bahan magnetik dengan larutan HCl 1 M. Hasil karakterisasi XRD dan TEM menunjukkan bahwa hibrida propildietilentrriamin-silika terlapis pada bahan magnetik pasir besi berhasil disintesis. Hasil adsorpsi menunjukkan bahwa semakin besar rasio mol NaSiO₃/TMSPDETA yang digunakan untuk sintesis PB/SiO₂/PDETA, semakin besar kemampuan adsorpsi yang dihasilkan. Adsorpsi optimum terjadi pada rasio mol Na₂SiO₃/TMSPDETA 1:2 yang dapat mengadsorpsi Au(III) sebanyak 182,18 mg/g.

Kata kunci: silika, propildietilentrriamin, pasir besi, adsorpsi Au(III)

***SYNTHESIS OF PROPYLDIETHYLENETRIAMINE-SILICA HYBRID
COATED ON IRON SAND MAGNETIC MATERIAL
FOR ADSORPTION OF Au(III)***

Ricka Prasdiantika
13/350728/PPA/04116

ABSTRACT

Synthesis of propyldiethylenetriamine-silica hybrid coated on magnetic material of iron sand (PB/SiO₂/PDETA) for adsorption of Au(III) has been studied. Magnetic material was separated from iron sand using an external magnet, and activated using a solution of HCl. Activation was done with various concentrations of HCl solution 0.5; 1.0; 2.0; and 4.0 M for 30 minutes. Magnetic material was soaked with sodium citrate solution 0.5 M as the dispersion medium. PB/SiO₂/PDETA was synthesized via sol-gel process by mixing magnetic material with sodium silicate solution (Na₂SiO₃) from rice husk ash and N-(3-trimethoxysilylpropyl)diethylenetriamine (TMSPDETA). In this study, PB/SiO₂/PDETA was synthesized with a variety of mole ratios NaSiO₃/TMSPDETA 0:1; 1:0; 1:0.5; 1:1; 1:2; and 1:3. Materials were characterized by X-Ray fluorescence (XRF), X-Ray diffractometer (XRD), Fourier Transform Infrared (FT-IR) Spectrophotometer, and Transmission Electron Microscopy (TEM). Adsorption ability of the material to Au(III) was evaluated in HAuCl₄ solution with a concentration of Au(III) 200 ppm and pH 3 for 120 minutes. Concentration of Au(III) which was not adsorbed was analyzed with Atomic Absorption Spectroscopy (AAS).

XRD characterization showed the higher the concentration of HCl solution used for activation of magnetic material, the greater intensity XRD and crystallinity of the magnetic material. The optimum activation was achieved in magnetic material washed with a solution of HCl 1 M. The results of characterization by XRD and TEM showed that propyldiethylenetriamine-silica hybrid coated on iron sand was synthesized. Adsorption results showed the greater of mole ratio Na₂SiO₃/TMSPDETA used in the synthesis of PB/SiO₂/PDETA, the greater the adsorption capacity is generated. The optimum adsorption occurs at mole ratio NaSiO₃/TMSPDETA 1:2 which was able to adsorb Au(III) with the amount of 182,18 mg/g.

Key words: silica, propyldiethylenetriamine, iron sand, adsorption of Au(III)