

## **PELAPISAN SILIKA TERMODIFIKASI KITOSAN PADA BAHAN MAGNETIK PASIR BESI UNTUK ADSORPSI EMAS(III)**

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### **INTISARI**

Pelapisan bahan magnetik pasir besi dengan silika termodifikasi kitosan (BMPB/SiO<sub>2</sub>/k) telah dilakukan. Bahan magnetik pasir besi (BMPB) asal Pantai Bugel, Kulon Progo dipisahkan secara magnetik kemudian dikarakterisasi dengan spektroskopi *Fourier-Transform Infrared (FTIR)*, *X-Ray Powder Diffraction (XRD)*, dan *Scanning Electron Microscope-Energy Dispersive Spectroscopy (SEM-EDS)*. Pelapisan dilakukan dalam sistem satu wadah dengan mencampur BMPB dan natrium silikat selama lima menit diikuti dengan penambahan larutan kitosan disertai pengadukan. Pengadukan dilakukan sampai masing-masing material tercampur membentuk gel basah. Komposisi campuran adalah 0,5 g BMPB, 0,73 g SiO<sub>2</sub>, dengan variasi kitosan (0,025 g; 0,050 g; dan 0,075 g). Produk BMPB/SiO<sub>2</sub>/k dikarakterisasi dengan FTIR, XRD, SEM-EDS dan analisis termogravimetri. Adsorpsi dilakukan melalui variasi pH terhadap larutan emas(III) 100 ppm dalam larutan klorida. Konsentrasi emas dalam larutan sebelum dan sesudah adsorpsi dianalisis menggunakan *Atomic Absorbance Spectroscopy (AAS)*.

Komposisi mineral utama bahan magnetik pasir besi yaitu magnetit (Fe<sub>3</sub>O<sub>4</sub>) yang dikonfirmasi melalui penyesuaian data dengan pola difraksi. Penambahan gugus fungsi kitosan dan silika diidentifikasi dari munculnya serapan vibrasi karakteristik. Pelapisan BMPB dengan silika termodifikasi kitosan menghasilkan partikel dengan ukuran yang lebih besar. Analisis termogravimetri menunjukkan perbedaan jumlah air teradsorb dan dekomposisi konten organik pada BMPB/SiO<sub>2</sub>/k. Penambahan kitosan yang memberikan massa produk terbesar adalah pada 0,05 g dan adsorpsi emas(III) dalam larutan emas klorida optimum pada pH 3.

Kata kunci: bahan magnetik pasir besi, kitosan, sol-gel

## **COATING OF CHITOSAN MODIFIED SILICA ON IRON SAND MAGNETIC MATERIAL FOR ADSORPTION OF GOLD(III)**

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### **ABSTRACT**

Coating of chitosan modified silica on iron sand magnetic material (ISM/SiO<sub>2</sub>/ch) had been conducted. Iron sand magnetic material (ISM) obtained from Pantai Bugel, Kulon Progo was magnetically separated then characterized using Fourier-Transform Infrared (FTIR) Spectroscopy, X-Ray Powder Diffraction (XRD), and Scanning Electron Microscope-Energy Dispersive Spectroscopy (SEM-EDS). The coating was performed in one-pot system by mixing ISM and sodium silicate for five minutes of sonication, then added with chitosan solution together with continuous stirring. Stirring was performed until each material were mixed forming wet gel. The mixture formula were 0.5 g of ISM, 0.73 g of SiO<sub>2</sub>, and the varied chitosan (0.025 g, 0.050 g, and 0.075 g). Product of ISM/SiO<sub>2</sub>/ch was characterized with FTIR, XRD, SEM-EDS and thermogravimetric analysis. Adsorption was performed by varying pH of 100 ppm of gold(III) in chloride solution. The concentration of gold in solution before and after adsorption were analyzed using Atomic Absorption Spectroscopy (AAS).

The main mineral composition of ISM was magnetite (Fe<sub>3</sub>O<sub>4</sub>) confirmed by diffraction patterns. The successful coating was confirmed by the appearance of characteristic peaks. The coating of ISM resulted in larger size of particle. The thermogravimetric analysis revealed the different amount of adsorbed water and the decomposition of organic content of ISM/SiO<sub>2</sub>/ch. The addition of chitosan giving highest mass of product was at 0.050 g and the adsorption of gold(III) in gold chloride was optimum at pH of 3.

Keyword: iron sand magnetic material, chitosan, sol-gel