

**ADSORPTION CHARACTERISTICS OF  
MULTI METAL {(Ag(I), Cu(II) and Cr(III))}  
AND ETHYLENEDIAMINE GROUP  
IMMOBILIZED ON SILICA  
FROM RICE HULL ASH**

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# ADSORPTION CHARACTERISTICS OF MULTI METAL {(Ag(I), Cu(II) and Cr(III))} AND ETHYLENEDIAMINE GROUP IMMOBILIZED ON SILICA FROM RICE HULL ASH

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A study on the adsorption characteristic of multi metals (Ag(I), Cu(II) and Cr(III)) and ethylenediamine group immobilized on silica prepared from rice hull ash has been completed.

Synthesis of ethylenediamine-silica hybrid (ESH) was carried out by adding HCl 3M to the mixture of sodium silicate solution and 3-ethylenediaminepropyltrimethoxysilane (EDAPTMS). Sodium silicate was obtained from destruction of rice hull ash with NaOH 4M at 500 °C for 30 minutes. The produced adsorbent was characterized by infrared spectrophotometer (FTIR) and X-ray diffraction (XRD). The adsorption of multi metal Ag(I), Cu(II) and Cr(III) was conducted in a *batch* system for one hour at variation of metal ion concentration. The adsorbed metal ion was calculated from the differences of metal ion concentration before and after based on the analysis with AAS method.

Characterization using FTIR spectra showed that ESH has been successfully synthesized. It was indicated by the appearance of characteristics functional groups, i.e -CH<sub>2</sub>- (methylene), -NH<sub>2</sub>- (amine), Si-OH (silanol) and Si-O-Si (siloxane). The XRD data showed amorphous structure of ESH.

The result of adsorption capacity of multi metals on ESH is higher than that on silica gel for Ag(I) and Cr(III) but is lower for Cu(II). The value of energy adsorption on silica gel for all ion metals indicated that the interaction between adsorbent and metal ions were dominated by chemisorption, while for that on ESH involved physisorption for Cr(III) and chemisorption for Ag(I) and Cu(II).

**Keywords:** adsorption, multimetals, ethylenediamine-silica hybrid (ESH), rice hull ash (RHA)