

SUMMARY

One of the biomass that has a high silica content of 86.90-97.30% makes rice husk very potential as a precursor of natural silica. Silica is widely used as an adsorbent. However, the use of silica as an adsorbent still has a weakness, namely its active sites in the form of Si-OH and Si-O-Si groups have low acidity properties so that adsorbent modification is required. Chitosan was chosen for silica modification because it has $-NH_2$ and $-OH$ groups that have a pair of free electrons that are reactive to other compounds. In this study, the adsorption ability of chitosan silica was improved by cross-linking technique using glutaraldehyde. Crosslinking increases the surface area of the adsorbent thus providing more adsorption sites for the adsorbate molecules. This study aims to obtain silica-chitosan/glutaraldehyde composites, determine the characteristics of the synthesized silica-chitosan, and determine the adsorption ability of the synthesized silica-chitosan as a chromium metal adsorbent.

This research was carried out through several stages, namely, preparation of rice husk ash, extraction of sodium silicate solution, synthesis of chitosan silica and silica-chitosan/glutaraldehyde composites, adsorption test of chromium metal and characterization. Rice husks are soaked in HCl solution and then washed and dried. After drying, the rice husks are then poured and burned in a muffle furnace. Sodium silicate extraction is carried out by refluxing rice husk ash with NaOH. Sodium silicate is then added with chitosan solution to produce chitosan silica composite and glutaraldehyde is added to produce silica-chitosan/glutaraldehyde composite. Adsorbents that have been successfully synthesized are then tested for adsorptivity on chromium metal and then characterized by FTIR to determine the functional group, XRF to determine the composition of the elements, SEM to determine the morphology of the adsorbent and AAS to measure the concentration of adsorbed metal elements.

Silica-chitosan composites have been successfully synthesized from rice husk ash. This is shown by the presence of O-H, Si-O-H, Si-O-Si, N-H, NH_2 , C-H groups in the FT-IR spectrum. The results of XRF showed that the silica content in rice husk ash was 95.27%. The SEM results showed that the morphology of the silica-chitosan/glutaraldehyde composite was tighter with regular structure and irregular particle shape. The adsorption test on chromium metal produced the amount of chromium metal adsorbed in the silica-chitosan/glutaraldehyde composite of 27.2 mg/g while in silica-chitosan it was 25.9 mg/g.