

ABSTRACT

Lead (Pb) has high toxicity if it enters the human body and can cause various organ damage, including kidney failure, liver damage, brain damage, irritation, and nervous system disorders. Activated carbon is a carbon compound with an amorphous structure due to the arrangement of its atoms, which have pores that enable it to absorb substances well. Therefore, its use as an adsorbent is due to its ability to absorb dyes, gases, and water. The enhancement of adsorption on the adsorbent is achieved by adding sodium silicate to coat the surface of activated carbon so that the OH active groups of sodium silicate can bind to the adsorbate, which is lead Pb(II). The objective of this research is to obtain a sodium silicate-activated carbon adsorbent with varying amounts of sodium silicate to activated carbon and to obtain data on the ability of the adsorbent to adsorb Pb(II) ions with varying concentrations of 5, 10, 25, 50, and 100 ppm using atomic absorption spectrometry (AAS).

Synthesis of sodium silicate from extracted rice husk ash. Activated coconut shell charcoal is activated using sodium hydroxide (NaOH) to produce activated carbon. The activated carbon is then mixed with varying amounts of sodium silicate to obtain a sodium silicate-activated carbon composite. The composite is characterized using Fourier Transform Infrared Spectroscopy (FTIR) to identify active groups and undergoes a test for the adsorption of Pb(II) ions with varying concentrations of Pb(II) ions. The remaining Pb(II) ions are analyzed using Atomic Absorption Spectrometry (AAS). The percentage of adsorption and adsorption capacity can be determined using Langmuir and Freundlich isotherms.

The results of this research are the variations of the composite between sodium silicate-activated carbon with weight-to-volume ratios A, B, and C and the obtained functional groups O-H from silanol (Si-OH), C=C carbon content, siloxane (Si-O-Si) groups, and C-H functional groups. The results of the adsorption using the sodium silicate-activated carbon composite variations A, B, and C, and varying concentrations of 5, 10, 25, 50, and 100 ppm of Pb(II) ions, show that variations A and B have very high adsorption capacity and percentage due to their high values in each variation, while composite C and activated carbon have lower values compared to variations A and B.

Keywords: Pb(II) Metal, Activated Carbon, Sodium Silicate, Adsorption