PENYERAPAN ION LOGAM Pb(II) OLEH HIDROKSIAPATIT DARI LIMBAH CANGKANG TELUR PUYUH YANG DISINTESIS DENGAN METODE *MICROWAVE-ASSISTED*

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ABSTRACT

ADSORPTION OF Pb(II) ION METAL BY HIDROXIAPATITE FROM QUAIL EGG SHELL WASTE SYNTHESISED BY MICROWAVE-ASSISTED METHOD

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Hydroxyapatite (HAp, $Ca_{10}(PO_4)_6(OH)_2$) is the main mineral component of bones and teeth. HAp has also been widely developed as a very promising biosorbent to absorb contaminants such as heavy metals. In this study, Pb(II) metal absorption was carried out using HAp with the adsorption method. The calcium source for HAp synthesis was obtained from quail egg shell waste and the phosphate source from Ammonium dihydrogen phosphate ($NH_4H_2PO_4$). HAp synthesis was carried out using the microwave-assisted method to be efficient in time and energy, and to produce HAp with high purity and homogeneity. This HAp synthesis was carried out with variations in synthesis time of 5, 10, and 15 minutes. Testing of the optimum Pb(II) absorption parameters consisted of pH, concentration, and contact time. Characterization before and after absorption was carried out using X-ray Fluorescence (XRF), X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), Brunauer-Emmett-Teller (BET), and (Scanning Electron Microscopy - Energy Dispersive X-ray (SEM-EDX). All synthesis results produced HAp, but 5 minutes were chosen for the absorption of Pb(II) metal ions because of its purity compared to the other 2 time variations. HAp with a synthesis time of 5 minutes produced a pore diameter of 16.0890 nm and a Ca/P molar ratio of 1.64 which was quite close to the stoichiometric Ca/P molar ratio, which was 1.67. In this study, the optimum absorption results of Pb(II) were obtained at pH 5, a concentration of 1100 mg/L, and an optimum time of 60 minutes with an absorption capacity of 499.34 mg/g. The absorption process of Pb(II) metal in this study followed the Langmuir isotherm model and the pseudo-second order kinetic model. The application of this study was carried out on water samples from the Batang Arau River estuary, especially around the Siti Nurbaya Bridge with a removal percent of 89,86%. The synthesis of HAp from quail egg shell waste using the microwave-assisted method proved effective as a biosorbent of Pb(II) metal.

Keywords: *Quail egg shell waste, hydroxyapatite, Pb(II), microwave-assisted, adsorption*