

Hanifa, A. 2019. Pemanfaatan Limbah Ampas Kelapa (*Cocos nucifera*) Terimobilisasi Silika Sebagai Adsorben untuk Menurunkan Kadar Timbal (Pb^{2+}) dan Penerapannya pada Air Limbah Elektrolating. Skripsi ini dibawah bimbingan Dr. Eko Prasetyo Kuncoro, S.T., DEA. dan Drs. Handoko Darmokoesoemo, DEA. Program Studi S1 Teknik Lingkungan, Departemen Biologi, Fakultas Sains dan Teknologi, Universitas Airlangga.

ABSTRAK

Penelitian ini bertujuan untuk mengetahui karakteristik adsorben ampas kelapa terimobilisasi silika berdasarkan analisis pH *point of zero charge* (pH_{pzc}), mengetahui adanya perbedaan efisiensi adsorpsi Pb^{2+} menggunakan adsorben ampas kelapa terimobilisasi silika berdasarkan variasi pH, waktu kontak, model kinetika adsorpsi, aplikasi adsorpsi pada limbah cair industri elektrolating serta karakteristik adsorben ampas kelapa terimobilisasi silika menggunakan FTIR sebelum dan sesudah adsorpsi. Nilai pH_{pzc} yang diperoleh sebesar 7,1. Variasi pH yang digunakan pada penelitian ini adalah 2, 3, 4, 5, 6, 7 dan pH asli limbah sintesis Pb^{2+} yaitu 5,5. Hasil penelitian menunjukkan pH optimum adsorpsi sebesar 5,5 dengan efisiensi adsorpsi sebesar 60,24%. Sedangkan variasi waktu yang digunakan adalah 5, 10, 15, 30, 60, 90, 120 dan 150 menit. Hasil penelitian menunjukkan waktu kontak optimum adsorpsi yaitu 120 menit dengan efisiensi adsorpsi sebesar 92,75%. Data yang didapat kemudian diolah menggunakan uji *Anova One Way*, hasil penelitian menunjukkan ada perbedaan efisiensi adsorpsi Pb^{2+} pada variasi pH dan waktu kontak. Model kinetika pada penelitian ini adalah orde pseudo kedua, sedangkan mekanisme adsorpsi yang berlangsung terdiri dari difusi intra partikel dan difusi eksternal. Aplikasi pada limbah cair industri elektrolating menunjukkan efisiensi adsorpsi Pb^{2+} sebesar 66,14%. Karakterisasi FTIR yang dilakukan menunjukkan adanya ikatan Pb-O-Si dan Pb-OH pada spektra inframerah sesudah adsorpsi.

Kata kunci: adsorpsi, ampas kelapa, silika, pH, waktu kontak, limbah elektrolating, FTIR.

Hanifa, A. 2019. Use of Coconut (Cocos nucifera) Dregs Immobilized by Silica as Adsorbent for Lead Removal and its Application to Waste of Electroplating Industry. This work was supervised by Dr. Eko Prasetyo Kuncoro, S.T., DEA. and Drs. Handoko Darmokoesoemo, DEA. Bachelor of Environmental Engineering, Department of Biology, Faculty of Science Technology, Universitas Airlangga.

ABSTRACT

This study was aimed to investigate the characteristics of coconut dregs immobilized with silica gel as adsorbent based on point of zero charge pH (pH_{pzc}) analysis, to determine Pb^{2+} adsorption efficiencies based on pH and contact time variations, adsorption kinetics model, application to electroplating industry liquid waste and also characteristics of coconut dregs immobilized with silica gel as an adsorbent using FTIR analysis before and after adsorption. The value of pH_{pzc} in this study was 7,1. The pH variation of synthetic Pb^{2+} liquid waste used in this study were 2, 3, 4, 5, 6,7 and the real pH value of the synthetic Pb^{2+} liquid waste (5,5). The study showed that the optimum pH for Pb^{2+} adsorption process was 5,5 with adsorption efficiency of 60,24%. While the contact time variations used were 5, 10, 15, 30, 60, 90, 120 and 150 minutes. The study showed that the optimum contact time for Pb^{2+} adsorption process was 120 minutes with adsorption efficiency of 92,75%. The data obtained were statistically analyzed using Anova One-Way test and the result showed there were differences in the efficiency of Pb^{2+} adsorption in term of pH and contact time variations. The kinetic model used in this study was the second pseudo order, while the adsorption mechanism that took place consisted of intraparticle diffusion and external diffusion. The condition of optimum pH and contact time was applied towards electroplating industry liquid waste. The study showed that the adsorption efficiency in this term was 66,14%. FTIR characterization results showed there were evidence of Pb-O- Si and Pb-OH compounds in after adsorption-infrared spectrum.

Keywords: *adsorption, coconut dregs, silica, pH, contact time, electroplating waste, FTIR.*