

Matondang, C. D. P. 2019. Pemanfaatan Cangkang Kerang Simpson (*Placuna placenta*) sebagai Adsorben Logam Timbal dan Aplikasinya pada Limbah Cair Industri Electroplating. Skripsi ini dibawah bimbingan Dr. Eko Prasetyo Kuncoro, S.T., DEA. dan Drs. Handoko Darmokoesoemo, DEA. Program Studi S-1 Teknik Lingkungan, Departemen Biologi, Fakultas Sains dan Teknologi, Univeritas Airlangga.

ABSTRAK

Penelitian ini bertujuan untuk mengetahui karakteristik adsorben cangkang kerang Simpson (*Placuna placenta*) berdasarkan analisis pH *point of zero charge* (pH_{pzc}), mengetahui adanya perbedaan efisiensi adsorpsi Pb(II) menggunakan adsorben cangkang kerang Simpson (*Placuna placenta*) berdasarkan variasi pembakaran, pH, waktu kontak, model kinetika adsorpsi, aplikasi pH dan waktu optimum pada limbah cair industri electroplating serta karakteristik adsorben cangkang kerang Simpson (*Placuna placenta*) menggunakan FTIR. Percobaan dilakukan dalam skala laboratorium dan teknik adsorpsi yang digunakan adalah teknik *batch*. Variasi pembakaran pada penelitian ini adalah tanpa pembakaran, 500°C dan 800°C, Variasi pH pada penelitian ini adalah pH 2, 3, 4, 5, 6, 7, 8 dan pH asli (5,3). Variasi waktu kontak pada penelitian ini adalah 1, 5, 15, 30, 45, 60, 75, 90, 105 dan 120 menit. Analisis statistik dengan *Anova-One Way*, lalu dilanjutkan dengan uji Duncan. Tingkat pembakaran optimum yang diperoleh yakni 800°C dengan efisiensi adsorpsi 89,55%. pH optimum didapatkan pada pH asli (5,3) dan waktu kontak optimum yang didapat adalah 105 menit dengan efisiensi adsorpsi 90,35%. Hasil penelitian menunjukkan ada perbedaan efisiensi adsorpsi Pb(II) pada variasi tingkat pembakaran, pH dan waktu kontak. Kondisi pH dan waktu kontak optimum ini kemudian diaplikasikan dalam limbah cair industri electroplating, hasil penelitian menunjukkan efisiensi adsorpsi Pb(II) sebesar 61,26%. pH_{pzc} yang didapatkan yakni 11,6. Hasil pengujian FTIR menunjukkan bahwa cangkang kerang simping (*Placuna placenta*) mengandung fungsi hidroksil (-OH), karboksil (-CCO), karbonat (-CO₃).. Hasil model kinetika adsorpsi pada penelitian ini mengikuti persamaan kinetika adsorpsi pseudo orde kedua.

Kata kunci: adsorpsi, *Placuna placenta*, pH, tingkat pembakaran,, waktu kontak, limbah electroplating, FTIR.

Matondang, C. D. P. 2019. Utilization of Placuna placenta shell as Adsorbent of Lead adsorption and Its Application to Electroplating Industry wastewater. 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, Airlangga University.

ABSTRACT

The purpose of this work was to determine the characteristics of the Placuna placenta shell as adsorbent based on pH point of zero charge (pHpzc) analysis, to determine the differences in the efficiency of Pb(II) adsorption using the Placuna placenta shell based on burning variation, pH, contact time, to determine adsorption kinetics model, to determine lead adsorption from electroplating wastewater and to determine characteristics of Placuna placenta adsorbent using FTIR before and after adsorption. The experiment was carried out on a laboratory scale and the adsorption technique used was the batch technique. The combustion variations in this study were without combustion, 500°C and 800°C. Variations in pH in this study were pH 2, 3, 4, 5, 6, 7, 8 and original pH (5.3). The variation of contact time in this study were 1, 5, 15, 30, 45, 60, 75, 90, 105 and 120 minutes. After that, using statistical analysis ANOVA-One Way, continued with Duncan test. The optimum result of pHpzc obtained was 11.6. The optimum combustion rate obtained is 800°C with adsorption efficiency of 89.55%. The optimum pH was obtained at the original pH (5.3) and the optimum contact time obtained was 105 minutes with an adsorption efficiency of 90.35%. The results showed that there were differences in adsorption efficiency of Pb(II) on variations in combustion rates, pH and contact time. The optimum pH and contact time then applied to electroplating wastewater, showed that the adsorption efficiency of Pb(II) was 61.26%. The FTIR test results show that the adsorbent contains hydroxyl (-OH), carboxyl (-COO), and carbonate (-CO₃) groups. The results of the adsorption kinetics model in this study followed the second order pseudo adsorption kinetics equation.

Keywords: *adsorption, Placuna placenta, pH, combustion rate, contact time, electroplating waste, FTIR.*