

Nilaturrohmah. 2020. Penyisihan Kadar Pb(II) dalam Limbah Cair Sintetis dengan Adsorpsi Menggunakan Kulit Buah Kakao (*Theobroma cacao* L.). Skripsi ini dibawah bimbingan Dr. Eko Prasetyo Kuncoro, S.T., DEA. dan Dr. Handoko Darmokoesoemo, Drs., DEA. Program Studi S-1 Teknik Lingkungan, Departemen Biologi, Fakultas Sains dan Teknologi, Universitas Airlangga.

ABSTRAK

Penelitian ini bertujuan untuk mengetahui adanya perbedaan efisiensi adsorpsi ion logam Pb(II) dalam limbah cair sintetis menggunakan adsorben kulit buah kakao (*Theobroma cacao* L.) berdasarkan variasi suhu pemanasan adsorben dan pH, serta mengetahui karakteristik adsorben kulit buah kakao berdasarkan analisis TGA, pH_{pzc} , dan FTIR. Karakteristik adsorben kulit buah kakao berdasarkan analisis pH_{pzc} mendapat nilai pH_{pzc} sebesar 5,36, berdasarkan analisis TGA terdapat 4 tahapan dekomposisi secara termal dari adsorben, dan berdasarkan analisis FTIR terdapat gugus hidroksil (-OH), gugus karbonil (C=O), gugus cincin aromatik (C=C), gugus (C-O) dari kelompok asetil lignin, serta gugus (C-O-C dan C-O) dari karbohidrat selulosa dan lignin. Penelitian ini dilakukan dalam skala laboratorium dan metode adsorpsi yang digunakan adalah metode *batch*. Variasi suhu pemanasan adsorben yang digunakan pada penelitian ini adalah 120°C, 150°C, dan 200°C. Hasil penelitian menunjukkan bahwa suhu pemanasan optimum pada adsorpsi adalah 120°C dengan efisiensi adsorpsi sebesar 83,47%. Variasi pH yang digunakan pada penelitian ini adalah pH 2, 3, 4, 5, 6, dan pH asli limbah cair sintetis ion logam Pb(II) yaitu sebesar 5,3. Hasil penelitian menunjukkan bahwa pH optimum pada adsorpsi adalah pH 6 dengan efisiensi adsorpsi sebesar 71,08%. Data yang didapatkan kemudian dianalisis dengan analisis deskriptif dan analisis statistik dengan uji ANOVA *One-Way* dilanjutkan uji Duncan pada $\alpha = 0,05$, hasil penelitian menunjukkan adanya perbedaan efisiensi adsorpsi ion logam Pb(II) berdasarkan variasi suhu pemanasan adsorben dan pH.

Kata kunci: adsorben, adsorpsi, kulit buah kakao, ion logam Pb(II), TGA, pH_{pzc} , FTIR

Nilaturrohmah. 2020. The Allowance for Pb (II) Levels in Synthetic Liquid Waste with Adsorption Using Cocoa Skin (Theobroma cacao L.). This script was supervised by Dr. Eko Prasetyo Kuncoro, S.T., DEA. and Dr. Handoko Darmokoesoemo, Drs., DEA. Bachelor of Environmental Engineering, Department of Biology, Faculty of Science and Technology, Airlangga University.

ABSTRACT

This study aims to determine the differences in the adsorption efficiency of Pb(II) metal ions in synthetic wastewater using adsorbent of cocoa skin (Theobroma cacao L.) based on variations in heating temperature of adsorbent and pH, and to determine the characteristics adsorbent of cocoa skin based on analysis TGA, pH_{pzc} , and FTIR. Characteristics of cocoa skin adsorbent based on pH_{pzc} analysis obtained a pH_{pzc} value of 5,36, based on TGA analysis there were 4 stages of thermal decomposition of the adsorbent, and based on FTIR analysis there were hydroxyl groups (-OH), carbonyl groups (C=O), ring groups aromatic (C=C), group (C-O) of the acetyl lignin group, and groups (C-O-C and C-O) of cellulose and lignin carbohydrates. This research was conducted in a laboratory scale and the adsorption method used was a batch method. The variation of heating temperature of the adsorbent used in this study was 120°C, 150°C, and 200°C. The results showed that the optimum heating temperature at adsorption was 120°C with an adsorption efficiency of 83.47%. The pH variations used in this study were pH 2, 3, 4, 5, 6, and the original pH of the synthetic metal liquid Pb (II) that was equal to 5,3. The results showed that the optimum pH at adsorption was pH 6 with an adsorption efficiency of 71.08%. The data obtained were then analyzed with descriptive analysis and statistical analysis with the ANOVA One-Way test followed by Duncan test at $\alpha = 0.05$, the results showed differences in the adsorption efficiency of Pb (II) metal ions based on variations in the heating temperature of adsorbent and pH.

Keywords: *adsorbent, adsorption, cocoa skin, Pb(II) metal ions, TGA, pH_{pzc} , FTIR*