

**ADSORPSI DAN DESORPSI Pb (II) PADA TANAH TERCEMAR
LIMBAH PENAMBANGAN EMAS TRADISIONAL DI KULONPROGO,
DAERAH ISTIMEWA YOGYAKARTA**

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INTISARI

Penelitian yang mempelajari adsorpsi dan desorpsi Pb (II) pada tanah tercemar limbah penambangan emas tradisional di Kulonprogo, Daerah Istimewa Yogyakarta telah dilakukan. Pengelolaan limbah yang kurang baik dalam penambangan emas tradisional menghasilkan logam-logam yang terlepas di tanah secara bebas seperti Cd, Pb, Zn, Ni, Co dan Hg. Penelitian ini dilakukan melalui dua tahapan, pertama dilakukan penentuan sifat fisikokimia tanah yakni berupa kadar air, abu, pH, konduktivitas, kadar logam yang terkandung, total karbon organik, dan kapasitas tukar kation. Kedua dilakukan kajian terkait adsorpsi dan desorpsi tanah terhadap logam Pb yang dilakukan dengan variasi konsentrasi, pH, dan waktu.

Dari penelitian ini didapatkan hasil bahwa sampel 1 memiliki kadar logam yang paling tinggi, yakni Cd sebesar $328,02 \pm 4,95 \text{ mg kg}^{-1}$, Zn sebesar $389,29 \pm 2,90 \text{ mg kg}^{-1}$, Pb sebesar $4.039,30 \pm 46,94 \text{ mg kg}^{-1}$, dan Hg sebesar $15,53 \pm 0,48 \text{ mg kg}^{-1}$. Kajian adsorpsi dan desorpsi hanya dilakukan terhadap logam Pb (II) karena kandungannya yang paling tinggi baik dalam sampel 1 maupun sampel 2. Pada adsorpsi variasi konsentrasi, adsorpsi optimum mulai dari konsentrasi Pb 200 mol L^{-1} dengan jumlah Pb yang teradsorpsi sebesar $2.359,72 \text{ mg kg}^{-1}$. Adsorpsi variasi pH optimum pada pH 3,5 dengan jumlah Pb yang teradsorpsi sebesar $1.765,28 \text{ mg kg}^{-1}$. Pada kajian desorpsi variasi konsentrasi asam tartarat, desorpsi optimum mulai dari konsentrasi asam tartarat $0,8 \text{ mol L}^{-1}$ dengan jumlah Pb yang terdesorpsi sebesar $111,90 \pm 1,60 \text{ mg kg}^{-1}$, sedangkan desorpsi variasi pH optimum pada pH 3,5 dengan jumlah Pb yang terdesorpsi sebesar $80,42 \text{ mg kg}^{-1}$.

Kata kunci : adsorpsi, desorpsi, logam, penambangan emas, pencemaran

**ADSORPTION AND DESORPTION OF Pb (II) ON THE POLLUTED SOIL
OF TRADITIONAL GOLD MINING WASTE AT KULONPROGO,
DAERAH ISTIMEWA YOGYAKARTA**

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ABSTRACT

Adsorption and desorption studies of Pb (II) on the polluted soil of traditional gold mining waste at Kulonprogo, Daerah Istimewa Yogyakarta has been conducted. Improper waste management in traditional gold mining could generously spoil the surrounding soil with metals such as Cd, Pb, Zn, Ni, Co and Hg. This study consists of two steps. Firstly, physicochemical properties of soil like water content, ash content, pH level, conductivity, metal content, total organic carbon, and cation exchange capacity are calculated. Secondly, soils adsorption and desorption studies of Pb are conducted by varying its concentration, pH level, and time.

This study shown that sample 1 had the highest metal content, 328.02 ± 4.95 mg kg⁻¹ of Cd; 389.29 ± 2.90 mg kg⁻¹ of Zn; 4039.30 ± 46.94 mg kg⁻¹ of Pb; 15.53 ± 0.48 mg kg⁻¹ of Hg. Adsorption and desorption studies were conducted only for Pb (II) because its content was the highest both in sample 1 and sample 2. In adsorption with variation of concentration, the optimum adsorption started from concentration of Pb 200 mol L⁻¹ with the amount of adsorbed Pb was 2.359,72 mg kg⁻¹. The pH optimum adsorption variation at pH 3,5 with the amount of adsorbed Pb was 1.765,28 mg kg⁻¹. In desorption study with variation of tartaric acid concentration, the optimum desorption start from concentration of tartaric acid was 0,8 mol L⁻¹ with adsorbed Pb was $111,90 \pm 1,60$ mg kg⁻¹, while the pH optimum variation at pH 3,5 with desorpted Pb as much as 80,42 mg kg⁻¹.

Key words: adsorption, desorption, gold mining, metals, pollution