

KAJIAN ADSORPSI DAN DESORPSI Pb²⁺ PADA TANAH TERCEMAR LIMBAH PENAMBANGAN EMAS TRADISIONAL

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INTISARI

Kajian adsorpsi-desorpsi logam Pb dari sampel tanah tercemar limbah penambangan emas telah dilakukan. Penelitian ini bertujuan untuk mengkarakterisasi tanah sekitar industri yang diduga tercemar oleh limbah logam berat yang mencakup kadar air dan kandungan logam berat, mengetahui kapasitas adsorpsi tanah sekitar industri penambangan emas tradisional terhadap logam berat khususnya logam Pb dengan menggunakan instrumen serapan atom (SSA), dan mengkaji pengaruh variasi konsentrasi dan pH larutan asam sitrat terhadap desorpsi logam.

Sampel tanah pada penelitian ini dibagi menjadi tiga titik sampel berdasarkan tempat pengambilannya, yaitu titik sampel I, II, dan III. Sampel tanah dipelajari kadar air dan kadar logam berat yang terkandung. Kapasitas adsorpsi sampel diketahui dengan menginteraksikan larutan Pb(II) pada berbagai kontak waktu dan konsentrasi. Kajian desorpsi Pb(II) pada sampel dilakukan dengan penambahan larutan asam sitrat yang meliputi pengaruh konsentrasi dan pH. Konsentrasi Pb(II) yang terdapat dalam larutan setelah interaksi diukur dengan instrumen SSA.

Hasil penelitian menunjukkan titik sampel I memiliki nilai kadar logam Pb tertinggi dengan total sebesar 10.760 mg kg⁻¹. Isoterm adsorpsi Pb dalam tanah mengikuti isoterm Freundlich dengan nilai kapasitas adsorpsi maksimum sebesar 33.333 mg kg⁻¹ dengan waktu kontak selama 360 menit pada titik sampel I. Variasi konsentrasi dan pH sangat mempengaruhi proses desorpsi. Kenaikan konsentrasi menyebabkan desorpsi Pb semakin banyak. pH rendah digunakan dalam mendesorpsi logam. Desorpsi ini optimum terjadi pada konsentrasi larutan asam sitrat sebesar 0,8 mol L⁻¹ dan pH 2.

Kata kunci: adsorpsi, asam sitrat, desorpsi, tanah tercemar, timbal

A STUDY ON ADSORPTION AND DESORPTION OF Pb²⁺ IN POLLUTED SOIL OF TRADITIONAL GOLD MINING WASTE

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ABSTRACT

A study on adsorption-desorption of Pb from polluted soil samples around the traditional gold mining industry has been done. This research aim to characterize physicochemical properties and heavy metal content of soil samples which was suspected has been polluted by heavy metal waste, to know the maximum adsorption capacity of soil against heavy metals especially Pb metal by atomic absorption spectrophotometer (AAS), and to examine the effect of various concentration and pH of citric acid solution on Pb(II) desorption.

Soil samples were divided into three sample points based on places where they were taken, namely sample points I, II, and III. Soil samples were studied for water content and the content of heavy metals contained. The adsorption process was carried out by soil interaction with Pb(II) solution at various time of contact and concentration. The of Pb(II) desorption in samples was done by adding citric acid solution and the effect of concentration and pH are investigated. Pb concentration in the solution after the interaction was measured by AAS method.

The result showed that the sample point I had the highest values of total Pb content of 10,760 mg kg⁻¹. Adsorption isotherms of Pb in the soil followed the Freundlich isotherm with the largest value of adsorption capacity of 33,333 mg kg⁻¹ with the contact time up to 360 minutes for sample point I. Various concentration and pH greatly affected the desorption process. Increasing concentration caused amore desorption amount of Pb. ApH was effectively used in the desorption process. Optimum desorption occurred at pH 2 with 0.8 mol L⁻¹ of citric acid solution.

Keywords: adsorption, citric acid, desorption, lead, soil contamination