

**KAJIAN FISIKA-KIMIA TANAH, ADSORPSI DAN DESORPSI Co(II)
MENGGUNAKAN ASAM SITRAT PADA TANAH KAWASAN INDUSTRI
TEKSTIL DI PEKALONGAN**

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INTISARI

Kajian parameter fisika-kimia tanah, adsorpsi dan desorpsi kobalt menggunakan asam sitrat pada tanah sekitar industri tekstil telah dilakukan. Penelitian ini bertujuan untuk mengkarakterisasi tanah sekitar industri tekstil yang diduga tercemar logam berat dengan cakupan parameter fisika-kimia tanah dan kandungan logam berat, kapasitas adsorpsi tanah terhadap Co(II), kinetika adsorpsi Co(II) dan desorpsi dengan larutan pendesorpsi asam sitrat.

Sampel tanah dibagi menjadi tiga titik sampel berdasar tempat pengambilannya, yaitu titik sampel I, II, dan III. Sifat fisika-kimia sampel dipelajari meliputi kadar air dan abu, pH, konduktivitas listrik, karbon organik total (TOC), kadar nitrogen fosfor dan kalium, kapasitas tukar kation serta kadar logam berat. Kinetika adsorpsi dipelajari dengan proses adsorpsi Co(II) oleh tanah dan kinetika desorpsi Co(II) dipelajari dengan mendesorpsi Co(II) dengan larutan asam sitrat.

Sampel I, II, III memiliki nilai pH berturut-turut 5,22, 4,83 and 5,19, sedangkan KTK adalah 100,2, 72,7 and 59,4 $\text{cmol}^+ \text{kg}^{-1}$. Konsentrasi Co(II) pada sampel I, II, dan III adalah 130,9, 118,5 and 88,9 mg kg^{-1} . pH dan KTK pada sampel I tertinggi diantara semua sampel dan menunjukkan pengaruh terhadap konsentrasi Co(II) pada sampel I. Sampel I, II, III memiliki konsentrasi TOC berturut-turut 84,3, 78,5 and 61,3 mg C g^{-1} , dan kapasitas adsorpsi sebesar 2,300, 1,884 and 767 mg kg^{-1} . Kadar TOC menunjukkan pengaruh yang signifikan pada kapasitas adsorpsi Co(II) pada sampel tanah. Kinetika adsorpsi Co(II) pada seluruh sampel mengikuti isoterm langmuir. Desorpsi Co(II) optimum pada sampel I terjadi pada pH 4, konsentrasi asam sitrat 0.4 mol L^{-1} dan waktu kontak 10 jam. Kinetika desorpsi Co(II) pada sampel I dan III mengikuti kinetika Krosmeier-Peppas dan sampel II mengikuti kinetika Higuchi.

Kata kunci: pencemaran tanah, fisika-kimia tanah, kobalt, asam sitrat.

STUDY PHYSICOCHEMICAL OF SOIL, Co(II) ADSORPTION AND DESORPTION USING CITRIC ACID IN SOIL AROUND TEXTILES INDUSTRY IN PEKALONGAN

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ABSTRACT

Study of physicochemical parameters, adsorption and desorption of cobalt using citric acid to the soil around the textile industry have been done. The aims of the study are to characterize soil around textile industry which was suspected to be polluted by heavy metals with main scopes of physicochemical parameters of soil and heavy metal content, the capacity of soil adsorption of cobalt (Co(II)) adsorption capacity by the soil, adsorption kinetics of Co(II) and study of desorption kinetics of Co(II).

There are three samples from 3 area sampling point, labeled as sampel I, II, III. Physicochemical parameters in this study included water and ash content, pH, electric conductivity, total organic carbon (TOC), nitrogen, phosphorus and potassium, cation exchange capacity, and the heavy metal content. Adsorption kinetics was studied on adsorption of Co(II) on soil. Kinetics desorption study was performed using desorption of Co(II) in soil with the citric acid solution.

The sample I, II, III had the pH 5.22, 4.83 and 5.19 respectively, while CEC was 100.2, 72.7 and 59.4 $\text{cmol}^+ \text{kg}^{-1}$ respectively. The Co(II) concentration on sample I, II and III was 130.9, 118.5 and 88.9 mg kg^{-1} . pH and CEC on sample I highest among all samples and showed significant impact on Co(II) concentration of sample I. Sample I, II, III has TOC concentration is 84.3, 78.5 and 61.3 mg C g^{-1} respectively, and adsorption capacity is 2,300, 1,884 and 767 mg kg^{-1} respectively. TOC showed significant impact on the adsorption capacity Co(II) on soil samples. Adsorption kinetics of Co(II) on all soil samples followed the Langmuir isotherm. Sample I Co(II) desorption optimum at condition pH 4, citric acid concentration is 0.4 mol L^{-1} and contact time 10 hours. The desorption kinetics of Co(II) on sample I and III followed Krosmeier-Peppas Kinetic and sample II followed Higuchi kinetic.

Keyword: Soil Contamination, Soil Physicochemistry, Cobalt, Citric acid.