

**KAJIAN SIFAT FISIKA-KIMIA DAN ADSORPSI Zn(II) PADA TANAH KAWASAN INDUSTRI TEKSTIL DI BANTUL YOGYAKARTA SERTA PENGARUH ASAM SITRAT DAN ASAM OKSALAT TERHADAP DESORPSI Zn(II)**

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**INTISARI**

Kajian sifat fisika-kimia dan adsorpsi Zn(II) pada tanah kawasan industri tekstil di Bantul Yogyakarta serta pengaruh asam sitrat dan asam oksalat terhadap desorpsi Zn(II) telah dilakukan. Penelitian ini bertujuan untuk menganalisis sifat fisika-kimia tanah serta pengaruhnya terhadap adsorpsi dan desorpsi logam berat. Penelitian ini juga menguji isoterm adsorpsi dan kinetika desorpsi Zn(II) menggunakan larutan asam sitrat dan asam oksalat.

Sampel tanah dibagi menjadi tiga berdasarkan tempat pengambilannya, yaitu titik sampel I, II, dan III. Sifat fisika-kimia yang dipelajari meliputi kadar air, pH, kadar abu, karbon organik total, kapasitas tukar kation, daya hantar listrik, serta kandungan logam berat. Kapasitas adsorpsi diketahui dari proses adsorpsi Zn(II) oleh sampel tanah. Kinetika desorpsi dipelajari dengan mendesorpsi Zn(II) dari sampel tanah dengan larutan asam sitrat dan asam oksalat.

Sampel I, II, dan III mempunyai nilai kapasitas tukar kation (KTK) berturut-turut 1103,33, 1033,33, dan 207 cmol kg<sup>-1</sup>, sedangkan nilai karbon organik total (TOC) adalah 89,427, 11,040, dan 10,634 mg g<sup>-1</sup>. Konsentrasi Zn(II) pada sampel I, II, dan III adalah 728,682, 263,970, dan 236,468 mg kg<sup>-1</sup>. Kapasitas adsorpsi tanah sampel I, II, dan III berturut-turut 906,056, 691,163, dan 302,019 mg kg<sup>-1</sup>. Nilai KTK dan TOC pada sampel I tertinggi di antara semua sampel dan menunjukkan pengaruh terhadap konsentrasi Zn(II) serta kapasitas adsorpsi. Kinetika adsorpsi Zn(II) seluruh sampel mengikuti isoterm Freundlich. Desorpsi Zn(II) semua sampel optimum pada pH 3, asam sitrat 0,6 mol L<sup>-1</sup>, asam oksalat 0,4 mol L<sup>-1</sup>, dan waktu kontak 600 menit. Kinetika desorpsi sampel I, II, dan III mengikuti kinetika orde nol.

Kata kunci : adsorpsi, desorpsi, fisika-kimia tanah, pencemaran tanah, seng.

**STUDY OF PHYSICO-CHEMICAL PROPERTIES AND Zn(II)  
ADSORPTION IN SOIL AROUND TEXTILE INDUSTRY AREA IN  
BANTUL YOGYAKARTA AND THE EFFECT OF CITRIC ACID AND  
OXALIC ACID ON Zn(II) DESORPTION**

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**ABSTRACT**

Study of physico-chemical properties and Zn(II) adsorption in soil around textile industry area in Bantul Yogyakarta and the effect of citric acid and oxalic acid on Zn(II) desorption has been carried out. This study aims to analyze the physico-chemical properties of soil and its effects on heavy metal adsorption and desorption. This study also tested the adsorption isotherm and kinetics of Zn(II) desorption using citric acid and oxalic acid.

Soil samples were divided into three based on where they were taken, namely sample I, II, and III. The physico-chemical properties were moisture content pH, ash content, total organic carbon (TOC), cation exchange capacity (CEC), electrical conductivity, and heavy metal content. The adsorption capacity was known from the Zn(II) adsorption process by soil samples. Desorption kinetics were determined by adsorbing Zn(II) from soil samples with a solution of citric acid and oxalic acid.

Samples I, II, and III had CEC values of 1103.33, 1033.33, and 207  $\text{cmol kg}^{-1}$ , while the TOC values were 89,427, 11,040, dan 10,634  $\text{mg g}^{-1}$  respectively. The concentrations of Zn(II) in the samples I, II, and III were 906.056, 691.163, and 302.019  $\text{mg kg}^{-1}$ , respectively. The CEC and TOC values in sample I were the highest among all samples and showed the effect on the Zn(II) concentration and adsorption capacity. The Zn(II) adsorption kinetics of all samples followed the Freundlich isotherm. The optimum Zn(II) desorption conditions of all samples were at pH 3, citric acid 0,6  $\text{mol L}^{-1}$ , oxalic acid 0,4  $\text{mol L}^{-1}$ , and contact time of 600 minutes. The desorption kinetics of all samples followed by zero order kinetics.

**Keywords:** adsorption, desorption, soil physico-chemistry, soil pollution, zinc.