



## **IMMOBILIZATION OF DITHIZONE ONTO NATURAL ZEOLITE AND ITS APPLICATION AS AN ADSORBENT FOR Hg(II)**

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### **ABSTRACT**

The research about dithizone immobilization onto natural zeolite for adsorption of Hg(II) has been done. The research consisted of synthesis and characterization of dithizone-immobilization natural zeolite and study of adsorption for Hg(II). The synthesis of dithizone-immobilized natural zeolite was done by refluxing natural zeolite and dithizone that dissolved in toluene. Adsorbent characterization was performed using X-ray diffraction analysis, infrared spectrophotometer and gas sorption analysis.

The result of characterization showed that dithizone has been successfully immobilized onto the surface of natural zeolite. Optimum condition of the adsorption of Hg(II) was at pH 7 and 5 respectively. Adsorption kinetics parameter showed that Hg(II) adsorption rate constant of adsorbent unimmobilized zeolite and dithizone-immobilized zeolite was  $8.10 \times 10^{-3} \text{ minute}^{-1}$  dan  $1.30 \times 10^{-2} \text{ minute}^{-1}$ , respectively. Equilibrium constant of unimmobilized zeolite and dithizone-immobilized zeolite was  $2.76 \times 10^3 \text{ L/mol}$  and  $4.77 \times 10^5 \text{ L/mol}$ , respectively. Adsorption isotherm parameter showed that adsorption capacity of Hg(II) for dithizone-immobilized zeolite ( $1.31 \times 10^{-5} \text{ mol/g}$ ) was higher than that of unimmobilized zeolite ( $8.00 \times 10^{-6} \text{ mol/g}$ ). Adsorption equilibrium constant of Hg(II) for dithizone-immobilized zeolite ( $7.71 \times 10^6 \text{ L/mol}$ ) was higher than that of unimmobilized zeolite ( $1.92 \times 10^6 \text{ L/mol}$ ). Adsorption of Hg(II) on unimmobilized zeolite and dithizone-immobilized zeolite were chemisorption, with the adsorption energy was 36.088 kJ/mol dan 39.552 kJ/mol, respectively. Acid stability study showed that dithizone immobilized silica was not stable to acid influences such as HNO<sub>3</sub>. The application of adsorbent for adsorbed Hg(II) within synthetic sample resulted that dithizone-immobilized zeolite was more effective to adsorbed Hg(II) than unimmobilized zeolite. It could adsorbed 80.89% Hg(II) for the first adsorption and increased to 99.36% of 8.16 ppm Hg(II) for the second adsorption and for unimmobilized zeolite was 51.73% and 97.98% of 7.43 ppm Hg(II), respectively.

*Keywords* : natural zeolite, immobilization, dithizone, mercury.