Kinetics and Thermodynamic Study of Textile Dyes Using Copper Modified Natural Zeolite as an Adsorbents

by Dewi Yuanita Lestari, Endang Widjajanti, Jaslin Ikhsan, Eli Rohaeti

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kinetics and isotherm pattern of adsorption of *remazol black b* dye using Cu/natural zeolite adsorbent.

Cu /natural zeolite adsorbents have been activated by HCl solution and NH₄Cl solution and impregnated using Cu(NO₃)₂.3H₂O solution. Characterization of adsorbents using Scanning Electron Microscopy, X-Ray Diffraction (XRD), and Energy Dispersive X-Ray Sperctroscopy (SEM-EDX). Adsorptions were carried out at contact time 5, 15, 20, 60 and 300 minutes and variation in initial concentration of 5, 10, 15, 20, 25 and 30 ppm. UV-Vis spectrophotometer is used to find the maximum wavelength, make a calibration curve for a standard solution, and measure the concentration of a remazol black dye solution b. The result of the SEM observations shows that Cu impregnated zeolites were smaller in grain form compared to zeolites before impregnation of Cu. XRD analysis of zeolite was a mordenite mixture of 42.8%, cliptilolite 39.8%, and quartz 17%. EDX analysis shows the percentage of Cu mass in the adtrsorbent was 1.58%. The equilibrium contact time was reached in 300th minute with adsorption capacity 0,4299 mg/g. Adsorption capacity was 0,0691 mg/gram at remazol black b initial concentration was 25 ppm on equilibrium contact time. Adsorption of remazol black b dye using Cu/natural zeolite adsorbent follows the pseudo second order adsorption kinetics and Langmuir adsorption isotherm pattern. Thermodynamic parameters of the adsorption of remazol black b and remazol red b in the form of ΔG°, ΔH°, dan ΔS°

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