ABSTRACT

Textile wastewater generally contains toxic dyes, such as Remazol Brilliant Blue R. One method that can be used to address dye pollution is adsorption. Zeolite can act as an adsorbent for dye adsorption. Zeolite can be modified with polyaniline to increase its adsorption capacity. This study aims to synthesize zeolite/polyaniline composites with varying natural zeolite masses, determine the characteristics of each composite variation, and analyze the adsorption capacity of zeolite/polyaniline composites with varying natural zeolite masses. The initial stage of the research involves activating natural zeolite, then synthesizing zeolite/polyaniline composites using the in-situ polymerization method with varying amounts of zeolite, and finally characterizing them using SEM-EDX, FTIR, and GSA. Next, performance testing of the composite for dye adsorption was conducted. The synthesis results of the zeolite/polyaniline composite showed that the surface morphology of the zeolite/polyaniline composite was coarse-textured and porous. FTIR spectra indicated the presence of functional groups from zeolite and polyaniline, including O-H at 3623.25 cm^{-1} and 3374.34 cm^{-1}, and Si-OH groups at 1629.78 cm^{-1}. For polyaniline, the N-H groups were at 3325.56 cm^{-1}, O-H groups at 3182.81 cm^{-1}, and C=C groups at 1533.66 cm^{-1} and 1399.52 cm^{-1}. Activated zeolite has a surface area, pore volume, and pore radius of 39.8 m^2/g, 0.096 cm^3/g, and 12.8 nm, respectively. Meanwhile, the PANI/zeolite 1/1 composite has a surface area, pore volume, and pore radius of 31.3 m^2/g, 0.068 cm^3/g, and 12.7 nm, respectively. The best adsorption capacity for Remazol Brilliant Blue R was demonstrated by the PANI/zeolite 1/1 composite, with an adsorption capacity of 71.2 mg/g at a concentration of 120 ppm. The adsorption of Remazol Brilliant Blue R by the zeolite/polyaniline composite follows the Langmuir isotherm equation.

Keywords: adsorption, composite, polyaniline, natural zeolite, remazol brilliant blue r

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