ABSTRACT

Methylene blue contamination is one of the things that threatens the environment and living things. An effective method to reduce methylene blue contamination is by adsorption using zeolite. In this study, methylene blue adsorption was carried out with synthetic Na-A zeolite as an adsorbent with Response Surface Methodology (RSM). Na-A zeolite was synthesized using sodium silicate and sodium aluminate precursors. XRD, SEM-EDX and GSA characterization were carried out to confirm and determine the characteristics of the synthesized zeolite. The methylene blue adsorption experiment was carried out based on the RSM experimental design using Box-Behnken Design (BBD) to determine and evaluate the effect of test variables on the response. The variables used were contact time (minutes), pH, and adsorbent concentration (g/L). The XRD results showed that the synthesized zeolite was Na-A zeolite with good crystallinity. The SEM-EDX results showed that cubic crystals had formed with the percentage of Si/Al composition in the sample almost the same, namely 10.28% and 10.64%. The results of GSA characterization showed that the synthesized Na-A zeolite was classified as a mesoporous material. The adsorption results showed that the % of methylene blue adsorption was 14.46-78.90%. The results of the RSM analysis obtained showed that the quadratic model could be used to navigate the methylene blue adsorption experiment and the conclusion was that the optimum conditions for methylene blue adsorption were % adsorption at 80.64%. The appropriate kinetic model for methylene blue adsorption using Na-A zeolite is a pseudo-second-order kinetic model.

Keywords: Zeolite Na-A, Methylene Blue, Adsorption, RSM