ABSTRACT

The content of methylene blue substances in textile industry waste can cause side effects such as digestive tract irritation, skin irritation, and others. One of the efforts to deal with this is to use an adsorbent that will absorb (adsorption) of methylene blue substances. In this study, the adsorbent used were AlO(OH) *nanoparticles obtained from bauxite ores by the Bayer Process. Then, the results obtained were calcined at temperatures of 300^oC, 400^oC, and 500^oC and characterized by X-Ray Diffraction (*XRD*) and Surface Area Meter (*SAM*). The* XRD *results showed that samples with calcination of 300^oC and 400^oC produced* AlO(OH) *nanoparticles, while at calcination temperature of 500^oC the sample produced mixed elements. The resulting* AlO(OH) *nanoparticles have an orthorhombic structure as well as crystal sizes of 2.73 nm and 2.28 nm. The* BET *results showed that AlO(OH) nanoparticles with 400^oC calcination had a surface area of 347.657 m2/g and particle size of 5.73 nm. Then the* AlO(OH) *nanoparticles are tested for their adsorption capabilities using methylene blue. The test results showed* AlO(OH) *nanoparticle adsorbent with 400^oC calcination had better adsorption capabilities than other samples. The adsorption of methylene blue with* AlO(OH) *nanoparticles was more in accordance with Langmuir Isotherm with a value of R^2 = 0.9446 and maximum adsorption capacity of 25.773 mg/g. Then the kinetic analysis of adsorption is more in accordance with order 3 with the largest reaction rate constant value of 0.0001.*

Keyword: Adsorbent, Adsorption, Boehmite (AlO(OH)), *Nanoparticle, Bayer Process*