ABSTRACT

Zirconium silicate ($ZrSiO_4$) testing as an adsorbent is carried out by varying the activation temperature, stirring time and variations in methylene blue concentration. The adsorption process is carried out by dissolving a sample of zirconium silicate ($ZrSiO_4$) that has been activated into a solution of methylene blue dye and stirred using a magnetic stirrer at a certain speed which is then measured adsorbantion value using a UV-VIS spectrophotometer. From the research that has been carried out, the surface area of zirconium silicate ($ZrSiO_4$) is 10,365 m^2 / g, with a particle size (D) of 126,945 nm. Zirconium silica ($ZrSiO_4$) has a tetragonal crystal structure with crystal sizes for temperatures of 700^oC, 600^oC, and 500^oC respectively of 50.9369 nm, 47.5481 nm, and 52.8192 nm. Based on the correlation value (R^2) of adsorption isotherm analysis, it is concluded that Langmuir isotherms are closer to experimental data compared to Freundlich isotherms with a correlation value (R^2) of 0.8176 which indicates that the adsorption process is dominated by monolayer absorption, with a maximum adsorption capacity (q_m) value of 19.763 mg/g. The adsorption kinetics that occur follow the 2nd-order kinetic model with a correlation value (R^2) closest to 1 and the largest reaction rate constant (k_2) of 0.6668 min^{-1} which occurs at a concentration of 5ppm.

Keywords: activation, zirconium silica (ZrSiO4), adsorption, XRD, Surface Area Meter