

# The Effect of Sodium Hydroxide (NaOH) Solution Concentration on Properties of Geopolymer Paste

## Abstract

This research analyzes the effect of sodium hydroxide (NaOH) solution concentration ranging from 8M to 12M as alkaline activator on the properties of geopolymer paste. Alkaline activator is essentially a mixture of sodium hydroxide and sodium silicate solution. In this research, the main component used was raw kaolin. In order to produce kaolin based geopolymer paste, the alkaline activator solution was prepared with 0.24:1.00 ratio of  $\text{Na}_2\text{SiO}_3/\text{NaOH}$  and this alkaline activator solution was prepared for 24 hours prior before used in another process. The solid-to-liquid ratio which is kaolin-to alkaline activator solution ratio was 0.80:1.00. The mixture of kaolin based geopolymer paste were placed in cube moulds with a size of 50x50x50 mm, and left for 24 hours until it hardened. Then, the samples were cured at 80°C in the oven for 24 hours. The samples of kaolin based geopolymer paste were tested based on compressive strength, morphology analysis, water absorption and porosity after 28 days. In this project, 8M concentration of NaOH solution was the best concentration in order to study the synthesis of kaolin based geopolymer paste as the sample had the highest amount of compressive strength with 0.992 MPa and had the lowest water absorption and porosity with 1.246% and 24.08% respectively. Scanning Electron Microscope (SEM) was used to observe the morphological structure of the kaolin based geopolymer paste. The sample with 8M concentration of NaOH solution shows that least amount of unreacted particles. The structure of kaolin based geopolymer paste was more dense at 8M concentration as the size of pore decreases. The kaolin based geopolymer paste is suitable for use in the construction building industry as a finishing product such as coating.