

## **Kaolin-based geopolymers with various NaOH concentrations**

### **Abstract**

Kaolin geopolymers were produced by the alkali-activation of kaolin with an activator solution (a mixture of NaOH and sodium silicate solutions). The NaOH solution was prepared at a concentration of 6-14 mol/L and was mixed with the sodium silicate solution at a Na<sub>2</sub>SiO<sub>3</sub>/NaOH mass ratio of 0.24 to prepare an activator solution. The kaolin-to-activator solution mass ratio used was 0.80. This paper aimed to analyze the effect of NaOH concentration on the compressive strength of kaolin geopolymers at 80 C for 1, 2, and 3 d. Kaolin geopolymers were stable in water, and strength results showed that the kaolin binder had adequate compressive strength with 12 mol/L of NaOH concentration. When the NaOH concentration increased, the SiO<sub>2</sub>/Na<sub>2</sub>O decreased. The increased Na<sub>2</sub>O content enhanced the dissolution of kaolin as shown in X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FTIR) analyses. However, excess in this content was not beneficial for the strength development of kaolin geopolymers. In addition, there was the formation of more geopolymeric gel in 12 mol/L samples. The XRD pattern of the samples showed a higher amorphous content and a more geopolymer bonding existed as proved by FTIR analysis.

### **Keywords**

Compressive strength; Geopolymers; Kaolin; Sodium hydroxide