Yudthana Leelathawornsuk 2009: The Role of Sodium Hydroxide Concentration in Fly ash-Based Geopolymer. Master of Engineering (Civil Engineering), Major Field: Civil Engineering, Department of Civil Engineering. Thesis Advisor: Associate Professor: Prasert Suwanvitaya, Ph.D. 88 pages.

The purpose of this study is to determine the effect of concentration of sodium hydroxide solution on fly ash-based geopolymer. This experiment, class C and class F fly ash in accordance with ASTM C618 were used. The fly ash samples were suspended in 4M sodium hydroxide solution. The dissolution samples with different proportions were analyzed with inductively coupled plasma emission spectrometer to determine the amount of silica, alumina and calcium dissolutions. Compressive strength and setting time of geopolymer were also tested. The compressive tests were conducted after aging the specimen at 1, 3, 7, 14 and 28 days. The mineralogical composition and microstructural of the geopolymer were determine by using X-ray diffraction and Scanning electron microscopy.

From the experiment results, the solubility of fly ash depending on the proportions and properties of fly ash. Class F fly ash containing higher amount of silica and alumina than class C fly ash but calcium ion was more dissolved from class C fly ash than class F fly ash. After the sodium silicate was added in the dissolution liquid, it had no formation because of the precipitation of fly ash was helpfully for the formation of geopolymer. Class C fly ash-based geopolymer produced higher compressive strength than class F fly ash-based geopolymer. High compressive strength was obtained with the use of 60% fly ash and 40% solution by weight. Scanning electron microscopy (SEM) of the geopolymer indicated that high percentage of fly ash produced low porosity and high density of geopolymer.

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