

Jirabute Kuntreerattanarom 2011: The Influence of Sodium Hydroxide Molarity and Leaching Time on The Properties of 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. 80 pages.

The purpose of this study was to determine the influence of sodium hydroxide molarity and leaching time on the properties of fly ash-based geopolymer. In this experiment, class C and class F fly ash in accordance with ASTM C618 were used. Fly ash samples were dissolved in sodium hydroxide solution. The mix was left standing for a pre-specified period, after which a sample was taken from the solution to determine the amount of silica, alumina and calcium ions leached out. Sodium silicate was then added and the solution thoroughly mixed together. Samples from the mixtures were then taken for determination of setting times and compressive strength. Broken pieces were collected for X-ray diffraction and Mercury Intrusion Porosimetry examination.

From the experimental results, the amounts of dissolved silica, alumina and calcium from fly ash depended on leaching time and molarity of NaOH. Maximum leachates were obtained at 20 minutes. Higher concentration of NaOH extracted more silica and alumina but less calcium. The concentrations of dissolved calcium ions from class C fly ash were higher than class F fly ash at all leaching times. Examination of Si/Al ratio showed the increase in the ratio increased the compressive strength of the matrix. The pore size and porosity of both classes of fly ash increased as the leaching time increased, resulting in the decrease in strength. From XRD analysis, the relative intensity of peaks in class C fly ash were higher than class F fly ash, suggesting that more dissolution from class C fly ash than class F had a significant effect to the peak of relative intensity which was compatible with compressive strength results.

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