Rattanakorn Na Wittayanan 2009: The Effect of Pre-Dissolution Time to Geopolymer Properties. Master of Engineering (Civil Engineering), Major Field: Civil Engineering, Department of Civil Engineering. Thesis Advisor: Associate Professor Prasert Suwanvitaya, Ph.D. 71 pages.

Geopolymerization is the reaction between rich silica (Si) and alumina (Al) base materials and highly alkaline solution. The result from this reaction is a new material with cement-like workability and engineering properties. This paper presents the effect of pre-dissolution time on geopolymer properties by investigating the dissolution of Al, Si and Ca ions using ICP-OES method. The study was conducted by using class C and class F fly ash as the base materials, dissolved by 4 M of NaOH and varied in pre-dissolution times between 5 - 180 min. Na_2SiO_3 was then added to produce geopolymer.

The results showed that the effect of pre-dissolution time on the dissolution of ions that Si, Al and Ca increased to a maximum values at pre-dissolution time of 30 min for both classes of fly ash. After that, the concentration decreased. For Al, the dissolution continued until end of experiment for class F fly ash. For compressive strength, there was no difference on strength prepared by class F fly ash when increased pre-dissolution times while increase pre-dissolution time decreased strength for geopolymer prepared by class C fly ash. It was found that initial and final setting times increase as the pre-dissolution time increase for both materials. Geopolymer prepared by class C fly ash faster setting than class F geopolymer. For the microstructure analysis, geopolymer was a composite material which consisted of matrix, surrounded by non-reacted fly ash. This hardening led to compressive strength of geopolymer. The high amount of Al and Si dissolution increased the density of matrix. The XRD results indicated that geopolymer showed the same basic features mostly attributable to reacting fly ash. For instance, peaks due to haematite (F), quartz (Q) and mullite (M) were all regularly observed.

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