

Thesis Title	Factors Affecting Physical Properties and Compressive Strength of Fly Ash-based Geopolymer
Author	Hongsheng Cheng
Degree	Master of Science (Materials Science)
Advisor	Asst. Prof. Suthee Wattanasiriwech, Ph. D.
Co-Advisor	Assoc. Prof. Darunee Wattanasiriwech, Ph. D.

ABSTRACT

Fly ash particle size distribution and curing conditions, such as curing atmosphere, activation temperature and initial water content, are important for mechanical properties of fly ash-based geopolymers. This work has been done to study the relationship between the factors above and compressive strength, as well as the physical properties including apparent density, bulk density and porosity. To make sure the study was consistent, the Si:Al:Na molar ratio was kept as constant at 2.46:1:1.38 throughout this research. The effect of curing atmosphere on compressive strength and physical properties was evaluated by comparing the specimens kept either in saturated or open condition. Activation temperatures of 60, 75 and 90 °C in parallel with various initial water content of 29, 34 and 44 wt% were selected in finding the optimum activation condition. Finally, as received fly ash and fly ash with milling time of 10 min were chosen to study effect of particle size on compressive strength and physical properties. Compressive strength has been studied by universal testing machine (UTM). To observe the microstructure, scanning electron microscope (SEM) has been used. Following ASTM C 642-06, physical property values were

obtained. X-ray diffraction (XRD) has been used for roughly analyzing the phase. In summary, the highest compressive strength was obtained at the activation temperature of 75 °C compared to 60 °C and 90 °C, under saturated condition, using finer fly ash and with lower initial water content.

Keywords: Fly ash/Geopolymer/Compressive strength/Density/Saturated/Initial water/Particle size/Activation temperature

