Thesis Title	Effect of Particle Size of Fly Ash with Burned and Unburned Calcium Carbide Residue on Compressive Strength of Mortar
Thesis Credits	12
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Degree of Study	Master of Engineering
Department	Civil Engineering
Academic Year	1998

Abstract

In this thesis, a development of compressive strength of fly ash and calcium carbide residue was studied. This mortar is made from fly ash, a by-product of burning coal from Mae Moh power plant, and calcium carbide residue, a by-product from producing acetylene gas, as a new cementitious material. Calcium carbide residue used in this studied was divided into two groups. The first group was unburned and the second group was burned at 200, 400, 600 and 800^{o}C. Both groups of calcium carbide residues were ground to high fineness and also classified into three particle sizes, then mixed with classified fly ashes, which had three different particle sizes. The mixing ratio of calcium carbide residue to fly ash was 30:70 by weight. Each size of calcium carbide residue and fly ash was mixed to from cementitious materials. Chemical and physical properties of both materials were investigated. The compressive strengths of standard mortar cube of 2×2×2 in. made from mixture of calcium carbide residue and fly ash were determined at the age of 1, 3, 7, 14, 28, 60 and 90 days.

The results presented that the mortar made from fly ash with burned calcium carbide residue had higher compressive strength and less setting time than the mortar made from fly ash with unburned calcium carbide residue. Compressive strengths of mortar made from fly ash with calcium carbide residue burned at 200 and 400^{o}C were almost as high as those of standard mortar. Mortar made from a 5 micron mean particle size of fly ash and a 72 micron mean particle size of calcium carbide residue burned at 200 and 400^{o}C were about 300 ksc or 90 and 93 percent of that of the standard mortar at 90 days. These mixtures had initial setting times

of 80 and 100 minutes respectively, and the same final setting time of 270 minutes. The highest compressive strength of mortar made from fly ash and unburned calcium carbide residue was the mixture of 9 micron mean particle size of fly ash and 4.5 micron mean particle size of unburned calcium carbide residue. It was 41 percent of the standard mortar strength at 90 days. The initial and final setting times of this mixture were 220 and 390 minutes, respectively, while the cement paste had initial and final setting times of 107 and 165 minutes, respectively. The results above suggested that the use of mixture of fly ash and calcium carbide residue as new cementitious material was possible. Since the compressive strength and setting times closed to that of standard mortar and cement paste. However, further research should be developed and emphasized on concrete properties such as bond, creep, shrinkage, modulus of elasticity, coefficient of thermal expansion, etc.

Keywords : Classified Fly Ash / Calcium Carbide Residue / Cementitious Material / Classified / Particle / Setting Time / Compressive Strength