

Thesis Title	Attack of Various Concentration of Sulfuric Acid on Fly Ash-Cement Mortars
Thesis Credits	12
Candidate	Miss Fongjan Jirasit
Supervisors	Asst. Prof. Dr. Chai Jaturapitakkul Assoc. Prof. Dr. Kraiwood Kiattikomol
Degree of Study	Master of Engineering
Department	Civil Engineering
Academic Year	1998

#### Abstract

In this study, the corrosion effects of various concentrated sulfuric acid solutions on mortar consisting of different mixtures of cement and classified and ground coarse fly ashes were investigated. Five different particle sizes obtained from air classification and grinding of Mae Moh fly ash replaced cement in mortar in the proportion of 0, 20, 35 and 50 percent by weight. The cementitious material (cement plus fly ash) to sand ratio was varied as 1:1.75, 1:2.75 and 1:3.75. Mortar specimens of 50x50x50 mm with controlled flow between 105-115 were cast and removed from the molds after 24 hours and cured in saturated lime water for 28 days. After 28 days, the mortars were divided into 2 groups. The first group was tested for compressive strength and the second was immersed in 3, 0.2 and 0.02 percent sulfuric acid solutions, which referred to pH of 0.5, 1.5 and 2.5, respectively. The corrosion resistance in term of weight loss of mortar due to sulfuric acid attack after immersing at 1, 3, 7, 14, 28, 60 and 90 days was observed.

The results showed that fine classified fly ash greatly enhanced the quality of mortar in both workability and compressive strength while coarse fly ash had inverse results. However, the coarse fly ash after grinding and classifying showed better performance in reducing the water requirement as well as increasing compressive strength. At 28 days of curing, mortar mixed with high fineness of fly ash had higher compressive strength than that of the control. Compressive strength also increased with the increase of cementitious material content but reduced with the increase replacement of cement by fly ash.

In the case of corrosion of mortar due to sulfuric acid solutions of 3, 0.2 and 0.02 percent concentration by weight, the results showed that weight loss was reduced with the reduction of acid concentration but the characteristic of corrosion was different in the various mix proportions. Reducing the cementitious material content and increasing the fly ash replacement reduced the degree of corrosion in high concentrated acid solutions. However, the high permeability of the mortar was another factor that contributed to the higher corrosion of mortar when the degree of acid concentration was reduced. Increasing of fly ash replacement content was another factor enhancing the rate of corrosion of mortars when immersed in 0.02 percent sulfuric acid solution (pH 2.5).

Keywords: Classified / Ground Coarse Fly Ash / Cementitious Material / Sulfuric Acid / Concentration / Mortar