

Thesis Title	A Study of Properties of Concrete Mixed with Palm Oil Fuel Ash
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Abstract

This research intends to develop the Palm Oil Fuel Ash (POFA) as a pozzolanic material for making concrete. Original POFA (Coarse POFA) from palm oil mills was ground to improve the quality until the particle sizes retained on a sieve No. 325 were 15-20 (fine POFA) and less than 5 percent (very fine POFA) by weight. Then, Portland cement type I was partially replaced by ground or unground POFA at the rate of 10, 20, 30 to 40 percent by weight of binder to produce concretes. The mixing water was adjusted to obtain slump of concretes between 5-10 cm. Setting times of fresh concrete were investigated. Compressive strengths of concretes were determined by using cylindrical concrete of 10x20 cm. All concretes were separated into 2 groups, the first group was cured in water and tested for the compressive strength at the ages of 3, 7, 14, 28, 60, 90, 180, 270, and 360 days. The second group was immersed in 5 percent of magnesium sulfate solution and was tested to determine the compressive strength at the ages of 60, 90, 180, 270 and 360 days. Concrete bars of 7.5x7.5x28.5 cm containing POFA immersed in 5 percent of magnesium sulfate solution were tested for expansion until 364 days.

The results revealed that the initial and final setting times of concretes mixed with POFA were increased with the increase of POFA replacement. After grinding, the use of ground POFA reduced setting time as compared to that of unground POFA. Concretes mixed with original POFA had the compressive strength lower than that of Portland cement type I concrete and decreased as the increase of POFA replacement. However, the concretes mixed with fine and very fine POFA at 10

and 20 percent, respectively gave the compressive strength as high as that of Portland cement type I concrete at the age of 90 days. For concretes immersed in magnesium sulfate solution, the compressive strengths of all concretes were as high as those of concretes cured in water and reduced after 360 days. The strength loss of POFA concretes in magnesium sulfate solution was increased with the increase of POFA replacement. However, the compressive strength of concrete mixed with 10 percent of very fine POFA was higher than that of Portland cement type V concrete although it was immersed in magnesium sulfate solution for 360 days.

The expansions of concrete bars containing high fineness POFA were less than those of concrete bars containing low fineness POFA and decreased as the increase of POFA replacement. The expansions of all concrete bars containing very fine POFA at the age of 364 days were less than that of concrete bar made from Portland cement type I. Additionally, at 40 percent replacement of high fineness of POFA, the expansion was less than that of concrete bar made from Portland cement type V. The POFA concrete bars showed less corrosion, with only small spalling at the edge of samples.

Keywords : Palm Oil Fuel Ash / Pozzolanic Material / Setting Time / Compressive Strength /
Expansion / Concrete