Pozzolanic reactivity and strength activity index of mortar containing palm oil clinker pretreated with hydrochloric acid

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ABSTRACT

Palm oil clinker powder (POCP) is an agro waste material that is often overlooked due to its low pozzolanic reactivity and contaminated with impurities and organic carbon. Therefore this study was proposed to enhance the pozzolanic reactivity of palm oil clinker powder through a chemical pre-treatment process. Characterization of treated and untreated POCP is determined through chemical oxides composition, mineralogical characteristics and microstructure properties. Its effect on the hydration of cement was studied through the inclusion as cement replacement material in mortar mixtures at the level of substitution of 2.5, 5.0, 7.5, 10.0, 12.5 and 15.0% (by weight of cement) for pre-treated and untreated POCP. Based on the findings, the pre-treatment process would enhance the pozzolanic reactivity of POCP up to 170% higher, increase the proportion of amorphous silica up to 9.6% higher, and better contribute to the strength development of mortar than untreated POCP. Hence, proving the effectiveness of chemical pre-treatment in producing pozzolanic POCP as a promising supplementary cement material.

KEYWORDS

Palm oil clinker; Pre-treatment; Pozzolanic; Strength; Cement

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