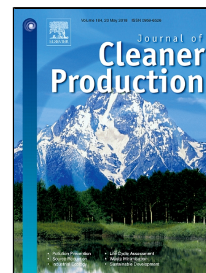


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High volume cement replacement by environmental friendly industrial by-product palm oil clinker powder in cement – lime masonry mortar

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Abstract

Cement-lime based mortar is extremely popular for a wide range of construction around the world and conserving natural resources used in the production of such material is of capital importance. Identification of alternative materials from palm oil based industrial by-products enabled researchers to use palm oil clinker powder (POCP) as a cement replacement material; in this research work, POCP was used as cement replacement material in masonry mortar. The physical, chemical properties and SEM of POCP were analyzed to investigate the feasibility of utilizing POCP as cement replacement for up to 80%. Based on the feasibility study, final mortar mixes were prepared utilizing 40% of POCP. Further investigations were carried on fresh, mechanical and bond properties of mortar. The hardened properties for mechanical performance and ultrasonic pulse velocity (UPV) investigated in water and air cured regimes show that up to 40% of cement could be replaced to obtain the requisite compressive strength of 12.4 MPa for cement-lime mortar. Further, POCP ground to more number of cycles had minor impact on the mechanical properties. The investigation on the potential use of POCP as cement replacement confirmed the potentiality through energy saving, cost effective and cleaner environment.

Keywords: Cement –lime mortar; palm oil clinker powder; mechanical performance; flexural bond strength; cost saving; energy and sustainability.

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