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THE INTRODUCTION OF DREDGED DAM SLUDGE LIKE CEMENT SUBSTITUTE IN CEMENTITIOUS PRODUCTS

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Abstract

The siltation of dams and the rate of cement used in cementitious products must be reduced because the production ravages the ecosystem. This article proposes a solution to these two environmental problems. The solution is to introduce calcined dredging sludge as a partial replacement for cement. To improve the pozzolanic efficiency of the sludge, thermal treatment at different rates (5, 10, and 20 °C/min) was applied, and various percentages of sludge for partial cement replacement were selected (5, 10, and 20% by weight). The setting time, the degree of hydration, the migration of chloride ions, the porosity, etc, were studied. Because of a low percentage of kaolin, the pozzolanic reaction was insufficient. However, the filler and dilution effects contributed to maintaining the characteristics of the cementitious products manufactured by modified cements in contact with the products developed by ordinary Portland cement (CEMI). The filler effect added more precipitation and nucleation sites for the hydrate formation, improving the modified cement pastes hydration temperature against CEMI paste. Despite reducing cement minerals, the dilution effect created more space to hydrates for multiplication. At 28 days, the lowest compressive strength recorded by the modified cements is 41MPa, a reduction of 9% compared to the CEMI mortar. The chloride ions penetration and water porosity do not exceed 1 mm and 3%, respectively, synonymous with the appropriate compactness of modified cement products. The results encourage the use of modified cements as a finishing material.

Key words: cement, dredged sludge, environment, substitution, thermal treatment

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