An Experimental Approach of the Reuse of Dredged Sediments in a Cement Matrix by Physical and Heat Treatment

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Abstract : In this study, a sediment was used as a secondary raw material in cement substitution with prior treatment. The treatment adopted is a physical treatment involving grinding and separation to obtain different fractions, using a dry method (1 mm, 250µm, 120µm) and washing method (250µm and 120µm). They were subsequently heat treated at temperatures of 650°C, 750°C and 850°C for 1 hour and 3 hours, in order to enable chemical activation by decarbonation or by pozzolanic activation of the material. Different characterization techniques were performed. The determination of main physical and chemical characteristics was obtained through multiple tests: particle size distribution, specific density, the BET surface area, the initial setting time and hydration heat calorimetry Langavant. The chemical tests include: ATG analysis, X-ray diffractometry (XRD) and X-ray fluorescence (XRF) which were used to quantify the fractions, phases and chemical elements present. Compression tests were performed conforming NF EN 196-1 French standard, over terms of 7 days - 14 days - 28 days and 60 days on all formulated mortars: reference mortar based on 100% CEM I 52.5N binder and cement substituted mortars with 8% and 15% by treated sediment. This clearly evidenced contribution due to the chemical activity which was confirmed by calorimetry monitoring and strength investigation.

Keywords : sediment, characterization, grinding, heat treatment, substitution

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