

LIME-METAKAOLIN HYDRATION PRODUCTS: A MICROSCOPY ANALYSIS

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Abstract

Metakaolin (MK) is nowadays a well-known pozzolanic material being used in cement-based materials, like mortars and concretes. The reaction of MK with calcium hydroxide yields cementitious products, being calcium silicate hydrate (CSH), stratlingite (C_2ASH_8) and tetra calcium aluminium hydrate (C_4AH_{13}) the main phases formed at ambient temperature. The transformation of stratlingite and C_4AH_{13} into hydrogarnet at long term is an important issue that may result in an increase in the porosity and a loss of compressive strength that can induce a complete material degradation.

With the objective of studying the compounds formed in lime/MK pastes and their stability during time, blended pastes were prepared with several substitution rates (in weight) of lime by MK, and maintained at $RH > 95\%$ and 23 ± 2 °C. XRD and TGA-DTA were used to follow the kinetics of the lime/MK hydration as well the reaction products. Microscopic tests (SEM-EDS) results are performed and compared with the thermal and mineralogical data. The results obtained show that the quantity of the hydration products formed changes with the lime replacement, being the aluminum and calcium silicates more abundant in the higher MK content pastes, and C_4AH_{13} , $C_4A\bar{C}H_{11}$ and C_2ASH_8 the major phases formed up to 90 days of curing.

Keywords: microscopy; XRD; TGA-DTA; lime; metakaolin