

Delayed Ettringite Formation and Alkali Silica Reaction, An Unexpected Phenomenon in Pastes of Portland Cement with Nanometric Silica Waste

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The replacement of Portland cement by alternative materials is nowadays a common practice and its advantages are widely accepted. For the development of this work, the substitution of Portland cement by a potential material, which is obtained as byproduct of a Mexican geothermal plant during the generation of electric energy, was carried out. The geothermal waste (GW) is mainly amorphous nanometric silica. Pastes with 0, 10 and 20% of GW, cured at 20 and 60°C were prepared. The XRD (quantitative) and SEM analyses showed that the clinker phases were more reactive in the presence of the GW, lowering the porosity and the calcium hydroxide content. Nevertheless, the presence of alkali silica reaction gel and ettringite was observed for the pastes with 20%GW, with its absence for the neat cement and 10% GW pastes. The formation and evolution of these phases will be analyzed in the extended version.