

Fayoum University
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Formation and Characterization of Calcium Sulphoaluminate hydrates prepared by precipitation and firing from nano-materials

By

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Approval Sheet

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Abstract

Calcium sulfoaluminate cement is not silica based binder, but it is sulfate phases produced by burning of gypsum, bauxite, and limestone in a conventional rotary kiln at 1300°C. The production of this kind of binders demonstrates many advantages when compared with ordinary

Portland cement, among which a reduced environmental impact, due to the lower burning temperature and lower CO₂ emission can be highlighted. The hydration of calcium sulphoaluminate in combination with gypsum and calcium hydroxide (CH) results in the formation of Ettringite (AFt) during the early hydration stage. AFt formation has been studied in synthesis reaction, as well as in cement during the reaction of calcium aluminates with sulfate ions. This work aimed to throw light on the nanosilica (NS) role on the formation of AFt phase by two different methods. The first one is the direct hydration of different mixes containing its nano-sized constituents, i.e. Ca(OH)₂, Al(OH)₃ and gypsum. The second one is the indirect method, in which the prepared mixes were hydrated after firing at a suitable temperature. Accordingly, a suitable method of preparation has been selected. The prepared samples were characterized by XRD, DTA and TGA techniques. It can be concluded that, the presence of NS in the used mixes for AFt synthesis, enhances its formation. Also, the firing method is more preferable than the precipitation method for AFt formation, because the AFt rate formation from the pre-fired mixes is higher than that of precipitation method.