



Influence of some additives on cement hydration

Preservation of natural resources in construction is today a major issue at the same time as reducing the emission of greenhouse gas. The use of blended cement in construction allows reaching these aims. Blended cements are a blend of portland cement and a combination of any one or more supplementary cementing materials such as slags, silica fume, fly ash or natural pozzolans.

Natural pozzolans have been used since antiquity with excellent results for the production of durable concrete. By-products as pozzolanic additions are now routinely used for the production of high-performance concrete. Fly ashes and silica fume are used to improve the resistance of concrete to the attack in aggressive environments. Recently, some activated materials such as metakaolin, which is produced by heating kaolinite, have been shown to have excellent pozzolanic properties.

Depending on the characteristics of these materials the kinetic of the cement hydration and the nature of hydrates phases can be modified. The understanding of this behavior is key to optimize the composition of such blended cement.

This study aims to depict the physico-chemical modifications induced by the additives on the cement hydration. The selected additives are a natural pozzolan, a zeolite and a metakaolin. From the preparation in laboratory of the blends, the cement hydration will be monitored by thermal analysis, XRD, FTIR and ^{29}Si and ^{27}Al NMR. These physico-chemical modifications will be coupled of the macroscopic evolution of the specimens and the evolution of their microstructure by means of SEM examinations.

Skills : Caractérisation des matériaux, Minéralogie, Expérimentation de laboratoire, Autonomie.

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