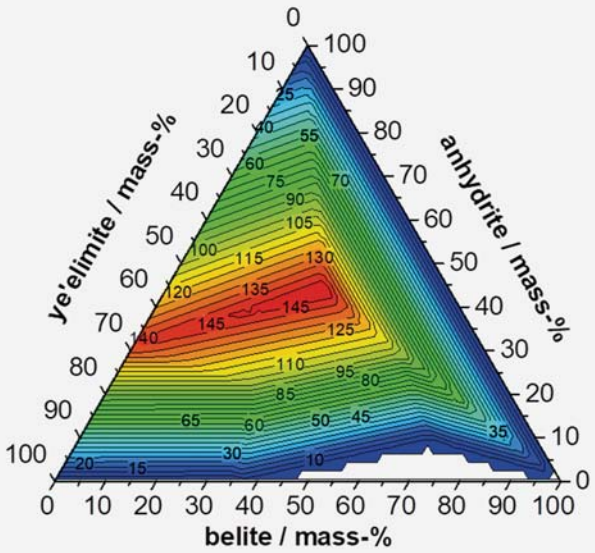
INTERNATIONAL WORKSHOP ON

Calcium sulfoaluminate cements



Theoretical amount of ettringite calculated by thermodynamic modelling
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CLINKERING OF CALCIUM SULFOALUMINATE CLINKERS: POLY-MORPHISM OF YE'ELIMITE

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The manufacture of CSA cements is more environmentally friendly than that of OPC as it releases less CO_2. This reduction depends on CSA composition and is due to three factors: i) less emissions from decarbonation in the kilns; ii) lower clinkering temperature, consequently less fuel is needed, and iii) it is easier to grind, implying a depletion in indirect emissions.

CSA cements are prepared by mixing the clinker with different amounts of calcium sulfate as a set regulator. Their main performances are fast setting time (followed by a rapid hardening), good-chemical resistance and, depending on the amount of the added sulfate source they can work as shrinkage controllers.

CSA cements present a wide range of phase assemblages, but all of them contain over 50 wt% of ye'elimite ($C_4A_3\bar{S}$) jointly with belite (C_2S), tetracalcium aluminoferrite (C_4AF) and other minor components such as CA, $C\bar{S}$, $C\bar{S}H_2$ and so on [1]. Ye'elimite is also included (~25 wt%) in BYF (Belite-Ye'elimite-Ferrite) or BAY (Belite-Alite-Ye'elimite) clinkers.

Ye'elimite has a sodalite type structure with general composition, $M_4[T_6O_{12}]X$. Stoichiometric ye'elimite crystal structure at room temperature will be described in detailed. The role of different amounts of minor elements on the synthetic procedure and crystal structures will be also presented [2,3].

This keynote will be also focused on a revision of the effect of raw materials on the mineralogical composition of CSA, BYF and BAY. Specifically, the role of main elements contents in the ye'elimite formation in these systems will be described. Moreover, the effect of minor elements on the polymorphism of both ye'elimite and belite, especially on BYF and BAY clinkers, will be presented [4,5,6].

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