

EFFECT OF DIFFERENT RETARDERS ON THE HYDRATION OF CALCIUM SULFOALUMINATE ECO-CEMENT PASTES

M. García-Maté¹, A.G. De la Torre¹, M.A.G. Aranda², I. Santacruz¹

1 Departamento de Química Inorgánica, Cristalografía y Mineralogía, Universidad de Malaga, 29071 Málaga, Spain.

2 ALBA-CELLS synchrotron, Carretera BP 1413, Km. 3.3, 08290-Cerdanyola, Barcelona, Spain.

isantacruz@uma.es

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The manufacture of Calcium SulfoAluminate (CSA) cements is more environmentally friendly than that of OPC [1] as their production releases up to 40% less CO₂ than the latter. The main performances of CSA cements are fast setting time, good-chemical resistance properties and high early strengths.

CSA cements are prepared by mixing CSA clinker with different amounts of a calcium sulfate set regulator such as gypsum (CaSO₄·2H₂O), bassanite (CaSO₄·½H₂O), or anhydrite (CaSO₄), or mixtures of them. It is possible to modify the hydration process of CSA cements not only by its composition, but also by the selection of different quantities or sources of calcium sulfate [2,3]. The dissolution rate of the sulfate source is a key point to control the reactions during the hydration of CSA cements, and hence the mechanical properties of the corresponding pastes and mortars. The solubility of bassanite in water (0.88 g/100 mL) is 3-4 times larger than that for gypsum or anhydrite and hence, all the reactions start quickly, showing initial setting times as short as 20 min, which do not allow the preparation of homogeneous samples, with the consequent dramatic effect onto their mechanical strength values. However, the setting time can be controlled through the addition of small amounts of different additives/retarders.

The objective of this work is to control the hydration, including setting time, of CSA cements prepared with bassanite and different retarders to obtain tailored CSA cements and mortars for different applications. The addition of these additives reduced considerably the viscosity of the bassanite-pastes to a minimum value which depends on the properties of the additive. The mechanical strength values of selected mortars have been correlated to those variables.

References

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