

Influence of Three Types of Superplasticizers on Tricalcium Aluminate Hydration in Presence of Gypsum.

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Superplasticizers used to produce more fluid or higher strength concretes interfere with most of the physico-chemical processes occurring in cement paste at early age, but all the mechanisms are not understood yet. We report the influence of three different types of superplasticizers on tricalcium aluminate hydration in presence of gypsum which is believed to control the fluidity of cement paste: diphosphonate-terminated polyoxyethylenes (DPP); polymethacrylic acids partially esterified with methoxy-terminated polyoxyethylene side chains (PCP); and naphthalene sulfonate formaldehyde condensates (PNS). DPP had no significant effect on ettringite formation at early ages, whereas PCP and mostly PNS both slowed down ettringite formation. This effect is due to a decrease of the C₃A dissolution rate. Adsorption of PNS and PCP, but not of DPP, also occur at very early ages in this system, and is presumably implicated in the retardation mechanism. In addition, PCP caused a decrease in the size of the ettringite crystals.