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Ordinary Portland Cement composition for the optimization of the synergies of supplementary cementitious materials of ternary binders in hydration processes

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Abstract

The synergistic effects of using several supplementary cementitious materials (SCMs), such as Blast Furnace Slags plus Limestone Filler or Fly Ashes, depend on the OPC composition. When using an OPC which is poor in C_3A and alkalis in ternary formulations, a similar initial strength gain to that of a plain OPC is detected and at longer hydration ages, the formation of monocarboaluminate, hemihydrate and hydroxalite instead of monosulphate can be seen. If an OPC with a higher C_3A content and alkalis is used with SCMs, the higher availability of Al causes the early formation of monocarboaluminate and a lower initial strength gain. At longer hydration times, in ternary blends with both OPCs, the mechanical strengths are higher and the C-S-H gels formed are richer in Al and poorer in C/S ratio with a subsequent lowering of the alkali content in the pore solution when compared to that in plain OPC.

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