Phase Compatibility of ά-C_2S-$C_4A_3\bar{S}$ Clinker on the System CaO-SiO_2-Al_2O_3-SO_3

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Many researchers have studied the fabrication of $C_4A_3\bar{S}$ and pure C_2S in order to increase hydration reactivity of C_2S in early stage. However, although it is generally acknowledged that various phase diagrams coexist on the system CaO-SiO_2-Al_2O_3-Fe_2O_3-SO_3, no detailed examinations have been reported on the phase compatibility of ά-C_2S-$C_4A_3\bar{S}$ clinkers on the system CaO-SiO_2-Al_2O_3-SO_3 (C-S-A-$\bar{S}$). In this study, ά-C_2S-$C_4A_3\bar{S}$ clinkers were synthesized at various temperatures from a mixture of raw materials. The ά-C_2S was stabilized at room temperature by adding borax. Phase equilibria of these clinkers in C-S-A-$\bar{S}$ system were also investigated by XRD, FT-IR and TEM. The results show that coexisted phases changed from $C_{12}A_7$+$C_4A_3\bar{S}$ +CA to C+C_3A+$C_4A_3\bar{S}$ according to the temperature on the CaO-Al_2O_3-SO_3 system, and $Ca_{11}(SiO_4)_4O_2S$ phases occurred at 1300°C on the CaO-SiO_2-$CaSO_4$ system. Moreover, modified belite clinkers containing the stabilizer were synthesized at 1300°C by the addition of the stabilizer and their major phase was ά-C_2S-$C_4A_3\bar{S}$.