

Effects of Heavy Metals Components on Formation of $4\text{CaO}\cdot 3\text{Al}_2\text{O}_3\cdot \text{SO}_3$ by using Dolomite, Phospho-gypsum, Rolling sludge

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Calcium aluminosulfate, $4\text{CaO}\cdot 3\text{Al}_2\text{O}_3\cdot \text{SO}_3$ (CSA) is usually used as rapid hardening cement and expansive cement due to the hydration behavior with formation of ettringite. And it can be also expected for special low energy prepared cement, because formation of Calcium aluminosulfate takes place at a relatively low temperature. In this study, the manufacture of Calcium aluminosulfate using a large amounts of industrial wastes and by-products as raw material; dolomite, phospho-gypsum, and rolling sludge etc, was carried out. After the raw materials were mixed, these were fired at $1,250^\circ\text{C}$ for 1 hour and cooled rapidly in air. The properties of the clinker were examined with XRD, SEM, and measurement of free CaO content. It was found that the main minerals of clinker synthesized at $1,250^\circ\text{C}$ were CSA, $\beta\text{-C}_2\text{S}$, C_{12}A_7 , C_4AF , and MgO. And Cr, Zn and Cu among the heavy metals contained the raw materials showed an incorporation ratio of up to 74-88%, but Pb showed that of up to 26-43% due to their degrees of volatilization during firing process.