Chemistry of cements

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ABSTRACT

The processes during the hydration of Portland cement are well known. The main hydrates formed include C-S-H, portlandite, ettringite, hydrotalcite and AFm-phases such as monocarbonate or monosulfate. Thermodynamic modelling coupled with kinetic equations, which describe the dissolution of the clinker, can be used to predict the composition of hydrated cements as a function of time. In the absence of limestone, ettringite becomes unstable and monosulfate is present after longer hydration times, while in modern Portland cement, where up to 5% of limestone is generally added, ettringite and Also the temperature has an important influence on the composition of ettringite and monocarbonate are formed. The presence of small amounts of limestone (up to approx. 5%) increases of 50° C and more lead in the long-term to a destabilisation of ettringite and monocarbonate and to the the total volume of hydrated solids and thus lowers the total porosity. The presence of silica rich supplementary cementitious materials (SCM) such as silica fume, fly strength at higher temperatures.