

IMPACT OF Li_2CO_3 ON PHASE DEVELOPMENT DURING HYDRATION OF CALCIUM ALUMINATE CEMENT WITH CALCITE

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During long-term hydration of calcium aluminate cement (CA-cement) conversion of meta-stable hydrates (e.g. C_2AH_8 & CAH_{10}) to stable C_3AH_6 is observed in many cases. KUZEL & BAIER (1996) found that conversion can be evaded by introducing a carbonate source (e.g. CaCO_3), leading to primal formation of stable monocarbonate ($\text{C}_3\text{A} \cdot \text{CaCO}_3 \cdot 11\text{H}_2\text{O}$, MC). Li_2CO_3 is used to shorten the induction period of CA hydration leading to acceleration of the nucleation rate (RODGER & DOUBLE, 1984).

To gain insight into the long-term impact of Li_2CO_3 on the hydration of CA-cement with CaCO_3 a reference mixture of 70 wt. % CA-cement and 30 wt. % CaCO_3 with a w/s ratio of 1 was compared to the same mixture with 0.05 wt. % Li_2CO_3 addition (abbr.: Li-mix). Phase formation within 28d compared to expected phase development, obtained by thermodynamic modelling with GEMS (WAGNER et al., 2012) was our focus of research.

Early hydration behaviour was already investigated by MANNINGER et al. (2019) and showed that changes of pore solution composition can be correlated with phase composition. In Fig. 1 the comparison of the long-term behaviour is shown. Addition of Li_2CO_3 leads to faster formation of thermodynamic stable hydrate phases (MC, $\text{Al}(\text{OH})_3$ mic.) during 10h and 1d while the phase content is nearly levelled out at 28d.

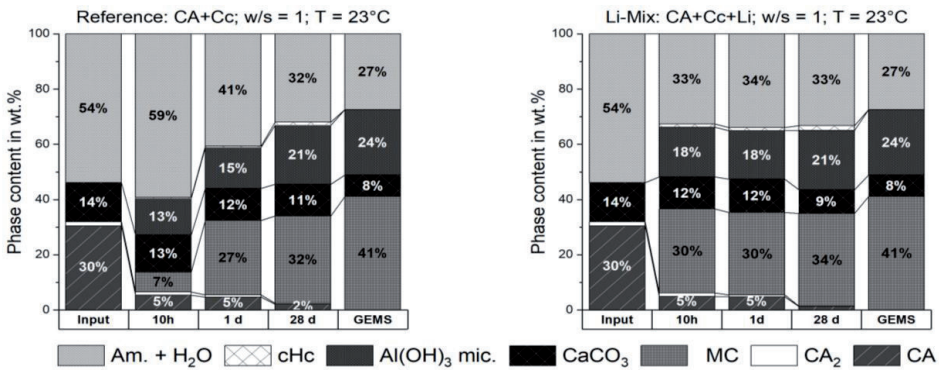


Figure 1. Comparison of phase development of reference & Li-mix to thermodynamic stable phases.

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 WAGNER, T., KULIK, D. A., HINGERL, F. F., DMYTRIEVAVA, S. V. (2012): Can. Mineral. 50, 1173-1195.
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