Mono-, di- and trichloroacetic salts of alkaline earth metals, Mn, Fe, Co, Ni, Cu, Zn and Li are investigated as additives to control the setting behaviour of calcium aluminate cement. While LiCl and Li$_2$CO$_3$ are known to act as accelerators [1,2], organic acids and their Ca-salts retard the hydration reaction, depending on their concentration [1,3,4,5]. In a detailed report on the hydration behaviour of a CAC using Ca-salts of chlorinated acetic acids, calcium-monochloroacetate was pointed out as the strongest retarder [6]. However, for the phase identification of such compounds by XRD, appropriate database entries are lacking. Crystal-structural data are available for NH$_4$-, Li-, Na-, Ca-, Ag-, Ni-monochloroacetates/-hydrates [7,8,9,10,11,12]. Thus, the crystal structures, their bonding chemistry and thermal stability as well as their chemical behaviour and influence on hydraulic binder systems are objects of investigation.

Alkaline earth monochloroacetates such as Ca(ClCH$_2$COO)$_2$$\times$H$_2$O, Sr(ClCH$_2$COO)$_2$ and Ba(ClCH$_2$COO)$_2$$\times$H$_2$O were crystallised from aqueous solution and found to form layered structures. Whereas, the high alkalinity of Li as well as of all other alkalis (A) leads to the hydroxylation of the relatively weak monochloroacetic acid, according to [13]:

$$\text{ClCH}_2\text{COO}^A + \text{H}_2\text{O} \leftrightarrow \text{ClCH}_2\text{COOH} + A^+ + \text{OH}^- \rightarrow \text{HOCH}_2\text{COOH} + A^+ + \text{Cl}^-$$

Thus, after a longer storage over several weeks, from an aqueous solution of Li(ClCH$_2$COO) a new addition compound Li(ClCH$_2$COO)(HOCH$_2$COOH) with a chain like crystal structure crystallised (Fig.1). For all other alkalis a complete conversion into glycolic acid and chloride was observed. A similar behaviour was found for Mg-, Co- and Zn-monochloroacetate compounds stored over a longer time in aqueous ambient, resulting in the crystallisation of the glycolate hydrates.

The setting of a typical CAC (Secar51, W/Z = 0.5, T = 20°C) was retarded when a 0.025 molar solution of Ca-, Sr-, Ba-monochloroacetates was used (Ca > Sr > Ba) as revealed by isoperibolic heat flow calorimetry. In all cases the main hydration product was found to be CAH$_{10}$. The lithium addition-compound strongly accelerates the setting, whereat two reactions occur.