

Reactivity of model Ca-Mg-alkali-aluminosilicate glasses in cementitious systems

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Four Ca-Mg-alkali-aluminosilicate glasses were synthesised as a model to study and clarify the reactivity of a calcareous fly ash (CFA) in a portland cement (PC) system.

Using a novel SEM-EDX image analysis technique groups of specific chemical compositions were identified in an example CFA. The most important ones served as a basis to decide on the composition of the glasses to be synthesised (fig. 1).

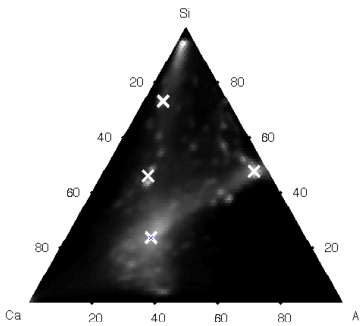


Figure 2. Synthetic glass composition superimposed on a ternary density plot of chemical composition of CFA (atomic %)

Dissolution experiments were carried out in NaOH pH 13 solution as described in [1]. The degrees of reaction of the synthetic glasses were measured after 1, 7, 28, 56 days of hydration by SEM-EDX on paste samples containing 55 wt.% PC and 45 wt.% glass. A comparison was made with a paste sample containing 55 wt.% PC and 45 wt.% CFA (fig. 2).

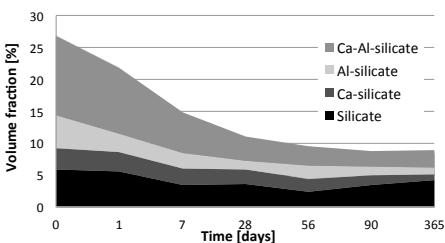


Figure 3. Reaction of the subclasses of fly ash in a 55 wt.% PC – 45 wt.% CFA system

[1] Snellings (2013), *J. Am. Ceram. Soc.* **96**, 2467-2475