

## **Reactivity of fly ash, slag and synthetic Ca-Mg-Na-aluminosilicate glasses in Portland cement and alkaline solutions**

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The fundamental aspects of the reactivity of amorphous SCMs in cement paste remain largely unexplored. The Portland-SCM systems are very complex, often with multiple glassy compositions reacting simultaneously but at different speed. This is crucial, as the amount and the intrinsic reactivity of glassy SCM components added to cement will affect the strength development, the porosity, the phase assemblage and the durability of the binder. Understanding and predicting of the reactivity of SCMs is essential to increase their incorporation in cement and enable a conscious and efficient qualification and use of these waste materials.

It has been shown recently that SEM-EDS image analysis can be used to measure the degree of reaction of glassy SCMs directly in cement paste. This contribution compares such measured reactivity of calcareous fly ash glasses and the reactivity of four model Ca-Mg-Na-aluminosilicate glasses synthesised to represent those in the fly ash. A quantitative approach decouples the effect of fineness and the intrinsic reactivity of glass. The latter is correlated to the structure of glass estimated from the chemical composition. The intrinsic reactivity of glass in cement paste was found to follow the same trend as the reactivity determined by dissolution experiment in NaOH pH 13 and at high dilution.