

Aggregate dissolution in different pore solutions, kinetics

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Building materials play a key role in modern infrastructures and housing for modern societies. In particular cement based materials are in high demand because of their high performance, low cost, availability of raw materials and relative low environmental footprint per unit mass produced [1]. The durability of concrete structures, however, can be affected by alkali silica reaction (ASR) which can cause expansion and deterioration of the concrete in the long term. ASR produces an expansive gel as a result of a chemical reaction between silica (from certain aggregates) and alkalis (from the pore solution of the cement paste), which is able to create macroscopic expansion in concrete structures [2]. The dissolution rate of aggregate has a direct impact on the mechanism of the ASR gel formation and is influenced by the concentration of different ions such as hydroxide or aluminium. In the present study the effects of the presence of the different ions and their concentrations in the pore solution on the dissolution rates of the reactive minerals is investigated to better understand the initiation of ASR and the consequent risk of damage.

References:

[1] Valentini, L., Favero, M., Dalconi, M. C., Russo, V., Ferrari, G., Artioli, G., *Cryst. Growth Des.* 2016, 16 (2), 646-654.

[2] Chappex, Th., Scrivener, K., *Cem. Concr. Res.* 2012, 42, 1049–1054.