Absorbency of Superabsorbent Polymers in Cementitious Environments

Optimal use of superabsorbent polymers (SAP) in cement-based materials relies on knowledge on how SAP absorbency is influenced by different physical and chemical parameters. These parameters include salt concentration in the pore fluid, temperature of the system and SAP particle size. The present work shows experimental results on this and presents a new technique to measure the swelling of SAP particles. This new technique is compared with existing techniques that have been recently proposed for the measurement of pore fluid absorption by superabsorbent polymers. It is seen that the concentration of Na⁺, K⁺, Ca²⁺, OH⁻, and SO₄²⁻, in the exposure liquid influences the maximum absorption of SAP. Even very low concentrations of these may reduce the absorption to a third of the value measured in pure water at room temperature. Additionally, the influence of the SAP absorption on the ionic composition of the exposure liquid is investigated with atomic absorption spectroscopy. The paper provides the reader with knowledge about the absorption capacity of SAP in a cementitious environment, and how the absorption process may influence the cement pore fluid.

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