Electrochemical desalination of bricks - Experimental and modeling

Chlorides, nitrates and sulfates play an important role in the salt-decay of porous materials in buildings and monuments. Electrochemical desalination is a technology able to remove salts from such porous materials in order to stop or prevent the decay. In this paper, experimental and numerical results for ED treatments of red bricks contaminated with NaCl, NaNO₃, and Na₂SO₄ are presented and compared. The results show high removal efficiencies of ~99 % for Cl⁻ and NO₃⁻, and ~89 % for SO₄²⁻ in less than 8 days when applying 2.22 Am⁻². The slightly slower removal rate in the sulfate-contaminated bricks with respect to the monovalent ions is discussed. Comparison between the experimental and the simulation results showed that the proposed numerical model is able to predict electrochemical desalination treatments with remarkable accuracy, and it can be used as a predictive tool for the optimization and the design of the treatment.

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