

Geochemical and physical changes of CEM I and II cement paste samples treated in acetic acid solutions of pure or simulated granitic pore water

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The prediction of physical performance of concrete structures exposed to various environments can be based on the understanding of the geochemical, mineralogical changes in cement-reactive fluid systems. In the present work, batch experiments of CEM I and II cement paste samples prepared with 0.4 w/c ratio are carried out. Both cubic samples (7 specimens for each test) and their powdered forms (2 parallel sets) are treated in four types of environments. Two of the studied reactive fluids are pure water and mineral water representing the pore water in Mórág Granite Formation. The latter is relevant for the National Radioactive Waste Repository in Bátaapáti (Hungary). The other two fluids are respective acetic acid solutions representing organic acid attack. The cubic samples are tested for compressive strength and studied by electron microscopy after several months of treatments. The powdered cement pastes continuously stirred in the solutions are analyzed after three weeks by XRD, ATR-FTIR and TA. During the experiments, the pH is regularly recorded and solution samples are taken for ICP-OES analysis. Preliminary results confirm the expected reactivity increase of cement pastes due to the acetic acid. These kinds of experiments, in addition to radioactive waste disposal, have applications to fields such as waste water treatment, deep foundations, tunneling, cement pastes of drillings and exploration works.