XVIII International Conference on Water Resources
CMWR 2010
J. Carrera (Ed)
CIMNE, Barcelona 2010

HYBRID PORE-SCALE SIMULATIONS OF CALCITE PRECIPITATION IN A CO2 RICH ENVIRONMENT

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Summary. A hybrid model was developed for calcite precipitation in a CO_2 rich environment. A Kinetic Monte Carlo model coupled with a solution of the classical diffusion equation was used to calculate the rate of a calcite precipitation-dissolution reaction for solutions with different pH and temperature. A Smoothed Particle Hydrodynamics method was used to simulate a pore-scale injection, entrapment and dissolution of a supercritical (sc) CO_2 as well as the calcite precipitation. Different mechanisms of sc CO_2 entrapment were investigated including dissolution of a sc CO_2 plume and the upward mobility of a sc CO_2. The effect of Raleigh-Taylor instability on the rate of CO2 dissolution was also studied. KMC and pore-scale simulations were used to calculate the effective rate of sc CO_2 dissolution and the effective rate of calcite precipitation/dissolution in the CO_2 rich environment.