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Reactive geochemical transport modeling of CO_2 in porous media
MOHAMMAD ALIZADEH NOMELI, AMIR RIAZ, University of Maryland College Park — In this study the modified Redlich-Kwong equation of state is used to develop a pressure-volume-temperature-composition (PVTx) model that predicts how temperature, pressure and salinity affect the solubility of the supercritical CO_2 in brine and is subsequently employed to determine the density and rate of mineral trapping of CO_2 in the form of precipitates. Rates of dissolution and precipitation of minerals are determined by taking into account the pH of the system, in addition to the consideration of the influence of temperature. This study also presents a model to simulate a reactive fluid within permeable porous media. Fluid convection, diffusion and chemical reactions inside a finite space are considered as a simplified representation of natural mineral trapping. The purpose of the current study is to show the time evolution of the aperture shrinkage caused by precipitation of calcite. Precipitation of calcite decreases the porosity and subsequently can change the permeability. Permeability of the porous media controls the path of aqueous CO_2 migration; therefore the aperture width has a pivotal role on solubility and mineral trapping of injected CO_2. The current model predicts the actual efficiency of the mineral trapping mechanism.

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