CO₂ Sequestration in Deep Saline Aquifers

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ABSTRACT

Sequestration of carbon dioxide (CO₂) in deep saline aquifers has appeared as an important potential option for reducing the emissions of greenhouse gases to the atmosphere. Large amounts of CO₂ would be injected in deep saline aquifers in a supercritical state. Under these conditions, CO₂ density and viscosity varies widely with minor changes of pressure and temperature. CO₂ injection will dramatically increase the pressure in the injection zone. This overpressure can produce the reactivation of sealed fractures or the creation of new ones in the caprock, through which CO₂ could escape easily to the atmosphere. A horizontal caprock – aquifer system has been modelled considering both purely hydraulic and hydromechanical couplings to study the multiphase flow and the failure mechanism produced when CO₂ injection takes place in the system, respectively. The understanding of these mechanisms is essential to evaluate CO₂ leakage and the injection conditions that can be sustained by the system without causing significant leakage.