



Modeling mineral alterations in shale reservoirs in contact with CO₂

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Hydraulic fracturing as well as CO₂ storage, if in contact with cap rocks, can lead to alterations of the mineral phase of shale reservoirs driven by the changes in fluid composition and pressure. Underlying concepts describing the shifts in geochemical equilibria are discussed for typical shale gas mineral compositions using the geochemical codes Phreeqc and MIN3P, which have recently been upgraded to cope with the conditions of pressure and temperature in deep reservoirs. Models using field data from Heletz oil field (Israel) and the North-west-German sedimentary basins are presented. Alterations of the mineral phase over time are elucidated and their consequences on flow and transport properties of the shale gas formation.