Core-Flood Experiment to Investigate Transport of Reactive Fluids in Rocks

Holger Ott, Kees de Kloe
Shell Global Solutions International BV
holger.ott@shell.com

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Text

The investigation of transport of reactive fluids in porous rocks is an intriguing but challenging task and at the border of present-day experimental feasibility. We designed and constructed an experimental setup to investigate physical and chemical processes caused by the injection of reactive fluids such as supercritical CO_2 and/or H_2S in geological formations. Potential applications range from disposal options, carbon storage (CCS) and acid-gas injection (AGI), to enhanced oil recovery. This poster outlines the requirements and the experimental implementation to investigate reactive transport in porous rocks. The focus is on the specification, the experimental processes and the analytical possibilities for the *in-situ* investigation of changes of the rock matrix and the fluid composition as result of chemical rock/fluid interaction, and the coupling of the chemistry to fluid flow in the rock matrix.

We incorporate elements of both areas, core flooding *and* chemical rock/fluid interaction. This includes 3D imaging by micro CT (μCT) scanning for *in-situ* determination of fluid saturation and changes of the rock matrix due to dissolution and precipitation reactions. We demonstrated that the novel combination of a core-flood experiment and a μCT scanner gives extra information compared to the use of conventional (medical) CT scanning, which might be crucial to understand processes on multiple length scales. A novel back-pressure system allows for on-line and time-resolved chemical gas analysis and various fluid-sampling options. Together with a fluid-saturation control and a differential pressure measurements, this gives access to understand the coupling of fluid flow and chemistry.