

Gas shale water imbibition tests with controlled suction technique

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Abstract

Water loss during flowback operations represents one of the main challenges related to the use of hydraulic stimulation to exploit shale gas resources. About 20% of the injected fracturing fluids are usually recovered after stimulation. Fluid imbibition is expected to be one of the main mechanisms responsible for the water uptake of shale gas reservoirs. Imbibition tests are typically performed to analyse this issue. This study presents a new experimental methodology based on the control of total suction to quantify the impact of the swelling response of gas shales on the water uptake during imbibition processes. The obtained results demonstrate that a precise quantification of the gas shale water uptake cannot be performed neglecting the volumetric behaviour and the presence of the mechanical stress during the imbibition process.