

## Capillary Resistance and Trapping of Hydrocarbons: A Laboratory Experiment

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Low permeability cap rocks retain hydrocarbons by membrane sealing when pore throats of the seals are sufficiently small to prevent leakage. The extent to which aquifer overpressures work to push hydrocarbons through membrane seals is debated. This paper reports the results from a laboratory experiment that was designed to investigate this issue.

Water pressure was applied to a water-wet, oil-saturated core sample, which was mounted to a low permeable membrane at the outlet. The oil was pressurized to 0.5 MPa, which is equivalent to the buoyancy of a 150 m oil column. The water pressure was high enough to ensure fluid flow through the sample. The experiment was designed to see whether water flushed oil through the membrane, or if oil was retained by capillary forces as water flowed through the core plug / membrane system.

The result of the experiment was that water flowed through the core, while the oil remained in place. This experiment suggests that traps can leak water and still retain all of its hydrocarbons. Aquifer overpressures below the hydrocarbon-water contact should not be expected to noticeably increase the risk of membrane seal failure under such conditions.

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