

Emulsification under different mixing conditions

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Abstract. Chemical EOR flooding, such as in alkaline or surfactant flooding, may lead to a complex phase behavior in the pore space; depending on the exact crude and injection-water compositions, emulsion phases may form to the advantage or disadvantage of the displacement efficiency. The injection-water composition, and hence the displacements efficiency, is typically optimized by its phase behavior and by core flood experiments. However, mixing regimes of oil and injection water are substantially different for both types of tests; while in classical test-tube experiments oil and water are mixed on a macroscopic scale and likely under turbulent conditions, we assume laminar flow – respectively mixing – conditions on the pore scale in porous media flows.

In our poster presentation, we ask the question of how representative are different measurements for the actual displacement process. For this, we compare classical test tube experiments, results from spinning-drop measurements and microfluidic experiments, representing substantially different mixing regimes. Furthermore, we discuss alkaline and surfactant systems, representing ideal and non-ideal systems. The poster builds on the paper SCA2019-011.