

Study of Viscous Effects at CO2 Flooding

By Guillermo R. Calderón:

Oil displacement by miscible flooding processes including CO₂ flooding is affected by instability at the flood front cause by an adverse mobility ratio. An unfavourable mobility ratio displacement couple with the heterogeneity of the porous medium results in viscous instability with in turn affects the displacements efficiency of multiple contact miscibility, sweep efficiency, breakthrough time, and slug size design. In consequence, it is crucial to generate fundamental understanding of the physical behaviour of the relevant fluid under reservoir conditions and to be able to model and simulate the flow. The economic potential of CO₂ injection can not be estimated without having reliable quantitative model for the fluid behaviour and mobilization of oil.

In accordance with that the following PhD program is proposed

It is planned to perform a set of different laboratory experiments (slim tube test and displacement core tests) to evaluated basically parameters of CO₂ gas injection processes, and viscous effects such as IFT, gas trapping effects, wettability, and dispersion. Experiments will be evaluated using numerical simulation.

Develop scaling up routines accounting for viscous fingering and heterogeneity. Scaling groups (gravity/viscous ratio, capillary/viscous ratio and others) are going to use to resolve flow region regimens and for establishing limits and range of value of the dimensionless groups over which viscous effects transition from one region to another occur.

Results and conclusion will be wrapped up to answer the viscous effects behaviour for CO₂ gas injection projects.