**Recovery of Waterflood Residual Oil Using CO2- Saturated**

**Brine Injection**

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**ABSTRACT**

We present results of a novel experimental study, where CO2-saturated brine is utilized to recover waterflood residual oil in a Berea sample. Brine saturated with CO2 at 90 psig was injected into the core at constant inlet pressure, and then the outlet pressure of the core was gradually decreased using a tightly controllable back pressure regulation system. The gradual increase in the pressure drop led to liberation of CO2 from brine, internal gas drive, mobilization of oil ganglia, and reduction of waterflood residual oil saturation from 41 to 20%; i.e. 51% of the waterflood residual oil was recovered.  The experiment was continued by repeating the above process at a higher level of CO2 saturation.  To do so, the pore pressure was first increased to 180 psig to dissolve the free CO2 back into brine, followed by injecting new brine saturated with CO2 at 180 psig. The oil saturation was further reduced to about 17.8%, leading to cumulative recovery factor of 56% of the original waterflood residual oil. Parallel pore-scale visualization studies using transparent glass micromodels indicated that the effectiveness of the above approach is linked to the interaction between a flowing, disconnected gas phase and oil ganglia (three-phase ganglion dynamics).