



Geological CO₂ storage in saline carbonate formations using core flooding experiment

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Continuous anthropogenic emission of green-house gases in atmosphere resulted in global warming which urgently requires mitigation techniques such as carbon capture and its subsequent sequestration. Geological sequestration of CO₂ in deep saline formations is an emerging technique to reduce carbon concentration in atmosphere. Investigations on CO₂ sequestration and its subsequent evolution in subsurface under targeted geological sites are at nascent stage. During the course of CO₂ geo-sequestration process the receiving geological media is exposed to cyclic CO₂-brine flooding. The successful implementation of CO₂ geo sequestration process requires the investigation of the target geological formation for its capacity, integrity, interaction between rock and CO₂/brine system. The objective of this study is to investigate the effect of cyclic CO₂-brine flooding on multiphase flow behavior during geo-sequestration on carbonate core under in-situ geological reservoir conditions. A series of practical experiments are conducted at two salinities 3 % and 7.5 % having 8 and 10 MPa as injection pressure using core flooding apparatus at TAMUQ. The pressure drop across the core increases with salinity and successive injection cycles; and decreases with injection pressure which significantly leads to dynamic response of core samples. Such changes could be due to hysteresis in CO₂ and brine flow through the core samples, formation changes, migration of fines, chemical reactions between carbonate and brine/CO₂. The findings of this study can be utilized in commencing any CO₂ geo-sequestration study in deep saline carbonate subsurface to mitigate the impact of greenhouse gas emissions.