Contribution ID: **81** Type: **Poster (+) Presentation**

Experimental investigation of physical dispersion and in-situ mixing during low salinity waterflooding

Monday, 31 May 2021 19:35 (1 hour)

Low salinity waterflooding (LSWF) as an enhanced waterflood technique is applicable in secondary and/or tertiary oil production. The performance of LSWF depends on different factors including the volume of injected brine, its salinity and in-situ mixing. Mixing is intensified due to adverse mobility ratio at low salinity (LS) - high salinity (HS) front. This research focuses on the impact of salinity of injection and resident brine (salinity gradient) on physical dispersion through single-phase (miscible) sandpack tests.

A systematic series of single-phase sandpack tests were performed. In this manner, the sandpack was initially saturated with high salinity brine (HS) and flooded with low salinity brine (LS), afterward. Consequently, the initially uniform salt distribution in the sandpack was altered gradually, leading to development of salinity gradient and mixing zone in the sandpack. The salinity of the effluent brine was measured as a function of injected pore volume. A coherent analytical approach was then carried out to estimate the length of mixing zone with respect to Peclet number and dispersivity. The salinity difference of the brines used in the tests were between 36,000 to 156,000 ppm.

It was observed that dispersivity and physical dispersion of salt during LSWF depends on the salinity of HS and LS. The higher the salinity difference, the higher the dispersivity. The maximum estimated dispersivity was observed for a test in which the salinity of HS and LS were 160,000 and 4,000 ppm, respectively. The estimated dispersivity of this test was 0.0071 ft. which is equivalent to a Peclet number of 116. The minimum dispersivity was obtained when the salinity difference was 36,000 ppm. The dispersivity of this test was estimated to be 0.0040 ft. which means the Peclet number is increased to 205. Putting all results together, it can be concluded that for a system with lower salinity difference, lower volume of LS will be required to establish low salinity conditions throughout the porous system.

The impact of salt concentration of resident HS and LS injection brine on physical dispersion/mixing of brines with different salinity was experimentally investigated for the first time, to the best of our knowledge. Moreover, visual evidence was provided to discuss the impact of salinity and salinity difference of brines on dispersivity of the system.

Time Block Preference

Time Block C (18:00-21:00 CET)

References

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