

ANALYSIS OF THE EFFECT OF IONIC CONTENT Na^{2+} , Ca^{2+} , AND Mg^{2+} ON THE MECHANISM OF LOW SALINITY WATER INJECTION ON OIL RECOVERY IN CARBONATE ROCK USING SPONTANEOUS IMBIBITION TEST METHOD

BORRY FRIMA MAULANA
143210777

ABSTRACT

Low salinity waterflooding (LSW) is one of the EOR methods that can be done to improve oil recovery. The LSW is performed by injecting water with salinity and certain ionic composition into the injection well. Previous research has shown that LSW can improve oil recovery on carbonate rock (Al-Harrasi, Al-Maamari, & Masalmeh, 2012; Yousef, Al-Saleh, & Al-Jawfi, 2011).

The effect of salinity and ion content on the amount of oil recovery is obtained through spontaneous imbibition test (SIT) conducted on carbonate rock (gambier limestone). This test is carried out by inserting different ion content (Na^+ , Ca^{2+} , and Mg^{2+}) into brine solution which is then inserted into amott cell to be heated at 70 °C with rock core samples which have been fulfilled by crude oil. To know The ability of ion, test devided into two stage. The first stage is SIT test for 12 hours using brine with NaCl content and salinity level at 10.000 ppm. The second stage is continued with replacement of brine solution with different ion content such as CaCl_2 and MgCl_2 at salinity level 10.000 ppm, 5,000 ppm, and 500 ppm.

Test with using the NaCl compound yielded the highest percentage increase of oil recovery by 68,8% for salinity 5,000 ppm. Tests with using CaCl_2 compound is 62,5% for salinity of 10,000 ppm. Test with using MgCl_2 is 100% for salinity of 10,000 ppm. This difference suggests that the ionic ability of the brine imbibition as a cation substitute in the MIE mechanism is strongly influenced by saline connate brine. In this test the Na^+ ions work more effectively when the brine imbibition has a lower salinity than connate brine. While CaCl_2 , and MgCl_2 are more effective in urging oil when brine imbibition has the same salinity as connate brine.

Keyword: *Spontaneous Imbibition Test, Salinity, Ion Content, Amott Cell, Oil recovery*