Importance of fines in smart water enhanced oil recovery (SmW-EOR) for chalk outcrops

In SmW-EOR it is generally believed that precipitation of brines must be avoided since it can have a negative impact on the SmW sweep efficiency. But substitution of Mg$^{2+}$ by Ca$^{2+}$ on calcite surfaces (a well-accepted phenomenon) can change the brine combination and enhance the possibility of fine formation at speciation. Considering this phenomenon we analyze the possibility of fines formation and its influence in SmW-EOR. To calculate the brine speciation and the amount of precipitate formed at different pressure and temperature conditions, we use the Extended UNIQUAC model for 61 SmW-EOR experiments reported in literature. Both the amount of available soluble SO$_4^{2-}$ (aq) in the solution and the amount of CaSO4 precipitation has been calculated and correlated to the corresponding oil recovery.

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Authors: Chakravarty, K. H. (Intern), Fosbøl, P. L. (Intern), Thomsen, K. (Intern)
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