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Effect Of Compaction On Oil Recovery Under Low Salinity Flooding In Homogeneous And Heterogeneous Chalk

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AWF.1.A.00 Recovery Processes on Core Scale

Compaction of the reservoir chalk (e.g. surface subsidence) may facilitate oil production. However, only few works have linked smart water flooding with chalk compaction and additional oil recovery. In this work, core flooding experiments with sequential injection of low salinity brines were performed to examine the effect of chalk compaction on oil recovery under smart water flooding. X-ray computer tomography scanning was applied to select outcrop and reservoir cores with different level of heterogeneity, which was demonstrated to be an important factor that determines the recovery even on core scale. A linear variable differential transformer (LVDT) device made it possible to detect changes of the core length during the experiments, which served as an indication of the compaction. Overburden pressure was increased stepwise at the final stages of the flooding to achieve higher compaction of the cores.

During secondary flooding, slight gradual compaction of the cores was observed. Subsequent low salinity flooding did not lead to further compaction for all the samples, nor additional oil recovery. Under final compaction, significantly more oil was produced from the heterogeneous cores, especially, from the reservoir core. Some fines production was observed during the core cleaning after the experiments. Fluid diversion due to closing micro-fractures under compaction and/or relocation of the fines is speculated to be a driving mechanism behind additional recovery from heterogeneous cores. Rock compaction appears to be a potential mechanism for enhanced oil recovery, however with a limited efficiency.

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