Секция «Геохимия»

EOR MECHANISM OF DILUTE SURFACTANT FLOODING PROVED BY LOW FIELD NMR CORE FLOODING AND TWO-PARALLEL CORE FLOODING EXPERIMENTS

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Dilute surfactant flooding is a promising EOR method. It is more economical and easier to be controlled in reservoirs compared with microemulsion flooding where high surfactant concentration is needed. In this work, we present a salt-tolerance surfactant that can attain ultra-low interfacial tension (IFT) by a low surfactant concentration (0.2wt%) under high salinity condition.

A novel anionic-nonionic surfactant with a low concentration of 0.2 wt% was used to prepare surfactant solutions at different salinity conditions. Ultra-low IFT (10^{-3} mN/m) was obtained at high salinity condition. These surfactant solutions were used for oil film stripping experiments in visual oil-wet quartz cell and filtration experiments in transparent sand pack model as well as two-parallel core flooding model under heterogeneous permeability conditions to study oil stripping and displacement mechanism and efficiency by ultra-low IFT.

Oil film can be effectively stripped only under ultra-low IFT condition at high salinity condition with the occurrence of wettability reversal. TFiltration experiments showed that a high displacement efficiency (additional oil recovery is about 16-23% depending on the heterogeneity) was yielded under ultra-low IFT condition at high salinity condition in dilute surfactant flooding process.

This anionic-nonionic surfactant can obtain ultra-low IFT at high salinity condition at a low surfactant concentration (0.2 wt%), which can effectively strip residual oil film and re-mobilize trapped oil in low-permeability zone that cannot be mobilized by water flooding under heterogeneous permeability. The development of this salt-tolerance surfactant and finding of its EOR mechanism will improve the application of dilute surfactant flooding in those reservoirs with high salinity.

Источники и литература

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Иллюстрации

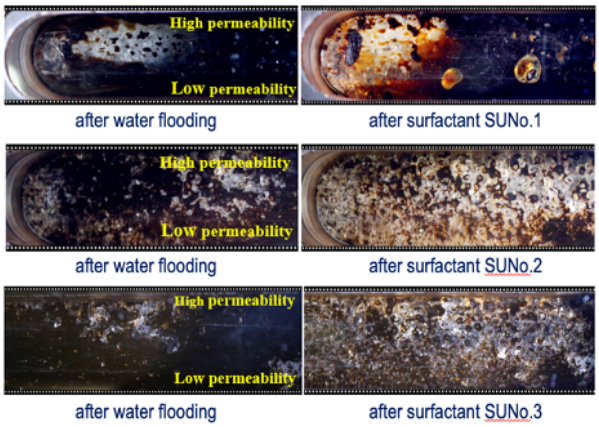

Рис. 1. Visual displacement processes in transparent sand pack model