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From: *Ingebret Fjelde*

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MSc and BSc Thesis: *Low salinity water flooding*

Topics on low salinity water flooding are proposed below.

Background

Reduction of the salinity of the injection water has in the literature been reported to improve the oil recovery in sandstone rock, both in core floods and field pilots. Mechanisms have been proposed, but they are not good described. The work carried out in the thesis should establish knowledge about recovery mechanisms in low salinity water flooding of sandstone oil reservoirs.

Thesis topics: Low salinity water flooding

1. Solubility and disintegration of minerals during low salinity water flooding

The objective is to determine the importance of solubility and disintegration of minerals in the different reservoir parts during low salinity water flooding.

After storage of mixtures of brine and minerals found in sandstones, the composition of the filtrate is determined and the remaining mineral characterized. Columns with minerals are also prepared, and the composition of the effluent is determined during brine injection. The brine composition and temperature are varied in the range expected during low salinity water flooding of typical sandstone oil reservoirs in the North Sea. The results are compared with published work and geochemical modelling.

One student can work on this subject.

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2. Retention and desorption of polar oil components during low salinity water flooding

The objective is to determine the retention and desorption of polar crude oil components onto minerals related to low salinity water flooding of sandstone oil reservoirs.

The crude oil is mixed with minerals found in sandstone rocks. After storage of the mixtures, the composition of the filtrate is determined. Columns with minerals are also prepared, and the composition of the effluent is determined during crude oil injection. The adsorption level of polar oil components is estimated based on composition of filtrates and effluents. The temperature, brine composition and oil composition are varied. The results are compared with published work.

One student can work on this subject.

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3. Wettability alteration during low salinity water injection

The objective is to study wettability alteration during low salinity water injection.

Sandstone core plugs saturated with brine is drained to initial water saturation. Wettability acquisition is then carried out during injection of crude oil before the wettability of prepared core plugs is characterized. The brine composition, oil composition and temperature are varied. The results are compared with published work.

One student can work on this subject.

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4. Study of mechanisms in low salinity water flooding using micromodels

The objective is to study mechanisms in low salinity water injection using micro-models.

The procedure for preparation of micro-models of sandstone for low salinity water flooding is developed. The mechanisms of low salinity water flooding are then studied using these micromodels. The brine composition, oil composition and temperature are varied. The results are compared with published work.

One student can work on this subject.

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