Recovery of carboxylic acid tracers in two phase flow experiments in chalk

Huynh, Khoa; Mokhtari, Rasoul; Andersen, Simon Ivar; Feilberg, Karen Louise

Publication date:
2021

Document Version
Publisher's PDF, also known as Version of record

Recovery of carboxylic acid tracers in two phase flow experiments in chalk

Khoa Huynh, Rasoul Mokhtari, Simon Ivar Andersen, Karen Louise Feilberg

Distribution of oxygenated compounds, such as carboxylic acids, in different phases could significantly impact the wettability of the chalk surface and subsequently the oil recovery. Those active polar compounds could act as “anchors” binding crude oil on the chalk surface, which could also be removed with suitable flooding fluids. In order to reveal the oil recovery enhancement mechanism using smart waters, it is critical to understand the distribution of those “sticky molecules” in different phases. This study attempts to examine the distribution of different carboxylic acid molecules in two phase flow experiment using Danish reservoir chalk. The approach is to spike those tracers into crude oil and monitoring their recovery during the core flooding experiment by oil phase LLE and Q-Exactive orbitrap mass spectrometry analysis. The partitioning of those acids on chalk and aqueous phases was also examined in phase distribution experiments. We observed that poly- carboxylic acid are strongly adsorbed by the chalk reservoir and aqueous phase. The aromatic mono- carboxylic acids are moderately portioned into chalk material and aqueous phase depending on aromatic structure. Interestingly, aromatic mono- carboxylic acids retained strongly in the core flooding system, which were later eluted after a certain pore volume flooding with different brines, while the aromatic tri-carboxylic acids were eluted easily into aqueous phase. Understanding the adsorption of those tracers on different phases could help to interpret the wetting state of Danish reservoir chalk and to correlate the oil recovery with different flooding conditions, especially brine compositions.