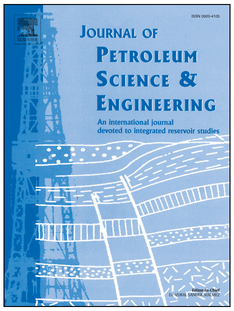

A comprehensive study of asphaltene fractionation based on adsorption onto calcite, dolomite and sandstone

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A comprehensive study of asphaltene fractionation based on adsorption onto calcite, dolomite and sandstone

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Abstract

In this study, based on a new procedure, asphaltene fractions of Sarvak oil samples were determined based on their adhesion to calcite, dolomite, and sandstone surfaces and their properties were evaluated. In irreversibly adsorbed asphaltenes, the highest concentrations of elements were 4.23 wt.% nitrogen (N) on the calcite surface, 7.12 wt.% sulphur (S) on dolomite surface, and 6.18 wt.% S and oxygen (O) on the sandstone surface. The dispersion of asphaltene fraction constituents on the surface, is approximately the same across the calcite sample, but in the dolomite sample, the highest adsorption of S correlates to the presence of magnesium (Mg). However, in sandstone samples, the highest S adsorption is achieved by potassium (K). The most dispersion of O occurs at the surface of the sandstone samples; according to matching through EDS mapping, due to the presence of silicon (Si), O has considerable dispersion. Asphaltene fractions also make lighter carbon compounds. It is important to note that in all samples, C_{17} is the highest peak seen in irreversibly adsorbed asphaltenes. In addition, the zeta potential is negatively affected by increasing the adsorption properties of asphaltene fractions; this depends on the concentration of asphaltene elements adhering to the surface. The O–H polar peak in the irreversibly absorbed asphaltene/sandstone sample is higher due to the presence of O, compared to the other samples. In all three mineral samples, bulk asphaltene and adsorbed fractions have roughly the same values for alkyl groups. The concentration of carbonyl, carboxylic acid, or derivative groups in adsorbed fractions in calcite and sandstone samples show a higher intensity.

Keywords: Asphaltene Fractions; Adsorption; FTIR; Elemental analysis; Zeta Potential.

1. Introduction