

Influence of asphaltene polarity on hydrate behaviors in water-in-oil emulsions

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Abstract

Asphaltene was fractionated into four subfractions with different polarities, and used to conduct the hydrate formation and dissociation experiments. It was observed that the more polar fraction could result in a higher tendency of self-aggregation and fewer asphaltenes adsorbing at the water-oil interface mainly due to the larger C/H ratio, higher aromaticity, and shorter length of the alkyl side chain. The nucleation rate decreased with the presence of asphaltenes, and the induction time increased with a reduction in asphaltene polarity in water-in-oil emulsions. The results showed that the formed amount of hydrates were reduced by the addition of asphaltenes. For the asphaltene containing emulsions, less hydrate was formed with the presence of a more polar asphaltene fraction. The presence of asphaltenes was also found to affect the growth rate of hydrate, which varies with the polarity. Meanwhile, all four asphaltene fractions were found to promote the dissociation of hydrate.

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