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## Synthesis of multifunctional polymeric additive for the inhibition of paraffin and asphaltenes deposition

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The heavy organic fractions (as wax, resins and asphaltenes) in the oil can cause problems during petroleum production 📕 and processing. Due to the similarities in solubility of paraffin and asphaltene deposition inhibitors, the development of multifunctional copolymers that act simultaneously in these two cases is very attractive for the oil industry. In this work it was to synthesize copolymers containing in their structure specific functional groups to act on both: deposition inhibition of paraffin and asphaltenes. Copolymers of styrene-stearyl methacrylate were obtained by radical polymerization, in various monomer ratios, and sulfonated under several reaction times. The copolymers were characterized by size exclusion chromatography (SEC), attenuated total reflectance-Fourier transform infrared (ATR-FTIR) and hydrogen nuclear magnetic resonance spectrometry (1H-NMR). Performance of the additives synthesized as inhibiting asphaltene deposition was determined by near infrared spectroscopy (NIR). For the study of paraffin deposition was employed pour point test in Thermo Haake C40P device refrigerated bath. The copolymers structures were confirmed by 'H-NMR analyses. It was observed chemical shifts at 6-7.4 ppm related to the aromatic hydrogen of styrene, at 0.8 ppm related to methyl group and 1.0-1.9 ppm related to methylene groups of the stearyl methacrylate. The sulfonation of the copolymer was confirmed by FTIR through the bands at 3400 cm<sup>-1</sup> assigned to the OH group and bands at 1034 and 1156 cm<sup>-1</sup> attributed, respectively, to symmetric and asymmetric stretching of the SO, group. The sulfonated copolymers showed better results in displacing the precipitation onset than the non-modified ones, especially at low concentrations. The results obtained for wax deposition inhibition show that it is necessary to fit the hydrophilic-hydrophobic balance of the copolymer structure in order to improve their performance.

## Biography

Elizabete F. Lucas is Chemical Engineer and obtained her D.Sc. degree in Polymer Science and Technology from Federal University of Rio de Janeiro (UFRJ) in 1994. She is Associate Professor at UFRJ since 1994 and has been accumulating a great experience in Polymer Science Applied to Petroleum Production for about 25 years. She is the director of the Laboratory of Macromolecules Applied to Petroleum Production (LMCP), has published 107 scientific papers, presented more than 250 talk/poster at conferences and written 3 books, 1 polymer dictionary, 1 vocabulary of oil chemistry and refining (in 4 languages), 1 book translation and 3 chapters of books. Since she has a strong interaction with petroleum industry, about 90 research reports and 36 technical reports have been prepared. The main studies involve polymer synthesis/characterization/properties, physical-chemistry of polymer solution, rheology of polymers and methods to evaluate the performance of polymers applied to different operations in oil production, from drilling to oil and water treatment. In such field, she has directed 30 master dissertations and 14 doctor thesis, and has 7 master dissertations and 11 doctor thesis under direction.

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