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Polymeric additives as flow improvers for crude oil and gas condensate

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Crude oil and gas condensate contains a wide range of hydrocarbon components with extremely differing physical properties. The major constituent of these hydrocarbon streams is paraffin wax. Paraffins are relatively insoluble and precipitate when these petroleum fluids are cooled down, and crystallized wax impairs the flow. The higher the wax content, the greater the problems with flow. Several options to minimize this effect are available, but the preferred method is the use of chemical additives referred to as wax crystal modifiers or flow improvers. Here we describe the synthesis and evaluation of polymeric additives as flow improvers. Additives were synthesized by free radical solution polymerization using tert-butylperoxy-2-ethylhexanoate as the initiator. Six types of additives of different composition and molar weight were prepared by copolymerization and terpolymerization of acryl esters of different alkyl chain length with styrene, (meth)acrylic acid, and 1-vinyl-2-pyrrolidone. The quality of the prepared additives as flow and rheology improvers was tested by applying them to crude oil and gas condensates fields from the northern part of Croatia and Hungarian gas condensate field Barcs. It is known that the efficiency of these additives is considerably influenced by their properties and by oil and condensate n-paraffin content and distribution. However, copolymers of octadecyl methacrylate with acrylic acid and terpolymers of octadecyl methacrylate with styrene and acrylic acid proved very efficient, regardless of gas condensate properties.

Dedicated to Dr. Radivoje Vukovic, the scientific adviser at the oil company INA–Industrija Nafte, Zagreb, Croatia.

Biography

G. Bogdanic and I. Wichterle are scientific researchers at the Institute of Chemical Process Fundamentals, Prague. Both publish extensively in the field of phase equilibria. G. Bogdanić received her Ph.D. from Institut Français du Pétrole, Paris, and completed postdoctoral studies at Technical University of Denmark, Lyngby. She is the (co)author of 3 books, 67 scientific papers, 2 patents, and the editorial board member of 3 reputed journals.

I. Wichterle received his Ph.D. from the Czechoslovak Academy of Sciences. During his postdoc stay at Rice University, Houston, he discovered a new phenomenon in critical region. He has authored 114 papers and 27 books/monographs.

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