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Synthesis and characterization of poly(methyl methacrylate-co-vinyl acetate) and its evaluation as filtrate reducer

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Abstract

The drilling fluids of petroleum wells must present different functions, such as filtration controlling. In this work, microparticles of poly(methyl methacrylate-co-vinyl acetate) (MMA/VAc) were synthesized by suspension polymerization and their performance as filtrate controller in aqueous fluids were evaluated. The polymers were characterized by 13C-nuclear magnetic resonance (NMR), particle size analyses, optical microscopy, differential scanning calorimetry (DSC) and thermogravimetry (TGA). The poly(methyl methacrylate-co-vinyl acetate) particles were obtained with slight different proportions of MMA/VAc. As expected, all particles presented spherical shape. The glass transition temperatures decreased as the VAc content increased, confirming the rubbery character of the spheres containing higher vinyl acetate content. TGA results showed that the copolymer has the thermal resistance required for the application under study: they lose mass only at temperatures above 146°C. The results of the filtrate reducing test, using ceramic discs with different pore sizes as filter element, showed that the performance of the polymer samples in related to: (1) the average particle size of the polymer samples in relation to the average sizes of the pores of the rock; and (2) the elastomeric characteristic of the polymer, which facilitates the polymer compression in the pores of the rock forming a more efficient grout. On the other hand, the more efficient is the polymer in block the pore rock, the more difficulty is removing the polymer seal to restore the oil production.

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.