

EVALUATION OF POLY(METHYL METHACRYLATE-CO-VINYL ACETATE) SYNTHESIZED BY EMULSION POLYMERIZATION AS FILTRATE REDUCER

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ABSTRACT

The drilling of petroleum well is extremely important and requires the use of suitable drilling fluids in order to ensure an efficient operation without causing rock damage¹. Specific polymers have been used in drilling fluids for control infiltration. In this case is important control the size and the distributions polymer particle². In this work, the poly(methyl methacrylate-co-vinyl acetate) (MMA-VAc), prepared by emulsion polymerization, was evaluated in terms of their performance in filtrate loss controlling of aqueous fluids. The influence of copolymer composition and particle size on the additive performance was investigated. The emulsions were prepared using potassium persulfate as initiator, sodium bicarbonate as buffer and sodium lauryl sulfate as emulsifier. The system was kept under stirring of 260 rpm at a temperature of 80 °C for 6h, during the polymerization the system was fed with monomer a rate of 1mL/min. The end of the reaction a part of the emulsion was stored and another precipitated with ethanol for using in test filtrate reducer. For test filtrate reducer was used a filter press with ceramic disc of 3 and 10 µm, simulating the rock. Polymer samples were characterized in terms of: copolymer composition by ¹³C-nuclear magnetic resonance (NMR), thermal stability by thermogravimetric analysis (TGA) and glass transition temperature by differential scanning calorimetry (DSC). The emulsion were characterized in terms of: size distribution by Nanosizer and morphology by optical microscopy. Were obtained poly(methyl methacrylate-co-vinyl acetate) with different proportions of MMA/VAc, The results of composition for the samples E-01, E-02 e E-03 (MMA/VAc) calculated were respectively: 100/0, 86/14 and 51/49. The thermogravimetric analysis showed that the copolymer has thermal resistance needed for its application losing mass only at temperatures above 186°C. As expected, the glass transition temperatures (T_g) decreased as the VAc content increased, presenting less T_g the copolymer E-03 with 40 °C confirming the rubbery character of copolymers containing high vinyl acetate content. Were observed optical microscopy the presence of droplets the emulsion. The size distribution were in the range of 50 nm for the all samples. For the test filtrate reducer were used the copolymer in emulsion and copolymer precipitates presenting best results the emulsion. Because the particle size is similar for all emulsions the elastomeric character was the main responsible for the decrease in filtrate loss. Showing better results in ceramic disc 10 µm and the emulsion E-03 best results in reducing filtration due to its larger elastomeric character.

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References:

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