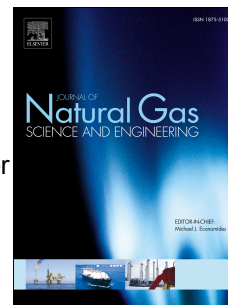


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Formulation of a water based drilling fluid system with synthesized graft copolymer for troublesome shale formations

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Abstract:

Shale formations consisting of reactive clay mineral of smectite group like montmorillonite may lead to severe wellbore instability problems with conventional water based drilling fluids. This may be due to their high magnitude of rock-fluid interaction inside the wellbore. Problems like hole enlargement, pipe sticking, high torque and drag etc. may escalate drilling cost and time. The present study deals with the applicability of synthesized polyacrylamide/diallyl dimethyl ammonium chloride-grafted-gum acacia copolymer in formulation of novel water based drilling mud system (WBDMS) for troublesome shale formations. The mechanism behind the synthesis was free radical polymerization. The structural information and morphological properties of copolymer were determined by Fourier transform infrared spectroscopy (FTIR) and Field emission scanning electron microscopy (FESEM). Further, its effect on filtration and rheology of developed mud system was analysed thoroughly as per API standard procedures. Further, effectiveness of graft copolymer on the shale stabilization was investigated using shale dispersion and shale durability tests. The reactivity of core sample with the developed drilling fluid system was analysed using core flooding experimental setup. The experimental investigations showed that synthesized graft copolymer has significant effect on rheological parameters and filtration characteristics of the system due to its synergistic effects in the developed system. Also, its shale stabilization property was superior to the commercially used shale stabilizer (partially hydrolyzed polyacrylamide polymer). It was evident from the high values of shale

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