

Polymer nanocomposites application in drilling fluids : A review

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ABSTRACT

Indubitably, drilling fluid is the most crucial component of drilling operations. With the current exploration of hydrocarbons in deep water horizons, unconventional formations, and anticipated production from the arctic regions, there is a need to improve the properties of existing drilling fluids for harsh conditions. Recently, the synergic combination of polymer and nanoparticle (polymer nanocomposite) has gained prodigious attention for application as a drilling fluid additive due to its sterling and fascinating properties. Herein, the application of polymer nanocomposite (PNC) as an additive in drilling fluids has been reviewed. The survey of the literature shows that PNC significantly improved the rheological, filtration, and shale swelling inhibition properties of drilling fluids. Nonetheless, accurate modelling of its behaviour remains elusive. The mechanism of the improved efficiency of PNC as a drilling fluid additive was elucidated. Finally, the gaps in the research were highlighted, and recommendations for future studies were outlined. Overall, drilling fluids containing PNC exhibited comparably higher efficiency and immense potential to overcome severe wellbore problems encountered with conventional drilling fluids.

KEYWORDS

Drilling fluids; Nanoparticles; Polymer nanocomposites; Polymers; Rheological properties; Shale swelling

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