Title: Novel water-based fluids for dispersible shale formation applications

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I. Abstract

High-performance water-based drilling muds are environmentally-friendly and cost-effective regarding cuttings and fluids disposal, remain stable when exposed to high temperatures, and retard problems associated with reactive shale. Their technical performance approaches that of oil-based mud systems. This study, therefore, examines the effectiveness of sodium erythorbate, potassium formate, and polyethylene glycol for the formulation of high-performance water-based drilling muds. Biopolymers, diutan gum, konjac gum, and xanthan gum, were used as drilling fluid viscosifiers in the preparation of drilling fluid formulations. The shale rock samples were characterised using scanning electronic microscope photos while X-Ray diffraction analysis was used to identify the mineralogy of the shale samples. Shale recovery tests were carried out by aging shale cuttings in drilling fluid formulation and in freshwater dynamically in a roller oven for 16 hours at 120°C. The percentage recovery of shale rocks after dynamic aging was determined. Experimental data indicated that after dynamic aging for 16 hours, sodium erythorbate, potassium formate, and polyethylene glycol stabilised water-based drilling fluid formulations up to 232°C. Experimental data also indicated that the shale cuttings recovered from freshwater was 78%; with mud formulated with sodium erythorbate, potassium formate, and polyethylene glycol, the shale cuttings recovered were 100%. This new fluid systems which are stable at high temperatures and inhibit shale dispersion can meet high temperature and shale formation drilling requirements.

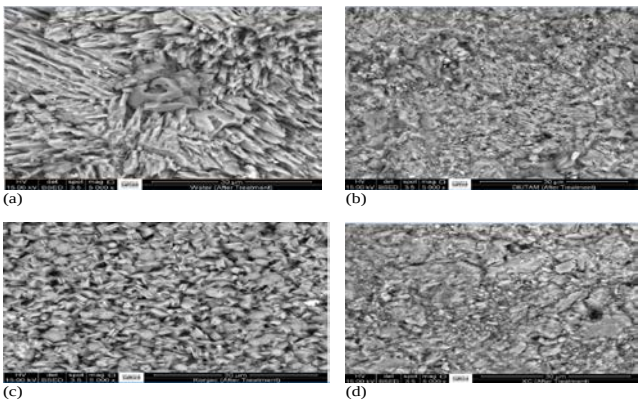


Figure 1: Shale samples aged in fluids (SEM photos - Mag. 5000x): (a) Shale sample after aging in freshwater at 120°C; (b) Shale sample after aging in an inhibitive mud formulated with diutan gum at 120°C for 16 hours; (c) Shale sample after aging in an inhibitive mud formulated with konjac gum at 120°C for 16 hours; (d) Shale sample after aging in an inhibitive mud formulated with xanthan gum at 120°C for 16 hour

II. Reference

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III. Biography

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