

## The Influence of Viscosifier Concentration on Rheological Properties of Invert Emulsion Mud

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**Abstract :** Oil-based muds are the most regularly used rotary drilling methods in the oil and gas industry. However, they have a negative impact on the environment, which leads to restrictions of their application in many countries of the world. Consequently, looking for new eco-friendly alternative formulations of oil-based drilling fluids for the exploration of troublesome formations. As one of the developments of Novel formulation of environmentally friendly drilling fluids and investigation of the formulation for jatropha oil-based drilling fluid samples at different concentrations of viscosifiers such as low viscosity polyanionic cellulose (PAC- LV), high viscosity polyanionic cellulose (PAC-V) and local Egyptian bentonite. The oil-water ratio was taken as 70:30, which is beneficial in producing a low fluid loss. 15 drilling fluid samples were formulated different concentrations of bentonite, PAC- LV and PAC-V individually and their mud density, rheological properties, electrical stability and filtration loss properties were determined. The rheological performance showed at higher concentrations of viscosifier, the trend of viscosity increment of PAC performed in a similar way to bentonite. The best result of electrical stability by using the lowest concentration of viscosifier was achieved with PAC-V. The lowest fluid loss volumes were obtained by using the highest concentrations (4 g) of viscosifiers. Mud cake thickness of samples increased by using viscosifiers; however, a lower range was achieved compared to API specification. From the overall experiment, it can be concluded that as the concentrations of viscosifier increase, the viscosity trend increase in a similar way to both PAC-V and bentonite. But we must note that the PAC-V is a more environmentally friendly additive and a renewable resource, cheaper than bentonite and improves properties of eco-friendly OBMs well. It is a preferable choice for oil-based drilling fluids.

**Keywords :** invert emulsion mud, oil-based mud, rheological properties, viscosifier

**Conference Title :** ICWDWDC 2022 : International Conference on Well Drilling, Well Design and Construction

**Conference Location :** Jeddah, Saudi Arabia

**Conference Dates :** November 14-15, 2022