Effect of Salt Contamination on the Filtration Loss in 4% Bentonite Drilling Mud with Xanthan Gum

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Abstract
In this study the filter loss in drilling mud with contamination of salt (sodium chloride, NaCl) was investigated. The drilling mud contained water, 4% bentonite and 0.5 lb/bbl (equivalent to 1.43 g/L) xanthan gum [1]. 0.5% salt (sodium chloride, NaCl) increased the fluid loss by over 30%. Addition of 0.5% surfactant reduced the fluid loss of contaminated drilling mud by over 40%.

1. Introduction
Polymer with the name of "polysaccharide" is a class of materials made of a chain of thousands of similar small unit molecules "monomers". Xanthan gum is a high-molecular-weight biopolysaccharide produced by bacterial growth. Commercially, this polymer is produced by growing the bacteria by a fermentation process, precipitating the gum in alcohol, and then drying and milling the product to a powdered form, then, it is added to a liquid medium to form the gum. The Xanthan gum Molecular formula is $C_{35}H_{49}O_{29}$ [2].

Xanthan gum has been used in drilling fluids, fracturing fluids, completion fluids and enhanced oil recovery polymer floods [3]. Moreover, this polymer has been used as viscosities and fluid loss control in oil and gas industry also can be used in almost any type of water and as a suspending agent [4, 5].

2. Objective
The main objective was to investigate (including fluid loss and changes in resistivity) the effect of salt contamination on xanthan gum modified 4% bentonite drilling mud.

3. Materials and Methods
Three samples have been used: 1. Water, 4% bentonite and 0.5 lb/bbl (equivalent to 1.43 g/L) xanthan gum ($C_{35}H_{49}O_{29}$); 2. Water, 4% bentonite, 0.5 lb/bbl (equivalent to 1.43 g/L) xanthan gum ($C_{35}H_{49}O_{29}$) and 0.5% salt (sodium chloride, NaCl) and 3. Water, 4% bentonite and 0.5 lb/bbl (equivalent to 1.43 g/L) xanthan gum ($C_{35}H_{49}O_{29}$), 0.5% salt (sodium chloride, NaCl) and 0.5% surfactant. The filter loss and resistivity were measured.

4. Results and Discussion
It was found that presence of salt (sodium chloride, NaCl) or contamination increases the filtration of the water based drilling fluid by 30%. Adding surfactant decreased the filter loss in salt contaminated drilling mud about 40%. Presence of sodium chloride can be detected by measuring resistivity due to influence of salt (sodium chloride, NaCl) on the increasing the conductivity. Therefore, by adding sodium chloride the resistivity decreased by 86%, after adding surfactant the changes in resistivity was doubled.

5. Conclusion
Based on this study contamination increases the filter loss about 30% and decreased the resistivity by 86% compared to the sample with no contamination. Adding surfactant improved this filtration considerably (about 40%) while the resistivity got doubled compared to contaminated drilling mud.

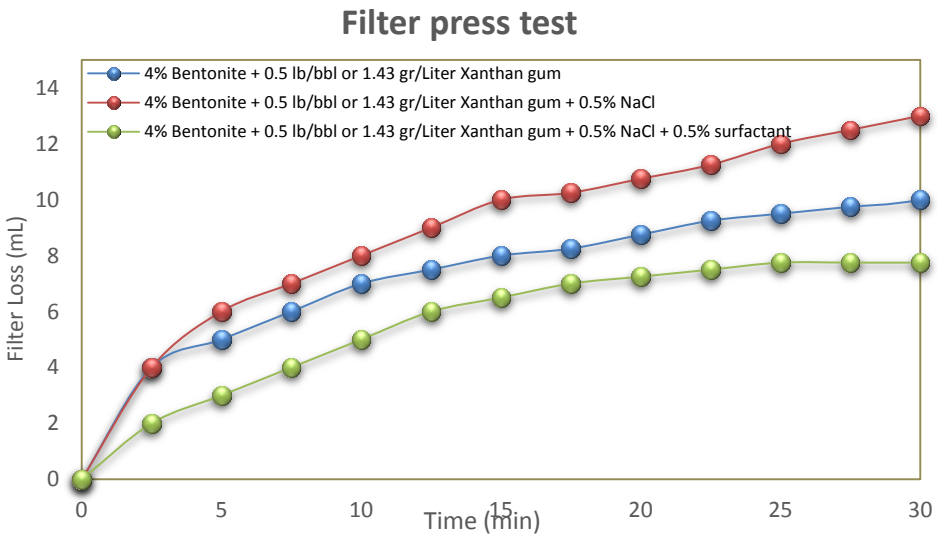

Figure 1:Filter loss of three samples

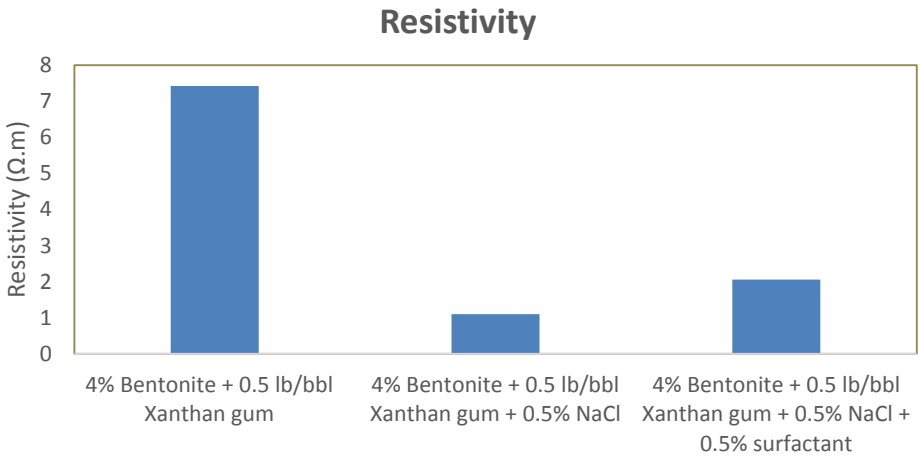

Figure 2: Resistivity of three samples

6. Acknowledgements

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7. References

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