



## DISPERSION BEHAVIOR OF SOME BENTONITES USED FOR DRILLING FLUID: EFFECTS OF POLYMERS AND WATER QUALITIES

*Dr. Shamima Akhter, Ahmad Dughaiman Marzouq AlGhadhour, Sabah Zaid Mejdel Al Otaibi, and Yousef Naser Al Otaibi*

*Innovation and technology group and Production Operation EK-1  
Kuwait Oil Company, Ahmadi-61008, Kuwait*

### Summary

We investigated the dispersion/flocculation behavior of some bentonites in relation to different polymer and polymer concentration, pH and NaCl concentration and their application to improve of drilling fluids.

The dispersion behavior of four commercial bentonites in solutions pH (pH 2, 7 and 12) and NaCl (1, 3.5, and 10%) were studied. Two organically treated bentonites (Tixoton and Bentonil-GTC4) and two untreated bentonites (Montigel-F and Wyoming) were used. The polymers are Carboxyl Methyl Cellulose, Partially Hydrolyzed Polyacrylamide, Xanthan Gum, and Polyvinyl Pyrrolidone. The dispersion behavior of bentonites/flocculation rate was measured by light scattering methods. The viscosity of bentonite suspensions were also investigated as a major rheological property of drilling fluid.

The dispersion/flocculation behaviors are strongly controlled by pH. The suspensions are stable at  $\geq$  pH 7 and unstable at low pH. The flocculation rates are increased with decreasing solutions pH. For anionic polymer treated samples, the stability of the suspension is increased with increasing concentrations of polymer whereas cationic polymer treated samples are relatively unstable in all pH conditions.

In NaCl solution, the flocculation rate is increased with increasing concentration of NaCl. Bentonites treated with anionic polymers show good dispersion whereas the cationic polymer is not effective in all NaCl solutions.

The viscosity of the samples increased while increasing pH, polymer concentration and polymer molecular weight. The cationic polymer treated samples showed significantly low viscosity at all pH conditions although the viscosity tends to slightly increase with increasing solution pH. Bentonites treated with Xanthan gum (anionic) showed best dispersion stability in all solution conditions.

The experimental results showed that the flocculation rate obtained by light scattering method is very useful to objectively evaluate the dispersion behavior of bentonite suspension. The dispersion/flocculation characteristics are classified as four grades (A, B, C, D) based on the flocculation rate. This classification can be used for the evaluation of dispersion properties of drilling fluid in diverse environmental conditions.

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## **Theory / Method / Workflow**

The dispersion behavior of four commercial bentonites in solutions pH (pH 2, 7 and 12) and NaCl (1, 3.5, and 10%) were studied. Two organically treated bentonites (Tixoton and Bentonil-GTC4) and two untreated bentonites (Montigel-F and Wyoming) were used. The polymers are Carboxyl Methyl Cellulose, Partially Hydrolyzed Polyacrylamide, Xanthan Gum, and Polyvinyl Pyrrolidone. The dispersion behavior of bentonites/flocculation rate was measured by light scattering methods. The viscosity of bentonite suspensions were also investigated as a major rheological property of drilling fluid.

## **Results, Observations, Conclusions**

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## **Novel/Additive Information**

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#### References

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