RHEOLOGICAL PROPERTIES OF AL - BARKAN BENTONITE

By

Fatma Ibrahim Sayed Barakat

A thesis Submitted to the
Faculty of Engineering at Cairo University
In partial fulfillment of the
Requirements for the degree of
DOCTOR OF PHILOSOPHY
In
Chemical Engineering

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Title of Thesis:

RHEOLOGICAL PROPERTIES OF AL – BARKAN BENTONITE

Key Words: Rheology – Bentonite - Thixotropy - Stretching theory

Summary:

This thesis is studying the rheological properties of three different types of A – Barkan bentonite ore. The three ores were analyzed using XRD and XRF. Programmable Brookfield rheometer was used to trace the change of shear stress with the shear rate according to different clay concentration, aging time and particle size. It was proved that the apparent viscosity of the three ores is changed under constant shear rate (thixotropic ores). In most cases the flow was found to be non – Newtonian flow differes from Bingham fluids to real plastic fluids. The effect of the aforementioned factors were studied on the nature of flow and the degree of thixotropy as the area of the thixtropic loop on the shear stress – shear rate diagram and in some cases using the exponential stretching theory. The effect of the sodium percentage on the degree of thisotropy was also traced. A statistical model was used to specify the effect of each studied factor on shear stress, apparent viscosity and the degree of thixotropy. The optimum specifications to use this ore as a drilling mud were also determined.

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