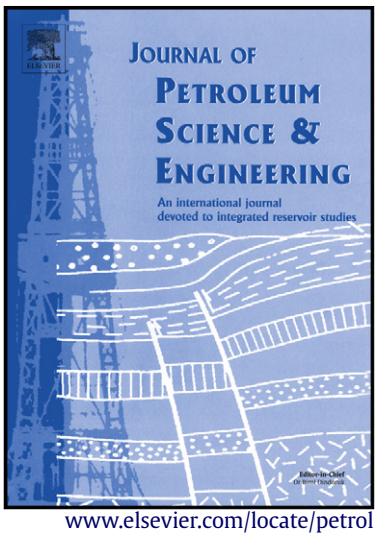

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Shishir Shivhare, Ergun Kuru

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A Study of the Pore-Blocking Ability and Formation Damage Characteristics of Oil-Based Colloidal Gas Aphron Drilling Fluids

Shishir Shivhare

Palantir Economic Solutions

205, 707-7 Ave SW

Calgary, Alberta, Canada, T2P 3H6

E-mail: shivhare@ualberta.ca

Ergun Kuru

School of Mining and Petroleum Engineering,

University of Alberta

Edmonton, AB, Canada, T6G 2W2

E-mail: ekuru@ualberta.ca

Abstract

The colloidal gas aphron (CGA) based drilling fluids are designed to minimize filtration loss by blocking the pores of the rock with micro bubbles. Aphrons behave like a flexible bridging material and form an internal seal in a pore-structure which can later be removed easily when the well is open for production.

A non-aqueous CGA fluid was formulated by mixing 0.4% W/W oil soluble surfactant (Sorbitan Fatty Acid Ester) and a 1.5% W/W linear polymer (Styrene-Ethylene-Propylene)) with mineral oil at a very high shear rate.

The CGA fluid was used in a series of core flooding experiments to see the effects of the fluid injection rate, the type of saturating fluid, and wettability of the porous media on the pressure drop across the porous media and return permeability.

Effective pore blocking ability of CGA fluid was confirmed by ever increasing resistance to the injection of CGA fluid through the porous media (i.e., continuous increase of pressure drop across the porous media). Results confirmed that microbubble buildup has occurred in the porous media, which limits the fluid invasion. The permeability alteration, measured as an indication of the formation damage due to CGA fluid flow, was found to be variable.

Keywords: Colloidal Gas Aphrons, Formation Damage, Drilling Fluids, pore-blocking, filtration loss