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## Toward a Hydrocarbon-Based Chemical for Wettability Alteration of Reservoir Rocks to Gas Wetting Condition: Implications to Gas Condensate Reservoirs

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### Abstract

Recently, wettability alteration has been much attended by researchers for studying well productivity improvement in gas condensate reservoirs. Previous studies in this area only utilized water/alcohol based chemicals for this purpose. While, hydrocarbon nature of the blocked condensate in retrograde gas reservoirs, may motivate application of hydrocarbon based chemical agents. In this study, a new hydrocarbon based wettability modifier is introduced to alter wettability of carbonate and sandstone rocks to preferentially gas wetting condition. Static and dynamic contact angle measurements, spontaneous imbibition and core flooding tests were conducted to investigate the effect of proposed chemical on surface wetting behavior, and fluid flow characteristics at core scale. SEM, EDX, EDX map and FTIR tests are used to characterize the adsorbed chemical layer and also to endorse the adsorption of fluorinated chemicals on both sandstone and carbonate rock surfaces. It is inferred from the results of contact angle hysteresis at different levels of tilt angle that the surface roughness increased as a result of treatment with the new chemical. Measurements of surface free energy of calcite thin section at different tilt

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