

# VISCOELASTIC PROPERTIES OF AQUEOUS ANIONIC SURFACTANT SOLUTIONS IN THE PRESENCE OF HYDROCARBONS

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Surfactant molecules can self-assemble and form long wormlike micelles which behave like reversibly breakable polymers. Wormlike micelles can form an entangled network what imparts viscoelastic properties to solutions. After contact with hydrocarbons the network is disrupted due to the fact that nonpolar solvents can be easily solubilized by hydrophobic micellar cores. We investigate the effect of hydrocarbons on viscoelastic properties of aqueous anionic surfactant (potassium oleate) solutions.

Rheological measurements were performed on a stress-controlled rotational rheometer Haake Rheostress 150L. At low hydrocarbon concentrations the solutions are viscoelastic and their rheological behavior can be described by Maxwell model with a single relaxation time. Plateau storage modulus, relaxation and reptation times decrease with increasing hydrocarbon concentration what is due to the shortening of the micelles. The dependencies of the rheological properties on surfactant concentration at fixed ratio surfactant/hydrocarbon confirm the presence of linear "living" chains at low hydrocarbon concentration and the transition to unbreakable chains with increasing hydrocarbon content. At higher hydrocarbon concentrations solutions lose viscoelastic properties and viscosity drops rapidly. The network is gradually disrupted and transition to unentangled regime occurs. This is due to the shortening of the wormlike micelles and to the formation of small spherical microemulsion droplets what was confirmed by cryo-TEM. At high hydrocarbon concentrations viscosity reaches the values equal to that of water what indicates to the complete disruption of the network and to the formation of microemulsion droplets as shown by DLS and cryo-TEM.

Thus, it was shown that potassium oleate solutions are highly responsive to hydrocarbons, and this effect is very promising for applications in oil recovery.

Acknowledgement: this work was supported in part by Award No KUK-F1-034-13 made by King Abdullah University of Science and Technology (KAUST).