Properties of Tetrameric Acids in Bulk and at the Oil/Water Interface

$C_{80}$ tetra-acid (also known as ARN) is a molecule present in petroleum crude oil at small concentrations (ppm level) which can precipitate during oil production in basic medium and in presence of calcium ion to form deposits. The formation of such deposits is detrimental in production because they can plug oil production facilities and may lead to costly production shutdowns due to deferment and clean-up operations. Calcium naphthenate deposits are found in wells all over the world (North Sea, West Africa, Brazil and China). Due to its practical interest, research efforts have been undertaken to understand the mechanism of formation of calcium naphthenate deposits*.

In this presentation, the bulk and interfacial properties of ARN and a model molecule specially designed to mimic its properties and named BP-10 are described. The bulk properties are studied by techniques like Small-Angle Neutron Scattering (SANS), Isothermal Titration Calorimetry (ITC) and Dynamic Light Scattering. The ARN and BP-10 properties at oil-water interface are studied by interfacial tension measurements and shear interfacial rheology.