

# 2<sup>nd</sup> World Congress on Petrochemistry and Chemical Engineering

October 27-29, 2014 Embassy Suites Las Vegas, USA

## Water-in-diesel fuel nanoemulsions: Preparation, stability, rheological and physical properties

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In this work, water-in-diesel fuel nanoemulsions were prepared with mixed nonionic surfactants. Several mixtures of span 80 and tween 80, with different Hydrophilic-Lipophilic Balance (HLB) and three mixed surfactant concentrations values were prepared to achieve the optimal values. Five emulsions with different water contents were prepared using high energy method at the optimum conditions. The effect of HLB value, mixed surfactant concentration and water content on the droplet size has been studied. The interfacial tension and thermodynamic properties of the individual and the blended emulsifiers were investigated. Droplet size of the prepared nanoemulsions was determined by dynamic light scattering and the nanoemulsion stability was assessed by measuring the variation of the droplet size as a function of time. From the obtained results, it was found that the mean droplet sizes was formed between 49.55 and 190.1 nm depending on HLB value, surfactant concentration and water content of the blended emulsifiers. Nanoemulsion systems were then subjected to rheological evaluation. Results showed that the prepared water-in-diesel fuel nanoemulsions exhibited low viscosity Newtonian character. The time influence on the rheology of the nanoemulsions has led to evolution of water droplet size due to Ostwald ripening phenomenon and a slight decrease of viscosity was observed that indicate the change of rheological character of the nanoemulsion system into time-dependent non-Newtonian character as a result of the interfacial relaxation stress by time. Also, the physical properties, kinematic viscosity and density, of the prepared nanoemulsions and the effect of different temperatures on these properties were measured.

### Biography

Ahmad M. Ragab has completed his M.Sc. from the Faculty of Science, Menoufia University, 2012 and he has been working as an assistant researcher at Egyptian Petroleum Research Institute (EPRI), Cairo, Egypt. He has involved in research as a board member at the Chemical Services and Development Centre (CSDC) at this institute. He has published 4 papers in reputed journals and one book.

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