

Interfacial Properties of Three Nonionic Surfactants in an Aqueous Amine Solution (n-Methyldiethanolamine + Diethanolamine)

J. Águila-Hernández,^S B.E. García-Flores,^C and A. Trejo

*Programa de Ingeniería Molecular, Instituto Mexicano del Petróleo, Área de Investigación en Termofísica,
Mexico, D.F., Mexico
bgarcia@imp.mx*

The equilibrium surface tension was determined experimentally for the surfactants 2,4,7,9-tetramethyl-5-decine-4,7-diol (surfynol 485) with 30 moles of ethylene oxide, 2,5,8,11-tetrametyldodeca-6-yne-5,8-diol (surfynol DF110-D), and cis-9-octadecen-1-ol (ocenol) in the aqueous amine mixture formed by n-metyldiethanolamina (MDEA) and diethanolamine (DEA) (32.5 mass % of MDEA, 12.5 mass % of DEA, and 55 mass % of water). Seven different concentrations for each surfactant and two temperatures (313.15 and 323.15) K were studied. In order to determine the values of the equilibrium surface tension the pendant drop method was used. The determined uncertainty for the surface tension results is $0.21 \text{ mN}\cdot\text{m}^{-1}$.

The experimental values of equilibrium surface tension as a function of surfactant concentration and temperature were used to calculate surface excess, using the Gibbs relation, the surface area occupied by a surfactant molecule at the air-liquid interface, and the modulus of elasticity of Gibbs, to explain the kinetics of surface aging.