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Comparative study of oil recovery efficiency enhanced by surfactants, microemulsions, and nanoemulsions

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Despite the high levels of technological development reached by the oil industry, oil recovery efficiencies in primary and conventional steps present a challenge. During the recovery process, a great amount of oil remains trapped in the reservoir rock. With the aim of solving this problem, scientists have developed advanced oil recovery methods using chemical, thermal, or miscible processes to move the oil retained after the conventional step. This study investigates the application of surfactants, microemulsions and nanoemulsions in the recovery process of mature oil fields. These systems have the power to reduce interfacial tension, display a high capacity of solubilization, and change the wettability of the rock. Such features favor the interaction between injected fluid and oil, providing a greater volume of displaced oil. An experimental study was developed to simulate oil recovery steps to improve efficiency results. The study compared recovery efficiencies using the injection of ionic and non-ionic surfactants solutions, microemulsions, and nanoemulsions systems. The experiments used a smaller amount of fluid and presented reduced costs, when compared to other methods. The results obtained for the tests varied from 35% to 85% for the advanced-step oil recovery, reaching 96% of total oil in place recovered.

Biography

Tereza Neuma Castro Dantas holds a Bachelor's degree in Chemistry from the Federal University of Ceará (1975), Master's Degree in Organic Chemistry for the same UFC (1979), Doctorate Third Cycle (1981) and PhD in Chemistry (1983), both by the Institute National Polytechnique de Toulouse, France. Member of European Academy of Sciences Arts and Literature. She is currently a teacher volunteer of the Universidade Federal do Rio Grande do Norte, working in teaching and research. Fellow in Research Productivity 1 B of CNPq. She is a professor of UNIRN and Executive Coordinator of the Primary Processing of Waste water - NUPPRAR/ UFRN/PETROBRAS. Holds the position of President of the Regional Council of Chemistry-XV Region. She is a member of the editorial board of the Brazilian Journal of Petroleum and Gas-BJPG. Has experience in the areas of Chemical Technology and Chemistry of Natural Products, working in the areas of Oil, Gas and Environment, involving applications with surfactant and microemulsions and nanoemulsions systems.

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