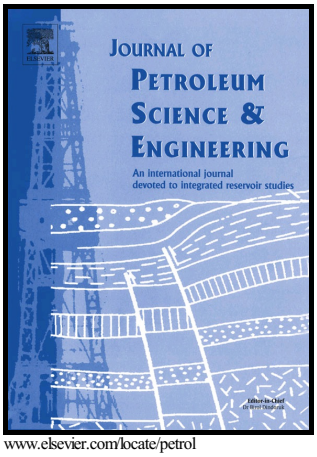

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Patrizio Raffa, Antonius A. Broekhuis, Francesco Picchioni

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Polymeric Surfactants for Enhanced Oil Recovery: a Review

Patrizio Raffa*, Antonius A. Broekhuis, Francesco Picchioni

Department of Chemical Engineering - Product Technology, University of Groningen, Nijenborgh 4, 9747 AG Groningen, the Netherlands

*Corresponding author. Tel.: +31(0)503634462. p.raffa@rug.nl

Abstract

Chemical enhanced oil recovery (EOR) is surely a topic of interest, as conventional oil resources become more scarce and the necessity of exploiting heavy and unconventional oils increases. EOR methods based on polymer flooding, surfactant-polymer flooding and alkali-surfactant-polymer flooding are well established, but new challenges always emerge, which give impulse to the search for new solutions. Polymeric surfactants represent a very attractive alternative to these techniques, because they can provide simultaneously increase in water viscosity and decrease in interfacial tension, both beneficial for the efficiency of the process. The analysis of the literature shows that the use of polymeric surfactants as displacing fluid has the potential to improve the performances of EOR in some cases. However, the synthesis are often challenging and costly and the available data about the real performances of such systems in oil recovery are still sparse. This holds back the possibility of a significant use of polymeric surfactants for EOR. This review collects the relevant work done in the last decades in developing and testing polymeric surfactants for EOR, with a particular emphasis on the chemical aspects, the patent literature and bio-based systems.

List of abbreviations

AA, acrylic acid; AM, acryl amide; ASP, alkali-polymer-surfactant flooding; BA, butyl acrylate; Ca, capillary number; DLS, dynamic light scattering; EA, ethyl acetate; EOR, enhanced oil recovery; HMPAM, hydrophobically modified poly(acryl amide); HPAM, partially hydrolized poly(acryl amide); IFT, interfacial tension; M, mobility ratio; PAM, poly(acryl amide);