

Evaluation of Water-Soluble Ionic Liquids Based on Quaternized Hyperbranched Polyamidoamine and Amino Acids for Chemical Enhanced Oil Recovery

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Abstract : Ionic liquids' ability to be tuned and stability under challenging environmental conditions are their significant features in enhanced oil recovery. In this study, two amino acid ionic liquids (AAILs) were prepared from quaternized hyperbranched polyamidoamine PAMAM (G0.5 C12) and amino acids (Cysteine and Lysine). The chemical structures of the prepared AAILs were verified by using FTIR and ¹H-NMR spectra. These AAILs were tested for solubility, thermal stability, and surface activity in the presence of Egyptian medium crude oils under different PVT parameters after being diluted in several brine solutions of various salt compositions at 10% (w/w) salinity. The measurements reveal that the produced AAILs have good solubility and thermal stability. The effect of different concentrations of AAILs (0.1-5%) and salinity (20000-70000 ppm) on Interfacial tension (IFT) were studied. To test the efficacy of (AAILs) for a CEOR, numerous flooding experiments were carried out in samples of sandstone rock. Rock wettability is important for sandstone rocks, so conduct wettability alteration by contact angle (CA) of (30-55) and IFT of (7-13). The additional oil recovery was largely influenced by ionic liquid concentration, which may be changed by dilution with the formation and injected brines. This research has demonstrated that EOR techniques led to a recovery wt. (22-45%).

Keywords : amino acid ionic liquids, surface activity, critical micelle concentration, interfacial tension, contact angle, chemical enhanced oil recovery, wettability

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