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# Thermal Stability of Acrylamide-Based Polymers at High Temperature and High Salinity

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**Abstract:**

During polymer floods or surfactant-polymer floods, polymer molecules reside inside petroleum reservoirs for years. This extended period gives sufficient time for the polymers to react with the in-situ environment (high temperature, oxygen-free, high salinity) which could lead to polymer degradation and viscosity loss. In this study, a systematic glove box operating procedure was developed to reduce oxygen concentration (in polymer solutions) to less than 15 ppb. Viscosity was monitored to investigate the thermal stability of one commercially available partially hydrolyzed polymer (HPAM) and three ATBS-based polymers at high salinity (36,000 ppm to 54,000 ppm) and high temperature (116 °C) conditions through a long period. Acrylamide-acrylate (AM-AA) copolymer Flopaam™ 3330s and ATBS-AA copolymer ZLPAM @50525 were selected as the potential candidates for alkali-surfactant-polymer (SP) floods at high temperature and high salinity environment. The viscosities of ZLPAM and Flopaam increased first due to hydrolysis, then slowly decreased. The pH of those polymers dropped approximately by one unit. SAV 20 and SAV 20xv showed no noticeable viscosity or pH changes. ZLPAM and Flopaam can be used at high temperature in the absence of divalent ions, whereas SAV 10 and SAV 10xv can be used in the presence of divalent ions.

Keywords: surfactant-polymer floods, thermal stability, acrylamide-acrylate, low oxygen environment, Enhanced Oil Recovery (EOR), high salinity