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Nanoparticles application for enhanced oil recovery

Maje Alhaji Haruna, Zhongliang Hu and Dongsheng Wen
University of Leeds, England

As many oil reservoirs go into their peak level of production, it is necessary to develop new technologies to keep production and increase the oil recovery rate. A number of enhanced oil recovery (EOR) are currently available, based on thermal, chemical and miscible flow approaches. One of the effective methods is polymer EOR where water-soluble polymers are used to increase the apparent viscosity of the displacing fluid in order to lower the mobility ratio. This maximises sweep efficiency of the oil recovery by creating less viscous fingering fluid. Their applications, however, are limited in high-temperature and high-salinity oil reservoirs because of their inherent poor salt tolerance and weak thermal stability. This work reports the rheological and EOR effect of a new polymer agent, i.e., partially hydrolyzed polyacrylamide (HPAM) seeded with silica nanoparticles. A series of HPAM/silica nanoparticle suspensions were prepared via solution mixing and the effects of nanoparticle content, polymer concentration, temperature and salinity on their rheological behavior were investigated using Anton Paar Physica MCR301 Trugap rheometer. The rheological and enhanced oil recovery (EOR) properties of such hybrids were studied in comparison with HPAM under simulated high-temperature and high-salinity oil reservoir conditions (T : 85°C; Salt: 8wt%). The rheological investigation showed that the HPAM and HPAM/silica suspensions displayed non-Newtonian behavior in almost the whole range of shear rate. It was found that the apparent viscosity of HAHPAM solutions increased with addition of silica nanoparticles, and HPAM/silica hybrids exhibit better shear resistance and long-term thermal stability than HPAM in synthetic brine.

Biography

Maje Alhaji Haruna has completed his masters in Chemical Engineering at the age of 24 years from the University of Leeds. He is about to start his PhD in December 2015, he is currently working as a graduate assistant in the school of Chemistry Federal University Dutse, Nigeria. Maje attended many science and engineering conference within and outside Nigeria. He has a wide research interest in the field of energy, hydrogen production and wastewater treatment. Current research focused on the nanoparticle application for enhanced oil recovery. He has published many papers in reputed journals.

majeharuna@gmail.com

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