



Preparation and evaluation of sodium oleate-derived multifunctional surfactants as oilfield chemicals

Xuefan Gu^a, Huani Zhang^a, Peng Wang^a, Sanbao Dong^{a,b}, ManXue Wang^{a,c},
Shidong Zhu^{a,b}, Ya Wu^a, Jie Zhang^a, Chen Gang^{a,b,*}

^a*Shaanxi Province Key Laboratory of Environmental Pollution Control and Reservoir Protection Technology of Oilfields, Xi'an Shiyou University, Xi'an Shaanxi 710065, China, Tel. +86-029-88382690; email: gangchen@xsyu.edu.cn (C. Gang)*

^b*State Key Laboratory of Petroleum Pollution Control, CNPC Research Institute of Safety and Environmental Technology, Beijing 102206, China*

^c*Shaanxi Key Laboratory of Lacustrine Shale Gas Accumulation and Exploitation (Under planning), Xi'an 710060, China*

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ABSTRACT

In this paper, sodium oleate (SO) was modified by the reaction with formaldehyde to prepare SO-1 to SO-4. And then surface tension, foaming ability and oil displacement ability were carried out to evaluate the applicability as oilfield chemicals. On this basis, the microstructural observation of the microstructure of the synthesized surfactant foam was observed by microscopy. The decay mechanism of different surfactant foams, the droplet structure was revealed. In the relationship between stability, the interfacial tension evolution reduces the ability of oil-water interfacial tension. The results show that SO-1 to SO-4 can significantly reduce the oil-water interfacial tension at a concentration of 1.0%. When the concentration is 0.5%, SO-1 can reduce the oil-water interfacial tension to 0.001 mN/m, and 1.0% SO-1 can reduce the oil-water interfacial tension to 0.0001 mN/m. The foaming ability evaluation shows that the optimal foaming concentration of SO-SO-4 is 0.4%, and the temperature has little effect on the foaming ability. The oil displacement ability evaluation is the evaluation of the viscoelasticity of the surfactants with different concentrations. The results show that the oil displacement efficiency of the new surfactants is higher than that of SO, and the SO-2 oil displacement ability is the best. 0.3% SO-2 displays the best oil displacement efficiency of 30%, indicating that the synthesis of SO-series surfactants can be greatly improved. The above experimental results all indicate that they have an excellent ability to reduce the oil-water interfacial tension, and they can be used in the oil and petrochemical industry for oil production and have certain practical uses.

Keywords: Sodium oleate; Surface interfacial tension; Foaming; Emulsification; Oil displacement

* Corresponding author.