

ТЕЗИСЫ ДОКЛАДОВ

INTERNATIONAL WORKSHOP

**«Multiscale Biomechanics and Tribology
of Inorganic and Organic Systems»**

МЕЖДУНАРОДНАЯ КОНФЕРЕНЦИЯ

**«Перспективные материалы с иерархической структурой
для новых технологий и надежных конструкций»**

**VIII ВСЕРОССИЙСКАЯ НАУЧНО-ПРАКТИЧЕСКАЯ
КОНФЕРЕНЦИЯ С МЕЖДУНАРОДНЫМ УЧАСТИЕМ,
ПОСВЯЩЕННАЯ 50-ЛЕТИЮ ОСНОВАНИЯ
ИНСТИТУТА ХИМИИ НЕФТИ**

«Добыча, подготовка, транспорт нефти и газа»

Томск
Издательский Дом ТГУ
2019

DOI: 10.17223/9785946218412/494

QUENCHED POLYAMPHOLYTES FOR POLYMER FLOODING

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Polyampholyte type terpolymers were synthesized via conventional bulk free radical polymerization. Totally charged monomers such as 2-Acrylamido-2-methyl-1-propanesulfonic acid sodium salt (AMPSNa) and (3-Acrylamidopropyl)trimethylammonium chloride (APTAC) in combination with nonionic acrylamide (AAm) were used to prepare different compositions. Polyampholytes with different molar content: AAm 50-APTAC 25-AMPSNa 25, AAm 60-APTAC 20-AMPSNa 20, AAm 70-APTAC 15-AMPSNa 15, AAm 80-APTAC 10-AMPSNa 10 and AAm 90-APTAC 5-AMPSNa 5 are expected to improve their viscosifying ability, in high salinity media, which is attributed to the polyampholyte character of terpolymers [1].

Sand pack flooding was conducted to test the ability of the synthesized polymers to displace viscous East Moldabek (Kazakhstan) oil (140cp) out of high permeability porous media (16 Darcy). Initially the model was saturated with brine (100g/L salinity) and oil. Water flooding displaced 33% of oil. The figure 1 presents the results of the polymer flooding.

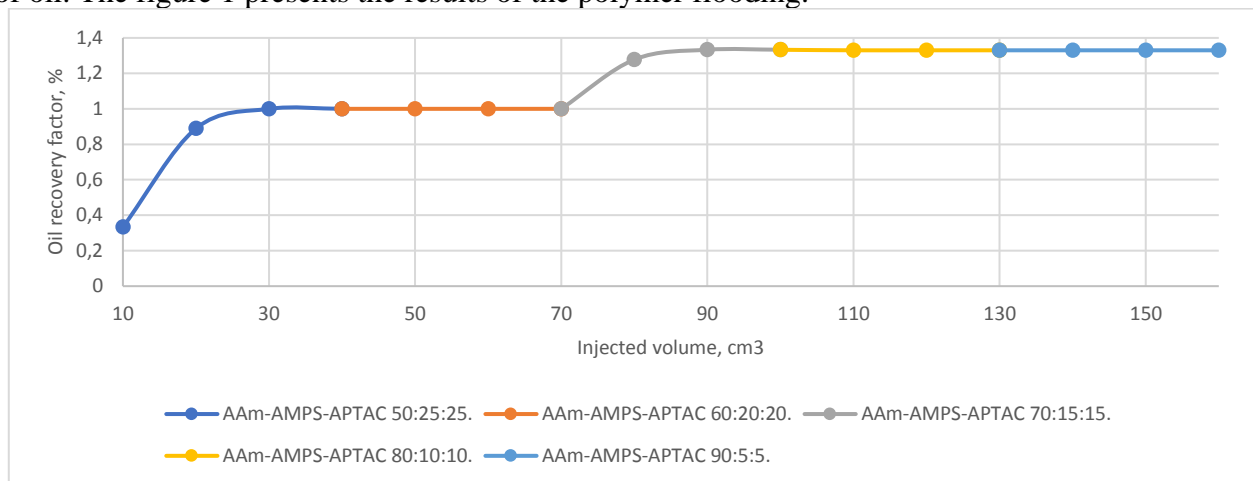


Figure 1 – Oil recovery vs polymer injected volume. Polymer concentration 0.5% in 100g/L brine. Flow rate 0.1cm³/min. Room temperature. 1 pore volume is around 50cm³.

As it can be seen, the injection of AAm-AMPS-APTAC 50:25:25 and 70:15:15 allowed to achieve 1 and 0.3% incremental oil recovery, respectively. This is not a substantial increment. However, we can expect better performance in layered heterogeneous models with lower oil viscosity [2]. Another test has been done by using 30% hydrolyzed 17mln Da polyacrylamide solution in 15g/L NaCl. Incremental oil recovery was equal to 5% versus 1.3% achieved by the polyampholytes. Future research will aim comparison between polyacrylamide and polyampholytes at higher salinity, temperature and reservoir heterogeneity conditions.

1- Dai C, Xu Z, Wu Y, et al. Design and Study of a Novel Thermal-Resistant and Shear-Stable Amphoteric Polyacrylamide in High-Salinity Solution. *Polymers (Basel)*. 2017;9(7):296. Published 2017 Jul 21. doi:10.3390/polym9070296.

2- Seright, R. S. (2016, April 11). How Much Polymer Should Be Injected During a Polymer Flood? *Society of Petroleum Engineers*. doi:10.2118/179543-MS.