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Effect of various classes SAS on hydrophobic surface of oil stratum

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The works presents the results of laboratorial researches performed in Oil Academy of Azerbaijan (Baku) aiming to provide familiarization with the appropriate methods of research. To determine effect of SAS we researched change of the value of surface tension at the water-oil interface, also wetting features of water solutions of the researched agents at the hydrophobic surface of oil stratum. As test agents, we used Sulfanol (anionic SAS) and Alkan 202 (nonionic SAS) having industrial base of production.

Resulted pumping of water solutions of SAS into stratum the surface-molecular features of medium in oil collector change, namely, surface tension at the boundary of oil and rock drops, wetting effect improves, what aggregately provides increase of oil inflow productivity.

Keywords: surface tension. wetting properties, hydrophobic, SAS

Efficiency of oil fields development is mainly determined with condition of bottomhole formation zone (BFZ) of producing and injection wells. This part of stratum suffers various physicochemical and thermodynamic fluctuations of temperature and pressure to the most extent. Increase of water saturation of BFZ also leads to decrease of oil relative permeability.Treatment of BFZ with use of effective technologies and chemical agents allows to enhance efficiency of oil flow to well bottom. Pumping of working liquid containing SAS into the stratum promotes evener advancing of water-oil contact. Is has washing and phydrophobing effect on the oil stratum surface. Physicochemical methods play important role in maintenance of level and increase of oil recovery of watered stratums and hard-to-recover oils [1].

For the purpose of justification of nature of behavior of SAS we researched their effect on change of superficial tension at the water- hydrocarbon interface and wetting properties of water solutions of the researched agents at the hydrophobic surface of oil stratum. We used Sulfanol (anionic SAS) and Alkan 202 (nonionic SAS) as the testing agents having industrial base of production. Resulted pumping of water solutions of SAS into stratum the surface-molecular features of medium in oil collector change, namely, surface tension at the boundary of oil and rock drops, surface wetting with stratal fluid

improves, intensiveness of capillary feeding of rocks increases. Great volumes of application of chemical agents in such arrangements increases importance of their diversification and creation of more economically and effective products. That is why, the works in the sphere of increase of oil recovery of stratum aim to search effective and low-priced SASes. Scientifically justified selection of SAS shall be fulfilled taking into account physico-chemical regularities, mechanism of their action and conditions of their practicing. [2]

For the purpose of justification of nature of behaviour of SAS-es we researched their effect on change of superficial tension at the water- hydrocarbon interface and wetting properties of water solutions of the researched agents at the hydrophobic surface. We determined interphase superficial tension at the fluid-fluid interface with the stalaglometric method, wetting effect – according to change of cosinus of wetting angle at inhibited oil drop spreading at the surface of paraffined plate in 30 sec, 1 min. and 3 min. The results of research fulfilled by us show interrelation between growth of concentration of SAS in working solution and efficiency of their action.

Interphase superficial tension at the kerosene - water interface in presence of SAS

Table 1.

№	Concentration of SAS in solution % mass	Superficial tension 10^{-3} n/m	
		Sulfanol	Alkan-202
1	1.0	0.93	3.74
2	0.5	1.83	5.26
3	0.25	2.4	7.0
4	0.125	3.61	8.9
5	without SAS	0.44	

In our research we used: Sulfanol (anionic SAS) and Alkan 202 (nonionic SAS) having industrial base of production. The results of research of effect of SAS at concentration 0.125%-1.0 % mass in water solution on change of interphase superficial tension at the interface of model fluid-fluid system are shown in Table 1. We used clarifying kerosene as hydrocarbon phase, as for water phase, it is presented with distilled water.

The experiments are fulfilled at 20°C. The experimental data prove that anionic SAS more than twice exceeds nonionic SAS in effectiveness of decrease of superficial tension at the phases interface. Sulphanol showed more activeness than Alkan 202 at both high and

low concentrations in water solutions. Effect of change of SAS concentration from 0.125% to 1.0% mass on wetting properties at +5°C is shown in Table 2.

Wetting properties of oil in oil field [Supsa] in presence of SAS

Table 2

№	Description of SAS	Concentration of SAS in oil	Wetting indicator in time COS θ , at T=+5 ^{0}C		
			30 sec.	1minute	3 minute
1.	Sulphanol	0.5	0.976	0.978	0.985
		0.25	0.968	0.971	0.980
		0.125	0.957	0.959	0.964
2.	Alkan-202	1.0	0.963	0.968	0.977
		0.5	0.956	0.959	0.970
		0.25	0.953	0.957	0.965
		0.125	0.936	0.939	0.948
3.	Oil without SAS	--	0.911	0.920	0.924

It is established that Sulphanol exceeds Alkan 202 in wetting capacity.In the Table it is clearly shown that SAS efficiency according to wetting capacity at hydrophobic surface for inhibited oil increases in comparison with poor oil without SAS. For concentration of agent in oil 0.125% in case of Sulphanol grows from cosθ=0.224 to cos θ=0.964, but in case of Alkan -202 – to cos θ=0.948. So, application of SAS allows to improve wetting properties of oil and just this causes their wide application in oil production processes.

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