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Lightweight Drilling Fluids Using New Sulphanole

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ABSTRACT: The article describes some of the colloidal and technological properties of sulphonole obtained from low molecular polyethylene – waste production of "Shurtan gas chemical complex" LLC. Shows a flowchart schematic process for preparation of sulphonole and results of preparation facilitated drilling fluids using sulphanol samples.

KEY WORDS: Sulphanole, sulphonation, oleum, drilling, surface active substance (SAS), low-molecular polyethylene (LMP),reagent, sulphonate.

I. INTRODUCTION

Sulphanol is used in the oil and gas industry to prepare lightweight drilling fluids, increase oil recovery by treating the bottom-hole zone of wells [1-2]. Petroleum sulphonates are obtained mainly by direct sulphonation of petroleum products (distillates, residual oils), followed by purification and neutralization of the resulting mixture of sulphonic acids [3-5]. The composition of sulfonates is determined by the composition of the hydrocarbon feedstock and the sulphonation process. Sulphonating agents - gaseous or liquid SO_3, a mixture of liquid SO_2 and SO_3, oleum, etc. The main products of sulphonation are alkyl aromatic, naphthenaromatic and, to a lesser extent, aliphatic sulphonic acids. Purification of sulfonic acids from acid tar is carried out in a solvent by sedimentation, centrifugation, filtration, aqueous extraction (from soluble impurities); sometimes additionally use adsorption purification on silica gel, activated clay and other sorbents; neutralize purified sulphonic acids with alkalis or amines.
As is known, upon sulphonation of unsaturated aliphatic compounds, depending on the reaction conditions, the sulpho group joins at the site of the double bond or replaces the hydrogen atom at one of the carbon atoms forming the double bond. [6-7]. The latter is actually sulphonation. As a result of the action of chlorosulphonic acid at a temperature of about 0 ° C, higher olefins are formed by alkene sulfonic acids.

II. SIGHNIFICANCE OF THE SYSTEM

We have developed a method for the synthesis of technical sulphanol by sulphonation of low molecular weight polyethylene fractions and subsequent alkaline neutralization.
Alkenes are sulphonated by oleum according to the following general reaction:

$$RCH=CH_2 + H_2SO_4 \cdot nSO_3 = RCH(CH_3)OSO_3H \text{ where } (R=C_{12} - C_{20})$$

When neutralized with alkali, olefin sulfonic acids are converted into the corresponding salts, and 1,2-sulton is converted into the salt of ox-oxysulphonic acid. 1,3- and 1,4-sultones are hydrolyzed to form the corresponding mixtures of sodium olephinsulphonates:

$$RCH=CHCH_2CH_2SO_3Na \text{ and } RCH_2CH=CHCH_2SO_3Na.$$

The optimal conditions for the synthesis have been defined as the following: reaction temperature was studied, initial substance and reaction time and the influence of the sulphonating agent to yield.

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III. METHODOLOGY

According to the results of the study of the kinetics of foam destruction (Table 1) obtained on the basis of aqueous surfactant solutions, the best indicators were recorded for the solution: OS-12 (0.2%), this solution also has better time stability.

The worst performance was noted for solutions OS-2 (0.2%) and OS-7 (0.2%).

Table 1.Stability and fracture kinetics of foam obtained from surfactant solutions

№	Surface active substances and their content (%)	Foam lift (cm^3) in 30 s	The volume of the foam column (cm3) during the observation, s					
			300	600	900	1200	1500	1800
1	OC-2 (0,2 %)	177	157	147	133	117	110	97
2	OC-7 (0,2 %)	193	177	163	147	140	133	120
3	OC-8 (0,2 %)	251	193	177	169	162	148	138
4	OC-12 (0,2 %)	442	408	404	394	286	278	271
5	OC-10 (0,2 %)	290	280	260	216	166	150	146

The obtained sulphanol samples were added to the initial drilling fluids and the density of the mixtures obtained was measured using special hydrometers.

IV. CONCLUSIONANDFUTUREWORK

Budelsulfanol can be used as a technical detergent. For cleaning the inner surfaces of reactors, filter elements of various industrial filters and other equipment**.** And also can be used in the manufacture of car wash caps.

V. EXPERIMENTAL RESULTS

Laboratory test results of sulphanole (OS series) for the preparation of facilitated drilling fluids are presented in Tables 2 and 3. To prepare the drilling fluids two types clay powder - bentonite: PBG brand and brand PBMB were used.

Table 2.Composition and technological properties of the drilling solutions(bentonitegrade PBG)

№	Drilling solution's composition	Process-dependent parameters				
		Density,g /cm^3	Conditional viscosity,sec.	Water yeild,cm^3/30 min.	Crust,mm.	pH
1	Initial solution	1.07	33	6	0.4	10
2	Initial solution + 3.5 % sulphanole OS-2	0.75	80	6	0.4	11
3	Initial solution + 3.5 % sulphanoleOS-3	0.80	38	6	0.4	10
4	Initial solution + 3.5 % sulphanoleOS-7	0.80	42	4	0.3	11
5	Initial solution + 7 % sulphanoleOS-7	0.70	42	4	0.3	11
6	Initial solution + 3.5 % sulphanoleOS-8	0.70	70	4	0.3	11

As it is seen from Table 2 sulphanole OS-8 and OS reduced density drilling fluid to 0.7 g/cm^3, while increasing its conventional viscosity from 33 to 70 and 80 sec., i.e. adding sulphanole observed improvement of some physical and chemical characteristics of the drilling fluid.

Table 3.Composition and technological properties of the drilling solutions (bentonitegrade PBMB)

№	Drilling solution's composition	Process-dependentparameters				
		Density,g/ cm^3	Conditional viscosity,sec.	Water yeild,cm^3/30 min	Crust, mm	pH
1	Initial solution	1.09	36	6	0.4	10
2	Initial solution + 3.5 % sulphanole OS-2	0.75	53	6	0.4	11
3	Initial solution + 3.5 % sulphanoleOS-3	0.76	37	6	0.4	10
4	Initial solution + 3.5 % OS-3 + 50 g of clay PBMB	0.90	48	6	0.4	11
5	Initial solution + 3.5 % sulphanole OS-7	0.75	47	5	0.3	11
7	Initial solution + 3.5 % sulphanoleOS-8	0.70	56	5	0.3	11

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Table 4.Composition and technological properties of the drilling solutions(bentonitegrade PBMB)

№	Drilling solution's composition	Process-dependent parameters				
		Density,g/cm^3	Conditional viscosity,sec.	Water yeild,cm^3/30 min	Crust, mm	pH
1	Initial solution	1,09	36	6	0,4	10
2	Initial solution + 1 % sulphanoleOS-11	0,85	53	6	0,4	11
3	Initial solution + 1 % sulphanoleOS-12	0,85	47	5	0,3	11

On the basis of laboratory test all the samples sulphanole obtained reduced the density of drilling fluids, which are listed in the above tables. A simple way to obtain technical sulphanole and low cost allow to efficiently introduce it in production, as well as to use it in drilling wells for oil and gas.

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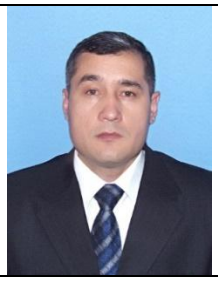
1.	**Bekturdiyev Gulom Mavlonberdiyevich** Institute of general and inorganic chemistry of the Academy of Sciences of the Republic of Uzbekistan, 2-Almalyk branch of the IslamKarimov Tashkent State Technical University.	
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