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Huseyn R. Gurbanov, Aysel V. Gasimzade

STUDY ON EFFICIENCY OF NEW MULTIFUNCTIONAL COMPOSITIONS FOR PREPARATION OF OIL FOR TRANSPORTATION

Azerbaijan State Oil and Industry University, Baku, Azerbaijan Republic

We studied the effect of individual reagents and new compositions on demulsification of stable water-oil emulsions produced from the wells of Muradkhanli and Balakhani fields, SOCAR. The corrosion protection effect of three new compositions designated as A, B and C in water-oil emulsion, as well as the effect of surface tension on freezing temperature are discussed in the article. Composition A contained the reagents ND-12 and Alkan, composition B contained reagents ND-12 and Gossypol resin, and composition C contained the reagents BAF, ND-12, Gossypol resin and Dissolvan-4411. Physical and chemical properties of the oil samples taken for the research were studied by known methods. The results of the obtained laboratory experiments gave reason to say that mainly one composition, B, has the highest demulsifying effect. In addition to the demulsifying effect of compositions A, B and C, the corrosion protection effect was also studied under laboratory conditions. In this regard, water-oil emulsion was used as an aggressive corrosion medium. The rate of corrosion was determined by gravimetric method in both reagent-free and reagent-containing mediums, and the corrosion protection effect of the compositions was calculated. Thus, the protection effect of composition B was 98.1% in Muradkhanli oil sample, and 97.8% in Balakhani oil sample. Moreover, the effect of all three newly prepared compositions on the surface tension and freezing temperature of the studied Muradkhanli and Balakhani oil samples were investigated. It was established that the composition C has the highest effect on the reduction of surface tension and freezing temperature of oil samples.

Keywords: oil-water emulsion, demulsifier, corrosion, surface tension, coldfingertest, freezing temperature.

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Introduction

Currently, the world's large oil fields have reached their final stage of production, as a result of which the amount of hydration can increase to 80–90%. An increase in the percentage of hydration causes the production to become complicated, changes in the rheological properties of oil, in particular, an increase in viscosity. Generation of water-oil emulsion forms is inevitable during oil production. Due to the decrease in the active resources of light oils, trends in the increase in the amount of production of high-viscosity heavy oils in the world have been revealed. Unlike oils consisting of dispersed systems with low and medium concentration, high-viscous heavy oils are considered associated dispersed systems of high concentration, which is reflected in the efficiency of their production, transportation and treatment processes.

Water-oil emulsions formed as a result of intensive mixing of formation waters and oils are stabilized by the impact of asphaltene, resin, paraffin, naphthenic acids and clay and clay-like solids and become stable. One of the most important characteristics of stable crude oil emulsions is interfacial viscoelasticity. Asphaltenes preventing the droplets from sticking together enhances interfacial viscoelasticity. Such stable emulsions cause a number of problems occurring in the oil sector from production stage to processing one. One of these problems is the corrosion of pipelines, oil storage

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tanks, pumps, production and processing facilities, as well as challenges generating during pipeline transportation due to the presence of dispersed water in water-oil emulsion, which increases the viscosity of oil. Corrosion is one of the important issues in the development, preparation and transportation of oil and gas fields. The increase in corrosion aggressiveness in oil and gas industry is due to the high mineralization of formation waters, the presence of dissolved hydrogen sulfide, carbon dioxide, and bacteria. The more minerals there are in formation waters, the more these minerals increase the stability of the emulsion and aggressiveness of the medium in the emulsion oil dispersion system. The aggressiveness of the medium reduces the service life of metal facilities and increases repair costs. Consequently, soil and water bodies are polluted with oil and oil products, which causes both environmental and economic problems. In this regard, it is important to remove ballast water from the oil composition. Since the rate of corrosion is stronger in the water environment, corrosion rate increases with increasing the water content. Different types of inhibitors are used to prevent corrosion [1–9].

There are several methods for demulsification of stable water-oil emulsion: via the action of ultrasound, electrodeposition, centrifugation and chemical demulsification. Chemical demulsification is the addition of small concentrations of demulsifiers with surfactant properties to stable water-oil emulsions. Surfactants are classified by amphoteric property, nano and ionic structures. The surfactant chain consists of two parts, one of which is called a polar group and the other is called a non-polar group.

Many researchers have found that the deemulsification of emulsions has a significant effect on the rheology of oils, including the change in viscosity by decreasing. The role of the demulsifier is to decompose stable emulsion by changing the rheology of the oil, reducing the interfacial surface tension and the strength of double electric layer. When the demulsifier reduces the interfacial strength and surface tension to a certain level, the separation of water from oil becomes easier [10–15].

The objective of this work is to investigate the protection efficiency of individual reagents and new multifunctional compositions under laboratory conditions.

Experimental

One of the commonly used methods for evaluating the demulsification capability of reagents and their compositions is a coldfingertest (static deposition) method. For this, reagents or compositions are first dissolved in a solvent, and then added in various concentrations to packaged oil samples to be investigated. After adding the reagents, they are mixed well for one minute, and then kept in a water bath. Depending on the demulsification capability of the investigated demulsifier, water separation is recorded at different times. Using the following equation, demulsification index can be calculated as:

$$\text{water separation\%} = V/V_0 \cdot 100\%,$$

where V indicates the volume of water separated after addition of the demulsifier, and V_0 indicates the volume of initial water in the crude oil emulsion.

Laboratory tests were modeled taking into account specific technological modes, such as separation temperature, dehydration period, hydrodynamic characteristics, dosing, and hydration of products. The demulsifiers were dosed in commercial forms and decomposition of stable water-oil emulsions was carried out at temperatures of 20 and 60^{0}C. The main evaluation criteria are as follows: the dynamics of oil dehydration considered as the amount of residual water in oils; and the quality of water and the wall of precipitator-cylinders in accordance with the standard SS 39-133-81.

During experiments under laboratory conditions, the following additives were used:

– ND-12 (Azerbaijan production),
– Gossypol resin (Azerbaijan production),
– Disulfan-4411 (Russia production),
– Alkan (Azerbaijan production),
– BAF (Azerbaijan production);
– composition of reagents ND-12 and Alkan in the ratio of 1:3, respectively (designated as *composition A*);
– composition of reagents ND-12 and Gossypol resin in the ratio of 1:1, respectively (designated as *composition B*);
– composition of reagents BAF, ND-12, Gossypol resin and Dissolvan-4411 in the ratio of 1:1:1:1, respectively (designated as *composition C*).

In the current research, experiments on dehydration of emulsions of Muradkhanli, Balakhani oil fields with various degrees of hydration for reagents produced abroad were conducted under laboratory conditions. The physical and chemical properties of the mentioned oils and formation waters are shown in Tables 1 and 2, respectively.

The selection of these oils is related to the fact that chemical reagents are used to increase oil yield in the existing field, and their use also leads to an increase in the stability of water-oil emulsions. In addition, the oil samples taken for research have

Table 1

Physical and chemical properties of crude oils

Parameters	Values	
	Muradkhanli oil field	Balakhani oil field
Density at 20^0C, kg/m^3	950.1	925.2
Viscosity at 20^0C, mPa·s	2160.3	2128.5
Amount of water, wt.%	42	31
The amount of chlorine salts, mg/l	535.6	380.4
The amount of mechanical mixtures, wt.%	6.01	3.99
Amount of resins, wt.%	15.2–18.7	6.3–8.8
Amount of asphaltenes, wt.%	3.9–4.6	0.1–0.18
Amount of paraffins, wt.%	4.1–6.2	0.3–0.45
Freezing temperature, ^{0}C	+10	+6

Table 2

General indicators of water formation

Parameters	Values	
	Muradkhanli oil field	Muradkhanli oil field
Total dissolved solids, mg/L	42.759	36.247
Density	1009.23	1002.59
Salinity mg/L	37.885	33.246
pH (at 19^0C)	7.12	8.37
Na^+ mg/l	13.726	11.055
Ca^{2+} mg/l	748	720
Mg^{2+} mg/l	198	160
Cl^- mg/l	19.012	17.257
SO_4^{2-} mg/l	2650	2485
HCO_3^- mg/l	789	731

stabilizers of both paraffin and resin-asphaltene type and generate stable water-oil emulsion systems over time.

Tested water-oil emulsion samples were placed in a specially graduated 100 ml precipitator with a conical bottom, to each of which pre-calculated amount of commercial demulsifiers was added through a syringe-micro-doser. The precipitators were tightly closed and shaken by hand for 10 minutes to ensure even distribution of the demulsifiers in the volume of oil phase, as well as good mixing.

The calculation of demulsifier doses was carried out based on the initial hydration of water-oil emulsions without taking into account the density of the demulsifier and oils.

The volume of the demulsifier solution dosed in emulsion weight was calculated according to the following formula:

$$V_d = \frac{m\left(100 - W_{or}\right)O_p}{1000}, \ \mu l$$

where m is the weight of emulsion (ml); O_p is the given dose of demulsifier (g/t); W_{or} is the initial average hydration rate of emulsion (%).

Many reagents with different surface activity were used during the research. The physicochemical properties of chemical reagents used for research are summarized in Tables 3–6.

Results and discussion

The deemulsification of Muradkhanli and Balakhani crude oil samples was investigated at 20^0C for 2 hours without reagent and with the effect of reagent, and the obtained results are presented in Table 7. During the process, 200, 400 and 600 g/t of demulsifiers, 50, 100 and 150 g/t of Gossypol resin, 80, 100, 120 g/t of BAF reagent, and 200, 400, 600 and 800 g/t of compositions A, B and C were used.

Figures 1 and 2 show the experimental results of the effect of new compositions on water-oil emulsions of Muradkhanli and Balakhani oils at 20^0C, respectively.

Both individual reagents and compositions were compared at different concentrations, and no intensive effect was observed at concentrations higher than the mentioned concentrations. As is seen from Table 3, the effect of compositions on stable water-oil emulsion is stronger than that of individual

Table 3

Physicochemical characteristics of Gossypol resin

Composition and properties	Values
Nitrogen-containing compounds, wt.%	10–12
Decomposition and oxidation products	35–40
Color	dark brown to black
The smell	specific oily smell
Molecular weight (av.)	290–300
Density, g/cm^3	0.8600
Ray refractive index $n d_4^{20}$	1.4100
Acidity (KOH, mg)	50
Freezing temperature, K	301
Moisture content, %	0.4–1.0
Ignition temperature, K	435
Dissolution: – in organic matter	good
– in water	weak

Table 4

Physicochemical characteristics of Dissolvan-4411

Composition and properties	Values
Color	yellowish liquid
Composition	Ethylene oxide/propylene, dissolved in methanol
Density at 20^0C, g/ml	0.95±0.02 g/cm^3
Freezing temperature, K	up to -36^0C
Viscosity. mm^2/s	25 mPa·s at+20^0C 80 mPa·s at 0^0C 400 mPa·s at -20^0C
Ignition temperature, K	11^0C
Efficacy (using ECG)	Meets the requirement of the standard
Expiry date	2 years
Environmental impact	A change in temperature has no effect on the reagent. It should be stored in a closed container

Table 5

Physicochemical characteristics of Dissolvan-4411

Application	Oil dehydration and desalination
The danger	Flammable liquid – category 3 Acute toxicity (mouth) – category 3 Acute toxicity (inhalation) – category 3 Acute toxicity (through the skin) – category 3 Skin corrosive effect - category 1B Effects on eyes – category 1
Composition	Isopropyl alcohol –20–30% alcohol Methanol – 20–30% alcohol Non-ionic surfactant – 20–30% polyester Organic base – 20–30% amine
Physical and chemical properties	Appearance – liquid Color – light to light yellow Solvent – soluble in oil and water Freezing temperature -50^0C Density (20^0C), g/ml, – 0.910–0.980 Viscosity (20^0C), mm^2/s – 25–30

Table 6

Physicochemical characteristics of Alkan

Composition and properties	Values
Color	transparent yellow-brown liquid
The smell	specific smell
Composition	block copolymers of simple and complex esters
Freezing temperature, ^{0}C	–38
Dissolution: – in organic matter	good
– in water	weak

Table 7

Demulsification of crude oils at 20^{0}C

Demulsifier	Consistency, g/t	Amount of water allocated, %		Irrigation coefficient, %	
		Muradkhanli	Balakhani	Muradkhanli	Balakhani
Without reagent	0.00	28.8	20.7	13.2	10.3
Dissolvan-4411	200	29.6	23.2	12.4	7.8
	400	30.4	25.4	11.6	5.6
	600	31.8	26.1	10.2	4.9
ND-12	200	29.2	22.3	12.8	8.7
	400	30.1	23.8	11.9	7.2
	600	31.5	25.9	10.5	5.1
Alkan	200	29.0	22.5	13	8.5
	400	30.2	24.2	11.8	6.8
	600	30.9	25.1	11.1	5.9
Gossypol resin	50	28.9	20.9	13.1	10.1
	100	29.4	21.5	12.6	9.5
	150	29.9	22.8	12.1	8.2
BAF	80	29.2	20.9	12.8	10.1
	100	29.6	21.7	12.4	9.3
	120	30.9	23.3	11.1	7.7
A	200	29.6	22.2	12.4	8.8
	400	31.5	25.8	10.5	5.2
	600	32.8	26.4	9.2	4.6
	800	33.4	27.6	8.6	3.4
B	200	30.1	23.2	11.9	7.8
	400	32.5	24.7	9.5	6.3
	600	34.2	27.3	7.8	3.7
	800	35.6	28.2	6.4	2.8
C	200	29.8	24.2	12.2	6.8
	400	32.7	25.8	9.3	5.2
	600	34.1	26.3	7.9	4.7
	800	35.3	27.9	6.7	3.1

reagents. The best efficiency was observed for compositions A, B, C, and the comparative analysis of the efficiency of the compositions revealed that the highest result was observed for composition B.

Dispersion of a stable water-oil emulsion accelerates with the increase in the temperature. In this regard, the effect of individual reagents and compositions was investigated at 60^{0}C, the obtained results are presented in Table 8.

As is seen from Table 4, the percentage of separated water increases significantly during the application of either reagent free reagents and individual reagents or composition-based reagents with the increase in temperature. The results of the research conducted at a temperature of 60^{0}C again showed that composition B has a higher demulsifying effect.

Figures 3 and 4 show the results of the

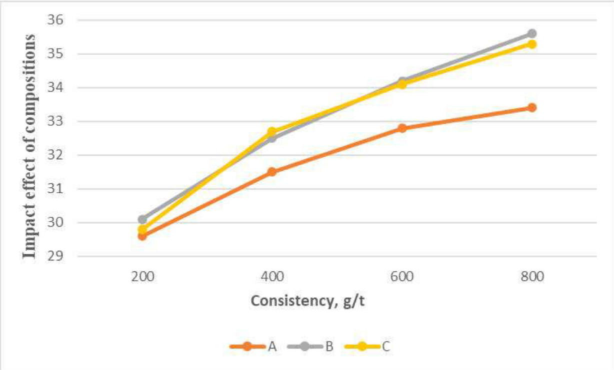

Fig. 1. Effect of compositions on Muradkhanli oil at 20⁰C

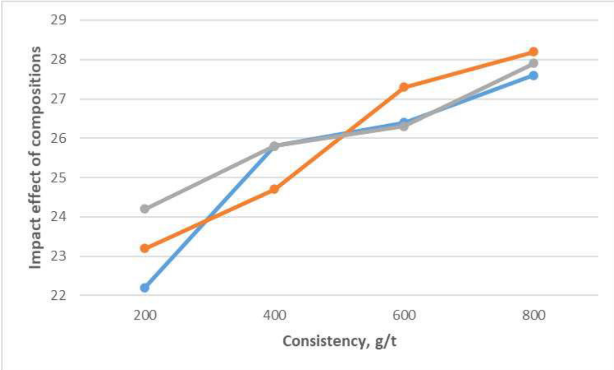

Fig. 2. Effect of compositions on Balakhani oil at 20⁰C

Table 8

Demulsification of crude oils at 60⁰C

Demulsifier	Consistency, g/t	Amount of water allocated, %		Irrigation coefficient, %	
		Muradkhanli	Balakhani	Muradkhanli	Balakhani
Without reagent	0	34.1	22.7	7.9	8.3
Dissolvan-4411	200	35.9	26.2	6.1	4.8
	400	39.8	27.4	2.2	3.6
	600	41.1	28.1	0.9	2.9
ND-12	200	34.6	25.3	7.4	5.7
	400	38.1	26.8	3.9	4.2
	600	40.7	28.9	1.3	2.1
Alkan	200	33.1	25.5	8.9	5.5
	400	38.7	26.2	3.3	4.8
	600	40.3	27.1	1.7	3.9
Gossypol resin	50	35.6	23.6	6.4	7.4
	100	36.3	24.5	5.7	6.5
	150	37.8	25.8	4.2	5.2
BAF	80	35.2	22.9	9.8	8.1
	100	36.7	24.7	5.3	6.3
	120	38.2	25.3	3.8	5.7
A	200	35.7	24.2	6.3	6.8
	400	36.9	26.8	5.1	4.2
	600	37.4	29.4	4.6	1.6
	800	41.5	30.6	0.5	0.4
B	200	35.7	24.5	6.3	6.5
	400	37.3	25.1	4.7	5.9
	600	40.2	28.7	1.8	2.3
	800	41.85	30.9	0.15	0.1
C	200	35.4	24.7	6.6	6.3
	400	36.6	26.9	5.4	4.1
	600	39.8	29.2	2.2	1.8
	800	41.7	30.8	0.3	0.2

experiments conducted with the effect of the compositions at 60⁰C.

Taking into account that one of the effects caused by the water-oil dispersion system is the ability to cause corrosion, the effect of new multifunctional compositions on the corrosion rate was studied and the obtained results are given in Tables 9 and 10.

When analyzing the results of Tables 9 and 10, it can be observed that the difference between the values of the corrosion rate is quite great after the application of reagent free reagents and compositions. The concentration ratios were also investigated in

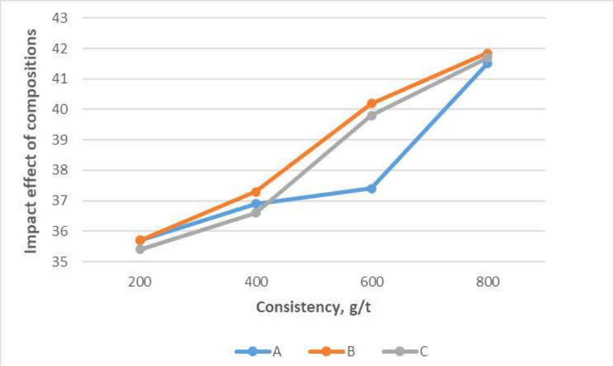

Fig. 3. Effect of compositions on Muradkhanli oil at 60⁰C

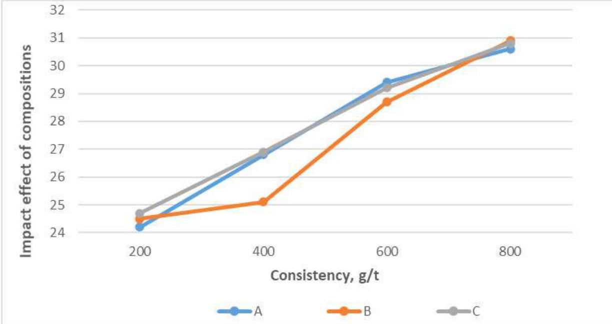

Fig. 4. Effect of compositions on Balakhani oil at 60⁰C

Table 9

Effect of compositions on corrosion rate in Muradkhanli oil

Composition	Consistency, g/t	Corrosion rate, g/m^2·hour		Protection effect, (z), %	Delay coefficient, % (γ)
		without reagent	with reagent		
A	200	5.1	0.9897	80.5	5.15
	400	5.1	0.7245	85.7	7.03
	600	5.1	0.5723	88.7	8.91
	800	5.1	0.2591	94.9	19.61
B	200	5.1	0.9258	81.8	5.50
	400	5.1	0.5193	89.8	9.82
	600	5.1	0.2795	94.5	18.24
	800	5.1	0.0939	98.1	54.31
C	200	5.1	0.9712	80.9	5.25
	400	5.1	0.6295	87.6	8.10
	600	5.1	0.3795	92.5	13.43
	800	5.1	0.1878	96.3	27.15

Table 10

Effect of compositions on corrosion rate in Balakhani oil

Composition	Consistency, g/t	Corrosion rate, g/m^2·hour		Protection effect, (z), %	Delay coefficient, % (γ)
		without reagent	with reagent		
A	200	4.3	0.9712	77.4	4.42
	400	4.3	0.7187	83.2	5.98
	600	4.3	0.5433	87.3	7.9
	800	4.3	0.2498	94.1	17.21
B	200	4.3	0.8945	79.1	4.80
	400	4.3	0.4928	88.5	8.72
	600	4.3	0.2577	94.0	16.68
	800	4.3	0.0925	97.8	46.48
C	200	4.3	0.9736	77.3	4.41
	400	4.3	0.6247	85.4	6.88
	600	4.3	0.3783	91.2	11.36
	800	4.3	0.1821	95.7	23.61

the corrosion rate when demulsification process was carried out, and comparisons were observed between the effects of the compositions. Composition B, which is effective in terms of demulsification, separated water from oil well, also reduced the corrosion rate to a minimum compared to other reagents. Again, the highest efficiency was observed in the amount of 800 g/t of the composition.

Table 11

Effect of compositions on freezing temperature and surface tension of oil samples

Composition	Consistency, g/t	Freezing temperature, ^{0}C		Impact effect on freezing temperature, %		Surface tension, N/m^2		Impact effect on surface tension, %	
		Muradkhanli	Balakhani	Muradkhanli	Balakhani	Muradkhanli	Balakhani	Muradkhanli	Balakhani
Reagent-free	0	+10	+6	0.00	0.00	28.5	25.4	0.00	0.00
A	200	+9.7	+4.8	3	20.0	23.6	22.8	17.1	10.2
	400	+9.3	+3.1	7	48.3	21.1	20.7	25.9	18.5
	600	+9.0	+2.7	10	55.0	18.8	19.2	34.0	24.4
	800	+8.5	+1.0	15	83.3	16.9	15.3	40.7	39.7
B	200	+9.8	+4.1	2	31.6	22.7	21.6	20.3	14.9
	400	+9.6	+2.7	4	55.0	18.5	17.9	35.0	29.5
	600	+8.8	+1.3	12	78.3	16.6	15.5	41.7	38.9
	800	+8.4	+0.5	16	91.6	13.2	12.8	53.6	49.6
C	200	+9.5	+3.5	5	41.6	22.4	20.7	21.4	18.5
	400	+8.8	+1.4	12	76.6	17.8	16.9	37.5	33.4
	600	+8.1	–2.6	19	143.3	15.3	13.8	46.3	45.6
	800	+8.0	–3.3	20	155	12.9	10.2	54.7	59.8

One of the most powerful factors affecting the stability of water-oil emulsion is the presence of mechanical impurities, asphaltene, resin and paraffins in the oil, which causes a high surface tension between the dispersed phases. At the same time, the freezing temperatures of hydrated and dehydrated oil are different. From this point of view, the effect of our experiment for cleaning oil from water without reagents and with the effect of compositions on the surface tension and freezing temperature was also investigated. The values of the obtained results are given in Table 11.

As is seen from Table 11, the value of surface tension is high since the emulsions of both Muradkhanli and Balakhani oils are stable dispersed systems. After the application of the compositions, the value of surface tension in both oil samples gradually reduced to a minimum. A trend is also observed between reagent free values of freezing temperatures. Although a decrease in the freezing temperature was observed due to the effect of the compositions, its effect on Muradkhanli oil was less. The is due to the fact that the amount of resin, asphaltene and paraffin compounds in Muradkhanli oil is high and this oil is heavier oil. In this regard, the freezing temperature of Muradkhanli oil decreased from +10^{0}C to +8^{0}C, while the freezing temperature of Balakhani oil decreased from +6^{0}C to −3.3^{0}C. Composition C had the greatest effect on freezing temperature among compositions A, B and C. At the same time, the effect of composition C on surface tension between components was greater than that of compositions A and B.

Conclusions

1. For the first time, the effect of various compositions on stable water-oil emulsion oil samples of Muradkhanli and Balakhani fields was studied in terms of selecting more effective reagents by conducting a comparative analysis. The highest effect was observed at a concentration of 800 g/t of the composition, which was prepared based on Gossypol resin and ND-12 reagents at a temperature of 60^{0}C (composition B). At this time, the amount of residual water was 0.15 and 0.1%, respectively.

2. During the research of the effect of 800 g/t of the compositions A, B and C on electrochemical corrosion rate in Muradkhanli and Balakhani water-oil emulsion, the highest effect was observed for the composition B. Thus, the protection effect of the composition B was 98.1% in Muradkhanli oil sample, and 97.8% in Balakhani oil sample.

3. It was determined that the composition C has a greater effect on reducing the surface tension and freezing temperature of oil samples. The composition C at the optimal concentration of 800 g/t reduces the freezing temperature of Muradkhanli oil sample from +10^{0}C to +8^{0}C, and the freezing temperature of Balakhani oil sample from +6^{0}C to −3.3^{0}C, and it reduces the surface tension from 28.5 N/m^2 to 12.9 N/m^2 and from 25.4 N/m^2 to 10.2 N/m^2, respectively.

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ДОСЛІДЖЕННЯ ЕФЕКТИВНОСТІ НОВИХ БАГАТОФУНКЦІОНАЛЬНИХ КОМПОЗИЦІЙ ДЛЯ ПІДГОТОВКИ НАФТИ ДО ТРАНСПОРТУВАННЯ

Гусейн Р. Гурбанов, Айсель В. Гасімзаде

Вивчено вплив окремих реагентів і нових композицій на деемульгацію стійких водонафтових емульсій, видобутих зі свердловин родовищ Мурадханли і Балахани, SOCAR. У статті розглянуто антикорозійну дію трьох нових композицій, позначених як A, B і C, у водо-масляній емульсії, а також вплив поверхневого натягу на температуру замерзання. Композиція A містила реактиви НД-12 і Алкан, композиція B містила реактиви НД-12 і смолу госипол, а композиція C містила реактиви БАФ, НД-12, смолу госипол і диссольван-4411. Фізико-хімічні властивості відібраних для дослідження зразків нафти вивчали відомими методами. Результати отриманих лабораторних дослідів дали підстави стверджувати, що найбільшу деемульгуючу дію має переважно одна композиція B. Крім деемульгуючої дії композицій A, B і C, в лабораторних умовах досліджували також антикорозійний ефект. У зв'язку з цим в якості агресивного корозійного середовища використовувалася водомасляна емульсія. Гравіметричним методом визначали швидкість корозії як у безреагентному, так і в реагентному середовищі та розраховували антикорозійний ефект композицій. Таким чином, захисний ефект композиції B склав 98,1% у зразку олії Мурадханли, а у зразку олії Балахані – 97,8%. Крім того, було досліджено вплив усіх трьох нових композицій на поверхневий натяг і температуру замерзання досліджуваних зразків нафти Мурадханли та Балахані. Встановлено, що композиція C найбільше впливає на зниження поверхневого натягу та температури замерзання зразків олії.

Ключові слова: водонафтова емульсія; деемульгатор; корозія; поверхневий натяг; холодний тест; температура замерзання.

STUDY ON EFFICIENCY OF NEW MULTIFUNCTIONAL COMPOSITIONS FOR PREPARATION OF OIL FOR TRANSPORTATION

Huseyn R. Gurbanov* *, *Aysel V. Gasimzade

Azerbaijan State Oil and Industry University, Baku, Azerbaijan Republic

*** e-mail: ebikib@mail.ru**

We studied the effect of individual reagents and new compositions on demulsification of stable water-oil emulsions produced from the wells of Muradkhanli and Balakhani fields, SOCAR. The corrosion protection effect of three new compositions designated as A, B and C in water-oil emulsion, as well as the effect of surface tension on freezing temperature are discussed in the article. Composition A contained the reagents ND-12 and Alkan, composition B contained reagents ND-12 and Gossypol resin, and composition C contained the reagents BAF, ND-12, Gossypol resin and Dissolvan-4411. Physical and chemical properties of the oil samples taken for the research were studied by known methods. The results of the obtained laboratory experiments gave reason to say that mainly one composition, B, has the highest demulsifying effect. In addition to the demulsifying effect of compositions A, B and C, the corrosion protection effect was also studied under laboratory conditions. In this regard, water-oil emulsion was used as an aggressive corrosion medium. The rate of corrosion was determined by gravimetric method in both reagent-free and reagent-containing mediums, and the corrosion protection effect of the compositions was calculated. Thus, the protection effect of composition B was 98.1% in Muradkhanli oil sample, and 97.8% in Balakhani oil sample. Moreover, the effect of all three newly prepared compositions on the surface tension and freezing temperature of the studied Muradkhanli and Balakhani oil samples were investigated. It was established that the composition C has the highest effect on the reduction of surface tension and freezing temperature of oil samples.

Keywords: oil-water emulsion; demulsifier; corrosion; surface tension; coldfingertest; freezing temperature.

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