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The Successful Application of Nanotechnology in the Primary Preparation of Oil

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ABSTRACT: The article presents the results Experimental-Industrial Tests (EIT) of innovative nanodemulsifier "IKHLAS"-1 for LLP "Tenge Oil & Gas" deposit in the Republic of Kazakhstan. Based on the results of the EIT, it was concluded that "IKHLAS" -1 is dominated by certain technological, environmental, and economic advantages over the base dissolving agent "Dissolvan" V 5748. Therefore, "IKHLAS"-1 was recommended for implementation at GF-2 and GS-1 LLP "Tenge Oil & Gas" and there are for the first time positive results from the application of nanotechnology in the primary preparation of oil.

KEYWORDS: Innovative nanodemulsifier "IKHLAS"-1, Oil-field nanotechnology; LLP "TENGE OIL & GAS" RK

I. INTRODUCTION

Brief description of the basic technology using the demulsifier "Dissolvane" V 5748 (Germany)

Oil preparation LLP "Tenge Oil & Gas" is carried out on two sites: GF-2 and GS-1. Specific flow rate (S_{fr}) for the basic demulsifier "Dissolvan" V 5748 was at GF-2 and GS-1 respectively ~ 145 -200 and 200 g/t. The heating temperature at the basic oil preparation technology for GF-2 was up to 85°C, and for GS-1 in VST No.2 (VST No.1) was 82-86°C. Pre-prepared oil at GF-2 for basic technology, is basically is surrendering to shop primary preparatin of oil (ShPPO) JS "OMG" for final preparation. The technology of oil preparation for GS-1 is two-stage. Heated water is used as the cushion water in the GF-2 and GS-1 systems. On Wednesdays the GS-1 carries out the renewal of the "cushion" water. Acceptance and delivery of crude and commercial oil at both sites are carried out with auto oil trucks (30-40 m³).

Period of EIT. In the period of 10.05.17-05.06.17 were carried joint pilot-industrial tests of the demulsifier "IKHLAS" -1, developed by specialists LLP "International Oil Services Kazakhstan", JSC "MangistauMunayGas" and Azerbaijan State University of Oil and Industry [1], at the GF-2 and GS-1 of LLP "Tenge Oil & Gas".

The purpose of the EIT. The purpose of the EIT is to identify the effectiveness of the demulsifier "IKHLAS"-1, compared to the base demulsifier "Dissolvan" V 5748 on the LLP "Tenge Oil & Gas".

II. LITERATURE SURVEY

In oil production conditions, especially in the late stages of oilfield operation, water-oil emulsions (reverse: water-in-oil), oil-water emulsions (direct: oil in water) and multiple emulsions (water-oil-water) are formed in the wells. [1]. It is known that the stability of emulsions plays a large role in the primary preparation of oil (PPO). The main reasons for the formation of stable emulsions include the following factors [2]:

- The presence of some natural emulsifiers in the composition of the oil itself: naphthenic acids; asphaltenes; resins, etc.;
- The salt composition of the aqueous phase;
- Negative temperature gradient in the oil wells when fluid moves from the bottom hole zone of formation to the well head;
- The share of nanoemulsions and multiple emulsions in the composition of water-oil emulsions;

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- The presence of nanoscale (up to 100 nm) mechanical impurities (solid mineral particles, for example, clays, iron sulfide, etc.), which can be adsorbed spontaneously on the surface of the globules of the aqueous dispersed phase. In order to desorb nanoparticles, the demulsifier, in our opinion, should also have a nanostructure [3].

In literature there are reports of some nanodemulsifiers [4-6]. However, there were no information on the using of these nanodemulsifiers. The subject of the study was crude oil from the fields of LLP "Tenge Oil & Gas" of the Republic of Kazakhstan, which refers to resistant water-oil emulsions. Therefore, the development and implementation of nanodemulsifiers for the preparation of persistent water-oil emulsions in general is one of the priority directions of the oilfield nanotechnology.

III. EXPERIMENTAL RESULTS AND DISCUSSION

III-I. EXPERIMENTAL RESULTS AT THE GF-2

Experimental-Industrial Tests (EIT) on GF-2 LLP "Tenge Oil & Gas" were carried out during the period 11.05.17 - 22.06.17. The technical criteria for evaluating the effectiveness of the demulsifier "IKHLAS" -1 in comparison with the basic demulsifier were: temperature in the furnace; the results of the analysis of GF-2 oil samples at the ShPRO JS "OMG"; temperature of oil ($\leq 60^{\circ}\text{C}$) delivery which under an existing contract is sent for delivery to ShPPO Department Oil Preparation and Production Service (DOP and PS) JS "OMG" for final preparation. The results of the EIT on the listed criteria are presented in Table 1. Some conclusions on the data of Table 1:

Table 1: Comparative results of the analysis of oil samples GF-2, prepared with the help of demulsifiers "Dissolvan" V 5748 and "IKHLAS"-1 at the ShPPO DOP and PS JS "OMG"

Date	Demulsifier	Temperature in furnace, $^{\circ}\text{C}$		Results of the analysis of GF-2 oil samples at the ShPPO of the DOP and PS of JS "OMG"		Oil temperature at delivery $^{\circ}\text{C}$	note
		output	entrance	$\text{H}_2\text{O}, \%$	Cl, mg/l		
01.05.17	"Dissolvan" V 5748	до 86	до 84	0.35	526	61	sfc**
02.05.17	"Dissolvan" V 5748	до 86	до 84	0.40	154	61	sfc
03.05.17	"Dissolvan" V 5748	до 86	до 84	0.40	170	65	sfc
04.05.17	"Dissolvan" V 5748	до 86	до 84	0.24	90	65	sfc
06.05.17	"Dissolvan" V 5748	до 86	до 84	0.27	101	62	sfc
08.05.17	"Dissolvan" V 5748	до 86	до 84	0.40	130	65	sfc
09.05.17	"Dissolvan" V 5748	до 86	до 84	0.40	260	62	sfc
10.05.17	"Dissolvan" V 5748	до 86	до 84	0.30	86	64	sfc
11.05.17	"Dissolvan" V 5748	до 86	до 84	0.30	146	67	sfc
the mean value for "Dissolvan" V 5748				0.34	185	64	
12.05.17	"IKHLAS"-1	до 86	до 84	0.06	10.5	60	sfc
16.05.17	"IKHLAS"-1	до 84	до 80	0.30	112	65	sfc
17.05.17	"IKHLAS"-1	до 80	до 76	0.24	42	63	sfc
18.05.17	"IKHLAS"-1	до 78	до 73	0.30	91	63	sfc
19.05.17	"IKHLAS"-1	до 84	до 80	0.12	32	60	sfc
20.06.17*	"IKHLAS"-1	до 80	до 75	0.21	63	60	without sfc
21.06.17*	"IKHLAS"-1	до 78	до 73	0.50	122	64	without sfc
22.06.17*	"IKHLAS"-1	до 75-76	до 69-70	0.27	90	62	without sfc
the mean value for "IKHLAS"-1				0.25	70	62	
The effectiveness of "IKHLAS" -1 relative to "Dissolvan" V 5748 (basic demulsifier)							
		decrease by $\sim 10^{\circ}\text{C}$	decrease by $\sim 14^{\circ}\text{C}$	decrease by $\sim 9^{\circ}\text{C}$	decrease by 2.6 times	decrease by 2°C , without sediment for cooling	

* at night (~ 01.00) the oven was switched off; sfc** - sucks for cooling

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- on 12.05.17, under the "IKHLAS"-1 EIT, for the first time at GF-2 high oil quality was achieved with respect to the contents of bound water (0.06%) and salts (10.5 mg/l). This is a testament to the fact that "IKHLAS" -1 works perfectly on GF-2 LLP "Tenge Oil & Gas";
- the reduction in output and inlet temperatures on the furnace was respectively on 10°C and 14°C, i.e. much better than in the underlying technology;
- decrease in the concentration of residual water by an average of 9%;
- a decrease in the concentration of chloride salts by 2.6 times, which more clearly demonstrates the clear advantage of "IKHLAS"-1 in comparison with the basic demulsifier "Dissolvan" V 5748;
- Was established and recommended the optimum thermochemical regime of the oil pretreatment technology for GF-2 of LLP "Tenge Oil & Gas" using the demulsifier "IKHLAS"-1: In the proposed thermal regime, the inlet temperature is 69-70°C, and the output temperature is 75-76°C in the furnace; shutdown of the furnace at night (~ 01.00), after reaching the indicated temperatures; the optimal recommended dosage for "IKHLAS" -1 is 145-170°C, depending on the condition of preliminary oil preparation on GF-2.

Some conclusions on the operational summary of the point of delivery of oil (PDO):

- Pre-prepared oil at GF-2 using "Dissolvan" V 5748 technology for delivery is mainly sent to the ShPPO DOP and PS JSC "OMG", and in the sent to the PDO for delivery to LLP "KazTransOil" it happens options for returns. For example, on 31.05.17 there was a return, due to the high content of salts (120 mg/l).
- Pre-prepared oil at GF-2 using the "IKHLAS"-1 technology, within a short period of the EIT, twice passed the state standard for delivery to the PDO. Returns were not. The rest of the deliveries were carried out at the ShPPO of the DOP and PS of "OMG".

III-II. EXPERIMENTAL RESULTS AT THE GS-1

The EIT for GS-1 LLP "Tenge Oil & Gas" was carried out during the period 27.05.17-05.06.17. Technological criteria for assessing the e Therefore, in the composition of oil LLP "Tenge Oil & Gas" at a temperature of 60-80°C exist uniformly distributed in oil nano and micro particles of paraffin. These nano and micro paraffin particles have a high adsorption capacity in relation to nano and micro particles of chloride salts. "Cushion" water with time is saturated with chloride salts. It is known that the solubility of sodium chloride is 260000-280000 mg / l. Above this limit, the solution is saturated or super saturated effectiveness of the demulsifier "IKHLAS" -1 were: the results of the analysis of the running oil samples on the water content and chloride salts on the V2 GS-1 capacity and on the PDO with samples from the oil tankers, as well as the temperature at the VST No.2 (VST No.1) and the oil temperature in each oil tanker. Comparative results of the analysis of oil content by water and chloride salts on the V2 GU-1 capacity are shown in Table 2. As follows from the data in Table 2, the results of V2, the efficiency of "IKHLAS"-1 by residual water in 14, and for salts in 18 times exceeds the efficiency of the basic demulsifier "Dissolvan" V 5748. During the EIT, were performed experiments with the sample from V2, at the Dean-Stark plant after 4 hours of settling at room temperature (24°C). At this, the residual water content was 0.0%.

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Table 2: Comparative results of analysis of oil samples from V2, prepared with the help of demulsifiers "Dissolvan" V 5748 and "IKHLAS" -1 on GS-1

Date	Demulsifier	Results of analysis of samples from V2		The effectiveness of "IKHLAS" -1 on	
		H ₂ O, %	Cl, mg/l	water (by average values)	salts (by average values)
15.04.17	"Dissolvan" V 5748	3	1583	13	7
17.04.17	"Dissolvan" V 5748	1.5	2861	6.5	12.7
18.04.17	"Dissolvan" V 5748	4	4383	17.4	19.5
20.04.17	"Dissolvan" V 5748	3	2618	13	11.6
21.04.17	"Dissolvan" V 5748	1	609	4.3	2.7
22.04.17	"Dissolvan" V 5748	2	1522	8.7	6.7
23.04.17	"Dissolvan" V 5748	3	3227	13	14.3
24.04.17	"Dissolvan" V 5748	10	12785	43.5	56.8
28.04.17	"Dissolvan" V 5748	2	2665	8.7	11.8
29.04.17	"Dissolvan" V 5748	2	1413	8.7	6.3
02.05.17	"Dissolvan" V 5748	5	2665	21.7	11.8
04.05.17	"Dissolvan" V 5748	3	2408	13	10.7
09.05.17	"Dissolvan" V 5748	1	520	4.3	2.3
10.05.17	"Dissolvan" V 5748	4	3147	17.4	14
12.05.17	"Dissolvan" V 5748	2	3580	8.7	15.9
13.05.17	"Dissolvan" V 5748	0.5	195	2.2	0.87
14.05.17	"Dissolvan" V 5748	3	3008	13	13.4
15.05.17	"Dissolvan" V 5748	1	769	4.3	3.4
16.05.17	"Dissolvan" V 5748	2.2	2306	9.5	10.2
17.05.17	"Dissolvan" V 5748	3	3728	13	16.5
19.05.17	"Dissolvan" V 5748	0.7	107	3	0.5
20.05.17	"Dissolvan" V 5748	3	4949	13	22
21.05.17	"Dissolvan" V 5748	9	16796	39.1	74.6
22.05.17	"Dissolvan" V 5748	2	2443	8.7	10.9
23.05.17	"Dissolvan" V 5748	7	10741	30.4	47.7
24.05.17	"Dissolvan" V 5748	3	9056	13	40.2
25.05.17	"Dissolvan" V 5748	2.6	2379	11.3	10.6
26.05.17	"Dissolvan" V 5748	8.4	12110	36.5	53.8
the mean value for "Dissolvan" V 5748		3.2	4092	14	18
27.05.17	"IKHLAS"-1	-	-	-	-
28.05.17	"IKHLAS"-1	-	-	-	-
29.05.17	"IKHLAS"-1	0.4	316	-	-
30.05.17	"IKHLAS"-1	0.06	53	-	-
31.05.17	"IKHLAS"-1	0.8	579	-	-
01.06.17	"IKHLAS"-1	0.09	105	-	-
02.06.17	"IKHLAS"-1	0.09	295	-	-
03.06.17	"IKHLAS"-1	0.09	113	-	-
04.06.17	"IKHLAS"-1	0.06	113	-	-
the mean value for "IKHLAS"-1		0.23	225	в 14 раза	в 18 раза

Therefore, dehydration of oil or demulsification process under the conditions of EIT of the demulsifier "IKHLAS"-1 on the deposit of LLP "Tenge Oil & Gas" is almost completely completed at the first stage of preparation, then only sediment in the tank is required, and the standard level of desalting is reached at the following stages (on VST No.1 and VST No.2) for oil preparation using "cushion" water (the second stage of oil treatment). Table 3 presents the results

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of the analyzes (and the oil temperature) on the PDO for autocarriers of oil, as well as the oil temperature in VST No.1. Some interpretations and comments on Table 3:

- According to the results of analyzes on 07.05.17 and 08.05.17 for the base technology there were 10 refusals of autocarriers of oil in PDO. The reason in these cases was a decrease in temperature by 6-7 ° C in VST No.2 (VST No.1). Therefore, 82-86°C is the optimum temperature range for the base technology;
- The reason for the remaining three returns (05.05.17, 16.05.17, 17.05.17) of the basic technology (Dissolvan V 5748) during the period of EIT (05.05.17-05.06.17) is, in our opinion, the demulsifier "Dissolvan" V 5748. "Dissolvan" V 5748, unlike "IKHLAS"-1 (oil-soluble) is an oil- water soluble. In the turbulent contact of the oil mass with the water cushion, according with law of physical chemistry, the part "Dissolvan" V 5748 passes into the water phase, as a result, the efficiency of the demulsifier, as well as the processes of dehydration and desalination, to some extent decreases. To avoid such negatives, on oilfield practice of oil preparation usually increases the dosage of the demulsifier. Indeed, with the Bottle tests, we found such an effect. Therefore, the optimal dosage of "Dissolvan" V 5748, in our opinion, should not be less than 220-230 g/t (ie about 20-30 g/t is a loss during washing with water).
- The proposed technology using the demulsifier "IKHLAS"-1 was implemented in four stages:
- • The first stage: the temperature on VST No.2 (VST No.1): T = 82-86 ° C. Problems with the delivery to the PDO are not found;
- • The second stage: the temperature on VST No.2 (VST No.1): T = 76-79°C. Problems with the delivery to the PDO are not found;
- • The third stage: the temperature on VST No.2 (VST No.1): T = 73-75°C. Problems with the delivery to the PDO are not found;
- • The fourth stage: the temperature on VST No.2 (VST No.1): T = 70-71°C. In one autocarriers of oil the concentration of salts was high (88 mg/l). Therefore, there was a return. It was interesting that the water concentration was 0%. Of course, based on this, we concluded that the recommended operating temperature for "IKHLAS" -1 in VST No.2 (VST No.1) should be at least 75 ° C. On the other hand, there was a need to present a mechanism on the issue, if water is 0%, why the concentration of salts is too high? Therefore, observations were made on the walls of the can, in which the sample was taken at the PDO. At the bottom of the bank, micro particles of chloride salts were found (Figure). Oil of LLP "Tenge Oil & Gas" by chemical nature refers to highly paraffinic oil. The melting point of high molecular weight paraffins (ceresin) reaches 60-80°C (Handbook of Chemistry 21, p.26). Therefore, in the composition of oil LLP "Tenge Oil & Gas" at a temperature of 60-80°C exist uniformly distributed in oil nano and micro particles of paraffin. These nano and micro paraffin particles have a high adsorption capacity in relation to nano and micro particles of chloride salts. "Cushion" water with time is saturated with chloride salts. It is known that the solubility of sodium chloride is 260000-280000 mg/l. Above this limit, the solution is saturated or super saturated in "cushion" water, as the analysis results show, the concentration of salts reaches the level of maximum super saturation (~ 300 000-530 000 mg/dm³ and more). Upon contact of such water with oil, there is an intense adsorption of salts on the surface of nano and micro paraffin particles and further occurs the growth of adsorbed salt molecules in the form of free microparticles, which we observed at the bottom of the glassware (Figure). At GS-1 LLP "Tenge Oil & Gas" up dating of "cushion" water is carried out once in the week. To ensure the washing of oil from particles of salts we recommend to update the "cushion" water 2 times a week or after 5 days as a maximum;
- During the EIT, the return of autocarriers of oil from the PDO were not detected, which confirms the relatively high reliability of the proposed "IKHLAS"-1 technology, compared to the base technology "Dissolvan" V 5748;
- In the period 01.06.17 - 05.06.17 the water content in all autocarriers of oil was 0%;
- Attention should also be paid to the oil temperature values for the autocarriers on the PDO (Table 3). As follows from the data in Table 3, the oil temperature for autocarriers in the cases of "Dissolvan" V 5748 is on

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the average 60-68°C, and in the cases of "IKHLAS"-1 it is 57-63 ° C. Therefore, with the use of "IKHLAS"-1, the temperature drops by 3-5°C, which are very significant indicators for the delivery of oil to the PDO and further to LLP "KazTransOil". The relatively high temperature (73°C for all three autocarriers) of oil at the PDO from 01.06.17 is due to the fact that on this day a long process of renewal of cushion water was carried out at GS-1, and the first consignment of commercial oil that day did not pass qualitative processing through the cooler. Since the subsequent batch of oil on the same day passed the cooling phase, the temperature for all three of the autocarriers on the PDO was rather low (58°C; 59°C; 59°C);

- Since Dissolvan V 5748 is demulsifier oil-soluble and water-soluble, it contributes to the formation of persistent oil-water emulsions, as a result of which "Dissolvan" V 5748 not only significantly exceeds the norms for the concentration of oil in water (C_o) for maintenance of reservoir pressure (MRP) ($C_o \gg 50$ mg /l), and also in a certain degree occurs of loss of oil. For the oil-soluble nanodemulsifier "IKHLAS"-1, no similar negatives not detected. In addition, the "IKHLAS"-1 nanodemulsifier during the EIT at the "Zhetybaymunaigas" deposits of JSC "MMG" (2014) also showed under properties of a demulsifier and desuspensioner of hard-to-destroy water-oil emulsions and suspensions (HDWOE and HDWOS), which resulted in a high degree of dehydration and desalting of oil, purification of sewage from oil, as well as almost complete prevention of the formation of T HDWOE and HDWOS in the PPO system [3].

The complex of the above-listed unique properties of the nanodemulsifier "IKHLAS" 1 is protected by the patent of the RK [7]. At present, the "IKHLAS"-1 nanodemulsifier is being successfully introduced in five oil fields (including the LLP "Tenge Oil & Gas") and at two mini oil refineries of the Republic of Kazakhstan.



Figure. Demonstration of microparticles of salts in the composition of oil.

IV. CONCLUSIONS

1. The results of Experimental-Industrial Tests (EIT) of the nanodemulsifier "IKHLAS" -1 at the GF-2 and GS-1 of LLP "Tenge Oil & Gas" were assessed positive.
2. Based on the results of the EIT, it can be concluded that "IKHLAS" -1 prevails with certain technological, environmental, and economic advantages compared to the basic demulsifier "Dissolvan" V 5748 (Germany). Therefore, the acceptance committee recommended the nanodemulsifier "IKHLAS" -1 for wide introduction at the GP-2 and GS-1 of LLP "Tenge Oil & Gas" with the optimal dosage of ~ 145-170 g/t.

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3. When introducing new VST and other structures to exploitation, during the implementation of the demulsifier "IKHLAS" -1 on GF-2 and GS-1 of LLP "Tenge Oil & Gas", the necessary out jointly technological and analytical monitoring, for select most of optimal thermochemical mode of primary preparation of oil.

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Table 3: Results of analytical and thermal monitoring at the PDO for autocarriers of oil and VST No. 1

Date	Demulsifier	T, °C VST No. 1	the results of analyzes on the PDO for autocarriers of oil											
			080			335			936			080		
			T, °C	H ₂ O, %	Cl, mg/l	T, °C	H ₂ O, %	Cl, mg/l	T, °C	H ₂ O, %	Cl, mg/l	T, °C	H ₂ O, %	Cl, mg/l
05.05.17	"Dissolvan" V 5748	82-86	66	0,09	47	66	0,09	43	66	0,09	45	63	0,09	49
06.05.17	"Dissolvan" V 5748	82-86	64	0,09	56	64	0,09	60	64	0,09	61	61	0,06	42
07.05.17	"Dissolvan" V 5748	75-80	60	0,18	88	62	0,18	82	61	0,18	90	65	0,70	128
08.05.17	"Dissolvan" V 5748	75-80	62	0,30	123	62	0,40	125	62	0,27	120	61	0,60	62
09.05.17	"Dissolvan" V 5748	82-86	62	0,12	62	62	0,12	70	61	0,12	65	63	0,09	54
10.05.17	"Dissolvan" V 5748	82-86	60	0,09	53	60	0,09	52	60	0,06	54	63	0,09	51
11.05.17	"Dissolvan" V 5748	82-86	63	0,09	51	62	0,09	57	63	0,09	54	64	0,09	50
12.05.17	"Dissolvan" V 5748	82-86	64	0,09	55	64	0,12	63	65	0,09	59	60	0,12	57
13.05.17	"Dissolvan" V 5748	82-86	61	0,09	50	61	0,09	48	61	0,09	49	61	0,09	65
14.05.17	"Dissolvan" V 5748	82-86	65	0,09	47	65	0,09	48	64	0,09	47	61	0,09	51
15.05.17	"Dissolvan" V 5748	82-86	61	0,09	66	61	0,09	57	61	0,12	70	61	0,06	49
16.05.17	"Dissolvan" V 5748	82-86	55	0,12	55	59	0,09	40	56	0,09	57	61	0,09	81
17.05.17	"Dissolvan" V 5748	82-86	59	0,09	56	59	0,09	58	60	0,12	90	62	0,09	55
18.05.17	"Dissolvan" V 5748	82-86	62	0,09	41	62	0,12	54	63	0,09	47	62	0,09	55
19.05.17	"Dissolvan" V 5748	82-86	62	0,09	55	61	0,09	57	61	0,09	59	62	0,09	66
20.05.17	"Dissolvan" V 5748	82-86	63	0,12	58	63	0,12	51	63	0,09	38	64	0,09	35
21.05.17	"Dissolvan" V 5748	82-86	61	0,09	48	61	0,09	47	61	0,09	54	65	0,09	48
22.05.17	"Dissolvan" V 5748	82-86	60	0,09	58	64	0,09	56	64	0,09	53	60	0,09	58
23.05.17	"Dissolvan" V 5748	82-86	-	-	-	-	-	-	-	-	-	-	-	-
24.05.17	"Dissolvan" V 5748	82-86	62	0,09	33	63	0,09	38	62	0,09	38	63	0,09	58
25.05.17	"Dissolvan" V 5748	82-86	62	0,09	63	61	0,09	40	62	0,09	54	61	0,09	52
26.05.17	"Dissolvan" V 5748	82-86	62	0,09	53	68	0,15	50	62	0,09	47	62	0,09	54
27.05.17	"IKHLAS"-1	82-86	63	0,09	57	62	0,09	54	63	0,09	52	68	0,09	51
28.05.17	"IKHLAS"-1	82-86	65	0,09	33	66	0,09	42	-	-	-	66	0,09	42
29.05.17	"IKHLAS"-1	82-86	63	0,09	62	63	0,09	57	62	0,09	68	60	0,15	79
30.05.17	"IKHLAS"-1	82-86	65	0,06	45	66	0,06	48	64	0,06	47	62	0,06	58
31.05.17	"IKHLAS"-1	76-79	61	0,09	60	60	0	50	60	0,09	60	63	0,03	45
01.06.17	"IKHLAS"-1	76-79	73	0	38	73	0	49	73	0	41	58	0	43
02.06.17	"IKHLAS"-1	73-75	62	0	49	63	0	49	62	0	45	58	0	33
03.06.17	"IKHLAS"-1	70-71	58	0	49	58	0	54	57	0	49	58	0	60
04.06.17	"IKHLAS"-1	70-71	63	0	63	64	0	53	63	0	88	59	0	65
05.06.17	"IKHLAS"-1	70-71	59	0	49	61	0	41	58	0	40	-	-	-