ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 8, Issue 11 , November 2021

Improvement of Processes of Field Treatment of Oil

RustamShafiev

PhD, Consultant - Secretary of The Scientific and Technical Council, JSC «O'ZLITINEFTGAZ», Tashkent, Uzbekistan

ABSTRACT: The article provides a methodology for improving oilfield technology based on the principles of a systematic consideration of the object of oil research, which is present in the form of a complex dispersed system using meta-analysis and metatechnology. It is proposed to subdivide the oilfield technology, selected as an analogue in the design, into the simplest - single processes. And consider each unit process separately with the identification of signs of their share in the formation and strengthening of a complex dispersed system, that is, make a selection of basic processes. The data of the results of special laboratory studies are given, which make it possible to develop reliable technical and technological solutions for correcting a single process with the provision of maximum attenuation of complex dispersed systems that enter the oil treatment unit. This condition is necessary and sufficient for the design of the development of new oil fields with hard-to-recover reserves. Social networking services are used for communication between people to share information through internet. Reaching hundreds millions of users, major social networks have become important target media for spammers. Social networks provide communication between people to share information through internet. The unbounded growth of content and users pushes the Internet technologies usage to certain limitations. The main objective of the proposed work is to find relationship between features and classifying patterns for detecting spam message from the unwanted sites. In this paper we have reviewed the existing techniques for detecting spam users in social network. Features for the detection of spammers could be user based or content based or both and spam classifier methods.

I. INTRODUCTION

For long-term developed oil fields and the commissioning of new facilities with hard-to-recover reserves, their construction and operation will inevitably be accompanied by planning measures to improve the efficiency of oil production. The main factors in the selection of the implemented measure can be, according to the authors of [185, p. 13], - "deterioration of the reservoir properties of the reservoirs; high water cut of products; low oil production rates; inconsistency of infrastructure conditions with current development parameters; deterioration of facilities; lack of regional synergy of infrastructure facilities".

Issues of field preparation of oil are well studied and there are numerous processes aimed at ensuring the quality of marketable oil corresponding to the requirements of oil refining [1,2,3]. Processes and apparatuses for degassing, thermochemical dehydration and desalting of oil are adapted to a certain type of averaged feedstock of a certain composition and properties, and therefore their application under conditions of rapid change in these parameters for the production of oil from hard-to-recover reserves can be problematic. How to proceed in this case? Obviously, an urgent modernization of the oil treatment plant is required. We propose to approach this problem by regulating the properties of produced complex dispersed systems, without resorting to expensive alterations of the existing oil treatment unit (OTP).

II. BACKGROUND OR RELATED WORK

Increased requirements for production implies a revision of the initial characteristics of technologies due to the failure to ensure their functions in full in the rapidly changing conditions of oil production from complex reservoirs. The multi-stage mechanism of the formation of a complex-multiple water-oil emulsion that originates in the reservoir and acquires a dispersed state in the production wells and communications of the oil collection and transport system requires an individual approach to their destruction at the oil treatment unit (OTP). At the same time, the problem of the accumulation of multicomponent dispersed systems in the form of a trap emulsion will grow, excluding the possibility of its destruction by coalescence of water globules [4-10].

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
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Therefore, all technical and technological solutions for the destruction of complex dispersed systems should be based on reliable laboratory data and pilot tests.

III. SCOPE OF RESEARCH

In modern conditions of globalization and active attraction of investments in the economies of countries, including in the oil and gas sector, an important aspect is multivariate comparisons of the adopted technical and technological solutions to ensure the maximum attractiveness of the project. This becomes especially relevant when the transfer of oil production from hard-to-recover reserves.

In these conditions, increased requirements are imposed on the initial data of their reliability and balance for the entire period of operation of the designed facility.

IV. METHODOLOGY

To isolate the processes of oilfield technology that affect the formation of complex multiple emulsion systems, we applied the principle of ranking the unit processes that make up the oilfield technology (existing or being the subject of exploratory design), which is described in [5], in relation to the technology of firms. This allowed the local processes encountered in the oilfield business - in the parent rock of the reservoir, structures, apparatus, devices and installations to be separated into independent groups and they were assigned a definition - a single process.

The basic process (in a series of unit processes, important for the problem being solved) is a unit of event that leads to a change in the physical state of a fluid (oil, gas, water and their mixtures) in the considered object of oilfield technology, which is related to the formation and strengthening of a complex dispersed system.

The aforementioned principle of oilfield technology crushing allows one to isolate the basic processes that need to be investigated to develop ways of influencing them with obtaining the required results on the properties of fluids supplied as a result to the oil treatment unit.

That is, the search for new solutions to improve the efficiency of oil preparation requires a constant and systematic study of the properties of the produced oil and its emulsions in order to have a clear idea of the mechanism of their formation, stabilization and the degree of stability for further targeted regulation of the structural and mechanical properties of dispersed systems.

Sufficient for these purposes will be: carrying out a complex of rheological studies of oil and water-oil emulsions according to provide the initial data for calculating the expected hydraulic resistance in pipelines and the processes of heat and mass transfer in the apparatus for degassing and dehydrating oil; testing the modes of thermochemical dehydration and desalting of oil and performing special studies on the destruction of complex emulsions, which will serve as the basis for creating new technological solutions that will reduce the cost of field preparation of oil and reduce the level of technological losses.

V. EXPERIMENTAL RESULTS

Tables 1 and 2 show the results of exemplary exploratory tests on oils, which make it possible to develop energy- and resource-efficient solutions for improving processes aimed at ensuring field treatment of oil that meets the requirements of oil refining.

As special studies, tests were carried out to intensify the coalescence of emulsified water droplets by purposefully acting on the armor shells of solvation layers around water globules. The results of special studies of the effect of shock waves are given in table 3, the effect of hydrodynamic jets of solutions of surfactants in table 4.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
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Table 1. Results of laboratory studies of changes in the dynamic viscosity of oil when it is saturated with components of formation fluids (20ºC)

Investigated oil sample	Dynamic viscosity, mPa.s	Excess (+) or decrease (-) dynamic viscosity,%
1. Initial oil	15,6	0
Oil + 10% formation water	19,1	+ 22,44
Oil + 50% formation water	113,7	+ 628,85
Oil + 15% gas condensate	6,1	- 60,90
Oil + dissolved gas (90 m3 / m3)	3,7*	- 76,28
Oil + 0.5% paraffin	31,6	+ 102,56
Oil + 0.5% resin	32,0	+ 105,13
Oil + 5.0% asphalt-resin-wax	58,0	+ 271,79
2. Initial oil	44	0
Losses of light ends 2.8%	60	+ 36,4
3. Initial oil	125,5	0
Heat treated	55,3	- 55,9

Table 2. Results of thermochemical testing of emulsions

Investigated sample of water-oil emulsion	Demulsifier specific consumption - dissolvan 4411, g / t	Thermochemical sludge		Water content in oil,%
		Temperature, ºC	Time, hour	
1. Initial oil-water emulsion	-	65	4	40
	60	65	4	4,5
	80	65	4	0,0
+ 2.0% paraffin	120	65	5	3,5
	160	65	5	0,0
+ 5.0% paraffin	200	65	5	0,9
	220	65	5	0,0
+ 10.0% paraffin	260	65	5	2,7
	300	65	5	1,5
2. Initial oil-water emulsion, content of 0.55% mechanical impurities (mi)	250	65	5	1,2 и 0,12% mi
	300	65	5	0,0 и 0,05% mi
3. Initial oil-water emulsion 73.5% of formation water	65	55	3	1,3
+ 1.0% HCl (11%)	65	55	3	35,5
+ 3.0% HCl (11%)	65	55	3	60,0
4. Oil-condensate oil-water emulsion	-	25	2	11,8
density 771 kg / m3	20	45	2	0,0

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
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Table 3. Results of a study of the effect of pressure waves on a stable oil-water emulsion during thermochemical dehydration

Indicators	Thermochemical sludge	Also after treatment with shock waves
Emulsion breaking temperature,ºC	65	45
Water content in emulsion, %	20	20
Demulsifier specific consumption, g/t	150	150
Standing time, hour	4	2
Residual water content in% at shock wave intensity (MPa)		
0,0	8,3	
0,8		0,90
1,0		0,56
1,3		0,50
1,5		0,42
2,0		2,10

Table 4. Results of a study of the destruction of a stable water-oil emulsion during water jet demulsification

Name	Reagent consumption, g/t	Demuls temperature tions, ºC	Outflow velocity of the demulsifier jet, m/s	Residual water content,%
Thermochemical demulsification	80	60	-	0,0
	65	45	-	4,0
Hydrojetdemulsification	65	45	0,2	3,8
	65	45	0,5	1,0
	65	45	1,3	0,5
	65	45	2,7	0,0
	65	45	4,5	0,0

VI. CONCLUSION

Having gained objectively reliable initial data for the implementation of the most accessible oilfield technology in relation to the considered design object, one can proceed to consider the issue of ensuring stability in the operation of the OTP.
The following comprehensive studies are required for a new project for the development of an oil field with hard-to-recover reserves:
A comprehensive analysis of the database on the development of existing oil production facilities is carried out with the choice of an analogue of the oil field development scheme and a proposal is being prepared for the selection of the most accessible oilfield technology for further consideration.
Balances (flow rates, pressures, temperatures) are compiled according to the selected scheme for each of the processes taken as a basis according to the adopted technology.
The required number of collecting points (LP) and their location are determined, the place of construction of the OTP is specified, the length of the loops from the wells to the JV and the collectors from the JV to the OTP is determined.
A decision is made on the processes of separating oil from gas, oil dehydration and desalination, and accounting of marketable oil to substantiate the concept of the OTP being constructed.

Separately, additions to the basic processes associated with ensuring the weakening of bonds in complex dispersed

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
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systems are being developed so that the operating modes of the OTP can be controlled, and its functionality corresponds to the design indicators for the output characteristics of the quality of oil treatment.
The necessity of building a booster compressor station (BCS) or using the capacities of a nearby integrated gas treatment unit (GTP) in order to utilize associated gas, which in this case can be an additional link in oil production - by the gas lift method and / or for pumping gas into the reservoir for reservoir pressure maintenance and environmental protection.
The problem of utilization of produced water is solved by designing capacities for its purification from oil and mechanical impurities, areas for waterflooding, the number and location of water injection wells, the length of low and high pressure water pipelines are determined, pumping equipment is selected.
The problem of protection of oilfield equipment from corrosion and salt deposition is considered.
Variants of applicability of secondary and tertiary methods of enhanced oil recovery (EOR) of a reservoir in conjunction with gas and formation water utilization systems, as well as measures being introduced to correct the properties of emulsions for basic processes are considered.
Requirements for equipment and apparatus for the development of an oil field in conditions of oil production from TIZ arise from the low production rate of such facilities and the rapidity of changing modes and methods of production in individual areas and the field as a whole. The main characteristic for the use of the equipment will be its high mobility and the complexity of the characteristics of the application for various conditions, i.e. versatility, and production should be modular.

VII. CONFIRMATION OF RESULTS

The solutions of the above tasks, taking into account the development and use of a reliable base of initial data, make it possible to carry out a project for the development of an oil field and select the most affordable oilfield technology to ensure high oil recovery factors with reliable operation of the oil treatment plant in compliance with:
- passing the volumes of oil, associated gas and formation water production during field development throughout the entire life cycle of the field;
- preparation of oil in terms of quality that meets the conditions of the current standards and requirements of oil refining;
- minimization of the environmental load on the natural environment, due to the utilization of associated gas and produced water.

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ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 8, Issue 11 , November 2021

AUTHOR’S BIOGRAPHY

SHAFIEV RUSTAM UMAROVICH

Place of work: JSC «O'ZLITINEFTGAZ».
Specialist in the field of production, collection, treatment, transportation and storage of oil.

Education:

Diploma of the Azineftekhim University (Baku, 1974) in the specialty of machinery and equipment for oil and gas fields.

Degree of Candidate of Technical Sciences (2007) in specialty 05.15.06, dissertation on the topic: “Methodological foundations of field preparation of oil at various stages of field development”.

Directions of scientific work

- Rheological studies of oil and water-oil emulsions;
- Oil dehydration and desalination;
- Technologies for collection, preparation, transportation and storage of oil;
- Oil losses.