SYSTEM ANALYSIS OF PROCESSES OF PRIMARY PREPARATION OF OIL FOR INDUSTRIAL PROCESSING

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Abstract: *in this article the process of initially preparation of oil refining in industry condition was analyzed system. Furthermore, systematic analysis of distillation oil devise (DOD) shows existing process line is insufficient, that is it contents the process of low parameter stability. It is confirmed by indicator of technological system integrity. Hence, development of the basic processes for separation of water and salts off oil in DOD allows increasing considerably technical and economic of operating benefits, as well as quality oil preparation for refining.*
Keywords: *demulsifier, emulsion, hydrophob, globule, gas condensate, oil, destruction, dehydration, desalination.*

СИСТЕМНЫЙ АНАЛИЗ ПРОЦЕССОВ ПЕРВИЧНОЙ ПОДГОТОВКИ НЕФТИ ДЛЯ ПРОМЫШЛЕННОЙ ПЕРЕРАБОТКИ

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Аннотация: *нестабильный сложный состав водонефтяных эмульсий обуславливает применение нетрадиционных способов интенсификации отдельных процессов в УПН. Ультразвуковое воздействие считается одним из способов сокращения времени разделения воды, газа, механических примесей, солей и т.п. веществ, сопутствующих нефти. Проведенные исследования показали эффективность применения ультразвукового воздействия на процессы подготовки нефти к промышленной переработке на УПН. При этом установлено, что более рационально использовать магнитострикционный преобразователь, вместо гидродинамического при следующих оптимальных условиях: мощность ультразвуковой частоты, равной 20 кГц, время озвучивания водонефтяной эмульсии – 60 секунд (для каждой партии подготовки нефти).*
Ключевые слова: *деэмульгатор, эмульсия, гидрофоб, глобула, газоконденсат, нефть, разрушение, обезвоживание, обессоливание.*

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It is known, in Uzbekistan oil mining mainly is carried out as a water-oil emulsions (WOE), which subjected to initially preparation into DOD with various output [1]. Equipments on oil preparation are as typical complex chemical technological systems to develop and optimize necessary application of modern ways of systematic analysis that solved by two stages: first, there are analysed DOD quality properties, second, there are quantitative ones [2].

It is known that in oils, along with dissolved salts, there are various highly dispersed salts in the form of crystals, which are difficult to remove during traditional dehydration of NOE.

To extract them from dehydrated oil, a multiple washing with fresh water is used, which is expensive in commercial conditions.

Flushing with fresh water (without recirculation) can reduce the content of salts and clusters in it. At the same time, the fresh water consumption for oil flushing is calculated according to the formula [3].

$$Q^{H_2O} = \frac{Q^{FW}}{0,8} \frac{ВК_л\text{-}X}{X\text{-}ВК_2} Q^o \qquad (1)$$

where Q^{H_2O} is the flow rate of the washing water, m^3;
Q^{FW} - the amount of formation water in the oil before the step desalination, m^3/m^3; $Q^{FW} = W1 / (1-W_1)$;
B - the amount of water in the oil at the outlet of the desalting stage, m^3/m^3; $B = W_2/(1 - W_2)$;
X - salt content in desalted oil, mg /l;
K1 - salt content in formation water, mg /l;
K2 - salt content in washing water, mg /l;
Q^O - the amount of oil to be prepared, m^3;
0,8 - coefficient of mixing efficiency.

As can be seen from this equation (2), the consumption of fresh water during desalting of oil is significantly affected by the intensity of phase mixing, which can be increased through the use of ultrasonic action. This allows not only to reduce the frequency of oil flushing, but also the amount of fresh water consumed during oil flushing.

With a view to deeper removal of chloride salts from oil, we performed a two-fold flushing with the regimes noted in the previous experiment. Analyzes of the residual water content and the concentration of chloride salts were carried out according to the procedures [4].

The results are shown in Table 1

Table 1.Indicators of preparation of local oils after the first and second washing using fresh water, ultrasonic treatment and without it

Name of local oils	After the first wash		After the second wash	
	Mass fraction of water, %	Mass concentration of chloride salts, mg / dm^3	Mass fraction of water, %	Mass concentration of chloride salts, mg /dm^3
Mingbulak (control) (x)	0,48	289	0,41	183
Mirshadi (control) (x)	0,67	364	0,57	215
Mingbulak	0,35	157	0,33	102
Mearshadi	0,38	230	0,35	184

Note: (x) without ultrasound (control).

From Table 1 it can be seen that double washing of oil with fresh water helps to reduce the content of chloride salts in it by about 1.6-2.0 times. In this case, the use of ultrasound also significantly reduces the residual content of chloride salts in oil. Moreover, the use of the last bole effectively works during the first washing of oil with fresh water, in the second relatively less efficiently, which confirms the presence of hard-to-remove salts in oil.

$$Q^{H_2O} = \frac{Q^{ПВ}}{0,8} \frac{ВК_л\text{-}X}{X\text{-}ВК_2} Q^H \qquad (2)$$

Yet, in industrial condition there is not possibility for maintenance of all oil attendants that explained continuous ingress of oil from multitude of wells. In addition, changing contents maintained above oil attendants, stratal water and mineral salts significantly impact on efficiency of marketable oil process. If development of DOD supposes some directions on improvement assessment of property wholeness (O) of the flowsheet will be important task.

Scientific basis of calculation of wholeness property of the flowsheet was stated in [5].

Evaluation of DOD wholeness consists of figures process stability belonging to the system. In that case, stable and "narrow" processes are revealed insufficiently that can be developed, intensified and optimized.

Furthermore, we have been studied unity of DOD based on account of stability of its compound processes. For that, there were assorted the normal technological conditions indicated but it approved time limit on present set. Data collection was realized in 24 days through per two hours and they were treated according to [5].

Hence, residual moisture content in oil (wt.%) was used as a variable output parameter of RWOS №1 while for RWOS №2 it was residual salt, mg/l.

Based on processing data observations it was received the following equations of wholeness DOD:

$$N_{ДСВА} = \eta_{Д} + \eta_{С/Д} + \eta_{В/С} + \eta_{А/В} - 3 = 0.81 + 0.73 + 0.76 + 0.87 - 3 = 0.17 \qquad (3)$$

It is noticeable from present equation stability of the processes in DOD is low that linked mainly by considerable fluctuations of preparing oil composition.

Therefore, it is necessary to design approaches their increase including conventional ways of impact on water-oil system.

Low wholeness of DOD is consequence of unstable functioning of multiple processes in DOD.

To sum up, systematic analysis of DOD shows that present technological line is completed insufficiently, that is it contents processes of low stability of output parameters. It is confirmed also indicator of wholeness of the flowsheet. Therefore, working the main processes of water separation and mineral salts from oil in DOD allows to rise considerably technical and economic efficiency for its functioning, as well as quality of oil preparation to industrial processing.

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