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Increasing the Efficiency of Destroying Water-Oil Emulsions by Replacing the Demulser

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ANNOTATION: An excellent result in the study of substances for demulsifiers is nonionic surfactants, since in a mixture with oil they do not decompose into cations and anions. Separols, disolvans, diproxylyns and others are such substances. The active substance (demulsifier) is adsorbed at the interface of the "oil-water" emulsion and expels less active natural emulsifiers present in the emulsion.

KEYWORDS: demulsifier, physical and chemical properties, reagent consumption.

The main problem of oil fields is an increase in oil water cut, which depends on the time of field development. The rheological properties of oils require special attention in the production, collection and treatment of oil. In turn, formation water during production forms asphalt-resin-paraffin deposits, which impede these processes [1]. After mixing formation water and oil, a difficult-to-break oil-water emulsion is formed. The destruction of such a mixture is the main task of the preparation of commercial oil.

One of the important and urgent tasks of oil producing companies is the selection of effective demulsifiers. This is due to the fact that an effective demulsifier in one field is ballast in another field. Each field is unique in terms of the component composition of oil, in terms of its physical and chemical properties and the degree of water cut. A demulsifier will be effective if it can provide the maximum depth of desalination and dehydration at a minimum temperature and flow rate. Significant criteria for the selection of a demulsifier are the following indicators: oil quality, namely, the content of mechanical impurities, salts, water, reagent consumption, as well as the duration of settling.

The technology of the commercial oil preparation process consists of four successive stages:

- oil separation;
- preliminary dehydration, in which the water content in oil is limited to no more than 10%;
- deep dehydration and desalination, with a water content after the stage of not more than 1%;
- oil stabilization.

At oil fields, the following methods are most often used for oil dehydration and desalination: gravity settling, thermochemical, electrochemical, namely, electrical dehydration and electrical desalination [2].

When using the chemical method, a demulsifier is added to the dehydrated oil. Most often these are surfactants. One ton of oil produced requires 5-60 g of reagent. Nonionic surfactants are a good result when studying substances for demulsifiers, since they do not decompose into cations and anions when mixed with oil. Separols, disolvans, diproxylyns and others are such substances. The active substance (demulsifier) is adsorbed at the interface of the "oil-water" emulsion and expels less active natural emulsifiers present in the emulsion. The film that forms on the surface of water droplets becomes less durable, which entails the coalescence of small droplets into large ones, that is, a coalescence process occurs.

The efficiency and rate of chemical dehydration of oil is markedly increased due to a decrease in the viscosity of the oil. In the case of using the thermochemical method, efficiency occurs due to a decrease in the viscosity of oil when it is heated, as well as facilitating the process of coalescence of water droplets.



The lowest residual water content is achieved by using electrical methods of dehydration and desalination. The processes of electrical dehydration and electrical desalination of oil take place in an apparatus called an electrical dehydrator, in which oil flows between electrodes, a high voltage electric field (about 30 - 40 kV) is created. To increase the rate of electrical dehydration, oil is heated to a temperature of 40 - 80 ° C. On an electric desalting unit, the process is carried out with a short residence time of oil in the apparatus, and a large depth of oil dehydration is required to achieve the maximum degree of desalination.

Due to the factors listed above, to obtain a high result of oil treatment, the electric method is combined with the thermochemical one, combining several factors affecting the oil-water emulsion, such as heating, supply of demulsifier, electric field and sediment in the gravitational field [3].

Oil from one of the West Siberian fields was taken for the study. Characteristics of the feedstock: oil emulsion coming from the oil treatment plant, water cut is up to 95%, temperature is from 5 - 57 ° C and pressure is 0.68 MPa. In the study of demulsifiers, significant criteria are identified changes in the water content in oil and salinity with any change in the technological parameters of the units, namely, the comparative conversion of the specific consumption of demulsifiers, taking into account the quality of the oil obtained in this case. According to modern requirements, the content of oil products in purified bottom water should not exceed 50 mg / l.

During the study of the technological scheme of the field and the physicochemical characteristics of the oil, it is proposed to replace the FLECT-13 demulsifier, which is currently used at the unit of the West Siberian field, with the Unidem ES series demulsifier of the Unitech company.

Demulsifier FLEKT-13 has the following characteristics:

- flash point fluctuates 23 - 29 °C; viscosity at 20 ° C, 79 mm² / s; pour point no more than -42 °C.
- Demulsifiers of the Unidem ES series by Unitech have a number of properties that make them stand out among their analogues, namely:
- high rate of water discharge;
- low content of water and salts in the treated oil;
- clear phase boundary;
- high quality of residual water;
- pressure drop in oil gathering systems;
- prevention of the formation of intermediate layers.
-

The criterion for evaluating the effectiveness of the demulsifier is the rate of water separation, the quality of the separated water in the process of oil preparation, the interface between the phases of the oil-water emulsion, and the final water content at the end of the process [4]. The advantage of this demulsifier is a small decrease in the consumption of the reagent during operation, a decrease in the specific price, and low indicators for the water content.

Based on the results that were obtained by the method of laboratory analysis, it can be concluded that this demulsifier is suitable for the studied field. The optimal volumes of the reagent and the injection technology were selected. This helps us to argue the economic benefits of using the new demulsifier.

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