THE EFFECT OF MAGNETIC FIELD ON THE DESTRUCTION PETROLEUM EMULSION

N. Mamulaishvili[1,a], G. Partskhaladze[1], G. Chavleshvili[1] , O. Janelidze[1]

[1]*Batumi Shota Rustaveli State Univefsity, Georgia*

[a]nora.mamulaishvili@bsu.edu.ge, [b] gizo.partskhaladze@bsu.edu.ge, [c]gocha.chavleshvili@bsu.edu.ge, [d]otari.janelidze@bsu.edu.ge

Abstract. One of the main problems of the technology of oil extraction at the Supsa field includes oil emulsions and their demulsification. Emulsions are formed in different areas of the oil well operation: in the process of pumping water into the oil well to maintain reservoir pressure, the emulsion is formed in the bottomhole zone, in oil pipelines, and not in the productive zone. The stability of such an emulsion depends on the content of its own emulators in the reservoir oil: naphthenes, SAS-es, paraffin, resins. The greater the salinity of the formation water, the more stable the emulsion. The emergence of stable emulsions is associated with the turbulent movement of air and liquid. Therefore, the extracted petroleum needs to be pretreated to a state of production for further transportation and processing.

The article shows the effectiveness of the influence of the magnetic field on the process of destruction of the oil emulsion, which forms in the extraction of oil from the Supsa field. The results of the process of the demulsification of crude oil under the influence of a magnetic field with low and high frequencies (Hertz) and in the presence of the demulsifier Alkan De 202 are presented.

1.Introduction

The destruction of water-oil emulsions is successfully carried out by thermochemical method. To improve the efficiency of the demulsifier, especially for highly viscous and high-strength oil-water emulsions, various methods are used, among which the application of a magnetic field has a significant effect.[1].

In the modern period, demulsifiers of foreign origin are widely used. A: Most demulsifiers are very expensive and on average cost 1 ton. $ 3500. ALKAN DE 202 was chosen as a demulsifier [2].

Previously, we carried out work in the direction of oil-water demulsification using a demulsifier based on non-ionic SAS solution, which has the ability to reduce surface tension at the oil-water interface. [3]. [4] [5].

In order to reduce the dosage of the demulsifier and reduce the residence time of the oil-water emulsion in the settling apparatuses, the separation of aggregate-resistant water-oil emulsions under the influence of a magnetic field has been studied.

2. Experimental procedure and sample preparation

The experiments were carried out in the educational laboratory of the technological faculty of Batumi State University Shota Rustaveli. Initially, we prepared a petroleum emulsion (233 ml of petroleum was added 100-200 ml of distilled water). When mixing, the mixture was blended with a mixer for 5-7 minutes. As a result, a homogeneous emulsion was produced without any segregations. The experiments were carried out separately by the method**.**

Method 1. The method involved carrying out a demulsification process using magnetic solenoid, which was omitted in the test sample. The solenoid core was made of Ferrite, 140 mm long. diameter of 8mm. Top wrapped with copper conductor. A low-frequency current in the range of 20–50 hertzs was passed through a solenoid in the samples under study and observed during the process of water separation. see figure 1.

Samples were prepared in graduated cylinders of 100-250 ml each. Then we injected certain amounts of the demulsifier into each sample (0.5-1.0 ml). at T = 20-22ºC. Then, a low-frequency current of 20-40 hertz was suppressed and observed during the demulsification process. As a result, two separate phases were formed: the upper phase of petroleum and the lower phase of water.

Fig.1. processing of petroleum emulsion method 1

Fig. 2. processing of petroleum emulsion method 2

Method 2. This method involves processing samples at higher magnetic field frequencies. Graduated cylinders with the test solution were placed in a coil and a voltage of 150-180 volts was applied. The frequency of the magnetic field varied from 20 to 80 hertz. fig. 2. The amount of released water and the coefficient, the degree of demulsification were determined.

Conclusions

The results obtained when testing both methods revealed that the process of de-emulsification of the oil emulsion effectively takes place at the initial stage of the process within 30-40 minutes, at a magnetic field frequency of 30 Hertz. A further increase in the volume of allocated water was not observed.

It is shown that the low-frequency magnetic field significantly increases the rate of separation of the water-oil emulsion in the presence of a demulsifier, Alkan DE 202.

References

[1] Shaikhulov A.M., Bojchuk A. A., Dokichev V. A., Svirsky S. E., Singizova V. H., Kresteleva I. V., Telin A. G. Magnetik field effect on demulsificationof water –in-oil emulsion of Kiengorskoe field a4 formation.ж. Нефтегазовое дело. 2014, т. 12, № 1

[2] "Alkan202" https://elibrary.ru/item.asp?id=15229926

[3] Mamulaishvili N., Salimova N., Khitarishviliand T., Partskhaladze G.Regulation of filtration and reservoir features of oil stratum rock with use of compositesolutions of SAS. J.Pet Environ Biotechnol 2018, Volume 9 DOI:10.4172/2157-7463-C1-041; 3rd World Congress onPetroleum Engineering and Natural Gas Recovery. July 20-21, 2018. Sydney, Australia.

[4] Mamulaishvili N., Partskhaladze G., Chavleshvili G., Zoidze R.. International Journal of Engineering Innovation & Research. Volume 6, Issue 6, ISSN: (2277– 5668); Supsa Crude Oil Demulsification Technology Development by Usingnon-ionogenic Surfactant Solution.2017.

[5] Mamulaishvili N.D., Salimova N.A., Khitarishvili T.D., Baladze D.A. Effect of various classes SAS on hydrophobic surface of oil stratum.The "International journal of Appled and fundamental research'' №2, 15-21.11.2014 Munch. Germany; http://www.science-sd.com/457-24744