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Analysis of the Current State and Methods to Avoid Asphaltene, Resin and Paraffin Substances Deposits Formation in Oil Production

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Abstract. The paper is devoted to the fight against asphaltene deposits - one of the urgent problems of the oil and gas field. The paper reviews the current state and methods of preventing asphaltene deposits in oil production. The authors consider the use of chemical and combined methods to classify chemical reagents to prevent the formation of asphaltene deposits. It is more rational to prevent the formation of asphaltene deposits than to remove them. This approach will reduce the equipment wear, energy, and production costs of one ton of oil. It is established that the first appearance and beginning of the formation of deposit in the well appears from 900 m and reaches its high value at a depth of 50–200 m. Using the example of an oil and gas condensate field (at a late stage of production), the authors show the effect of water cut in the well on the formation of asphaltene deposits. An increase in water cut leads to a change in the consistency of asphaltene deposits, a decrease in the formation of deposits in the well from a depth of 200–500 m to 1200 m, closer to the pumping equipment and the bottom-hole area. The research offers a block diagram of the effect of water cut in wells on the formation of asphaltene deposits, considers an algorithm for making decisions to justify the choice of reagents and the use of combined methods of treatment.

INTRODUCTION

Currently, most oil fields are characterized by the following problems: (1) high water cut, (2) low production rate, (3) lower reservoir temperature, and (4) high viscosity values of well production. Further exploitation of such oil fields can lead to the formation of asphaltene deposits on the surface of the oilfield and ground equipment in the bottom-hole area [BHA], the appearance of crystal hydrates, high-viscosity oil-water emulsion [OWE], etc.

Asphaltene deposits reduce productivity and complicate well operation and are accompanied by more frequent workovers. At the same time, the operating costs and the cost of oil production are increasing. Solving these problems requires capital labor and the development of new, rational technologies.

One of the rational options is to prevent the formation of asphaltene deposits rather than removing it. A combination of chemical and combined methods of fighting against asphaltene deposits is considered promising. It is important to obtain the composition and properties of the original oil and the formed deposits.

This approach guarantees the operation of equipment without accidents, reduces the cost of producing one ton of oil, and also ensures a more rational use of natural resources [1].

The research aims to develop new and rational technologies to prevent the formation of asphaltene deposits in oil production and transportation. It is necessary (1) to analyze the current state of asphaltene deposits formation, (2) to develop a classification scheme for methods of controlling asphaltene deposits based on a, review of existing