

**THEORY AND PRACTICE OF MEASURING THE PETROPHYSICAL CHARACTERISTICS
OF ROCKS**

V.A. Morev

Scientific advisor associate professor Chernova O.S.
National Research Tomsk Polytechnic University, Tomsk, Russia

Effective conducting of geological exploration complex and subsequent construction of geological models of oil and gas fields are possible only with full study of core samples.

The rocks which form the oil-bearing formations are filled with hydrocarbons, that is why, it is essential not just to be aware of mineral composition of rocks, but also know the chemical and petrophysical properties of the reservoir rocks (carbonate content, apparent porosity, gas permeability, density, clay content, compressibility, residual water saturation, wettability, electrical resistivity, etc.).

Techniques effectiveness increasing is a crucial direction in improving the methodological approaches which are used to conduct laboratory studies of core samples.

The purpose of this work is to study the feasibility of practical implementation of methodological approaches which allow to improve the efficiency of the sample preparation process during petrophysical studies.

It is known, that for conducting standard and special studies, core samples undergo several stages of sample preparation, including cleaning and drying process. During cleaning oil, bitumen, water and salts are eliminated from pore spaces. Then, after extraction, but before drying, it is necessary to split samples into 2 groups [1, 2]. The first group of samples with high clay content (> 30% clay minerals content) must be dried at a temperature of 70 °C. However, Standards of both countries do not specify the procedure of how to select heavily clayish core samples from all core samples.

Thus, it is worthwhile to note that the granulometric analysis of the core samples and X-ray phase analysis for rocks mineral composition study require special equipment and they are labor-intensive and time-consuming.

The problem was to divide core samples into two groups depending on their clay content and, in this paper, application of the express method of the indicator solution for solving this essential problem of samples segregation was proposed [3, 4]. The degree of transparency of water solution of methylene blue after the interaction with the rock was analyzed.

In the present work, the general mineralogical compositions of samples were determined using x-ray phase analysis (XPA). The mineralogical compositions of the samples were determined from the ratio of principal diagnostic reflections in diffraction patterns obtained under rigidly constant exposure conditions with observance of special safety requirements for working with sources of ionizing radiation.

The optical density of the indicator solution was determined on a KFK-3-01 photoelectric photometer using the optimum spectrum recording conditions. Solution optical density was measured at wavelength 665 nm, which corresponded to the absorption maximum of an aqueous solution of methylene blue.

For the experiment, several samples from the productive formations of the Western Siberia region were taken, represented by fine-grained sandstones. It is crucial to note that for siltstones and sandstones visual determination of clay content is the most difficult procedure.

The clay content in the samples varies from 14 to 33%.

Clayey minerals were primarily kaolinite and chlorite.

Water solutions after interaction with the samples with high clay content (> 30% clay minerals content), do not have any color. Consequently, the temperature in oven, where dry core sample, should not exceed 70 °C.

Thus, indicator solution method in laboratory practice of chemical and petrophysical studies makes it possible to increase the efficiency of clay minerals content determination. It is crucial to note, that incorrect core samples separation based on their clay content may cause the structural damage of their pore space.

References

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