

## Applications of the Petrophysical Properties of Oil and Gas Reservoirs for Exploration and Development Geology in Albania

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Thorough comprehension of the way in which capillary pressure in a reservoir affects hydrocarbon migration and entrapment is invaluable, if one is to learn and apply new methodology in the search for hydrocarbon pools. The method of capillary pressure has priority in solving some of the practical problems of exploration and development geology. This study presents the segment of capillary properties of oil and gas reservoirs as only one aspect of several years' research of more sophisticated and applicable methods in petrophysics.

A total of approximately 200 analyses of sandstone cores from the Albanian oil and gas fields were undertaken during this study. The final objective of the study was threefold:

- to uphold the petrophysical knowledge of the Albanian sandstone hydrocarbon reservoirs that was obtained based on routine parameters;
- to resolve some debatable problems of the domestic exploration and development geology of oil and gas;
- to model the system "seal - reservoir - oil and gas saturation" based on the petrophysical properties.

In relation to the first aspect, a comparison has been made between capillary parameters and routine parameters which upholds previous conclusions:

- a) the vertical zonation of the physical properties of the reservoir exists in the Patos - Marinza monocline, as well as in the Kuçova syncline with the trend of properties improving from the bottom of the reservoir upwards;
- b) the vertical and lateral heterogeneity of the distribution of the petrophysical properties both within a bed and from the reservoir bed decreases from the bottom of the reservoir upwards;
- c) the reservoir properties are reduced in the vicinity of the pinch-outs;

d) satisfactory correlation exists between the Kobe porosity and irreducible water saturation.

As far as the second aspect is concerned, attempts have been made to resolve the following problems using the capillary concepts combined with reservoir geometry and structural, sedimentological and petrophysical parameters:

- the problem of alternating gas-saturated and water-saturated beds in Messinian and Tortonian deposits (Frakuli-Divjaka-Ballaj);
- existence of either the sharp hydrocarbon-water contact or the transitional zone;
- the heterogeneous distribution of oil and gas saturation within a reservoir, together with the possible formation of a permeability barrier within a reservoir;
- the reservoir-seal relationship and explanation of filled and barren traps.

Concerning the third aspect, an original solution for the modelling of "seal - reservoir - oil and gas saturation" system is reached. The modelling considered the nature of the reservoirs, their geometric and hydrocarbon saturation features in combination with the petrophysical factors. Nine possible reservoir types were determined, throwing some light on the explanation of the irregular distribution of the gas reservoirs in the Pliocene and Tortonian sediments. The aforementioned could be of practical interest, especially when compared to the dry well analysis in attempts to predict risk.

The technique of capillary pressure has great potential for resolving problems in petroleum exploration, and exploration geologists are encouraged to make themselves familiar with this method, for it is the authors' belief that it will make them more successful in discovering oil and gas accumulations.

