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Petroleum Systems at a Depth Below 5000 m of Giant Oil and Gas Bearing Caspian Basin

Caspian petroleum province is a region where the growth of industrial reserves of HC is mostly owed to development deep-buried horizons whose perspectivity has been proved by discovered HC accumulations. Further addition of the reserves of oil, gas and condensate will be produced at the depth of 5-7 km. Presently, within the limits of this region there were discovered three fields with unique reserves, characterized by different structure and phase state of HC. Here three types of HC-systems have been identified: oil (Tengiz), oil-gas-condensate (Karachaganak) and gas-condensate (Astrakhan). These systems has a number of specific features: a large depth range of productivity, high formation pressure and temperature, complicated composition of the formation gas (hydrogen sulfide, Carbonic acid, nitrogen, C5+higher homologs) The major oil-and-gas-bearing system, enclosing most of HC reserves, is a Lower-Middle Carboniferous, mostly carbonates, comprising more than a half of HC resources (Fig.1). The field is formed of the argillaceous-carbonate rocks of subsalt Lower Permian and Kungurian salt-bearing series, whereas the Lower Permian subsalt rocks are among reservoir rocks (Karachaganak). In the Caspian petroleum province at large depths most common are zones with oil-gas-condensate, gas-condensate, and gas systems, here one can find different types of pools controlled by a mutual solubility of liquid and gaseous HC at various PVT conditions.