Petroleum Geology of Iraq

Commercial oil was discovered in the Kirkuk structure in 1927, and since then many oil and gas fields have been discovered. This has caused Iraq to be ranked as one of the leading producing countries of the world. It has proven reserves of 113 BB of oil and 110 TCF of gas from 84 fields.

The Lower Paleozoic and Triassic to Miocene section of the stratigraphic column is the main area of interest in Iraq, having potential and proven reservoir rocks of many ages. There are also great thicknesses of potential source-rocks which were especially well-developed during the Lower Paleozoic and Mesozoic.

The main reservoirs are the Cretaceous carbonates and sandstones in the Mesopotamian Basin, and Tertiary Carbonates in the Zagros Basin. These are sealed either by shales or evaporites. These two basins are dominantly oil-prone, while free gas occurs locally in the Tertiary reservoirs along the eastern margin of the fold belt and in Lowe Paleozoic reservoirs of Western Desert.

The Jurassic Sargelu and Naokelekan Formations represent the main source rock potential for the Mesopotamian Basin and Zagros fold belt. The shales of the Sargelu have TOC that range from 2% to 6% with higher values of up to 20%; while in the TOC of the Naokelekan is from 3-9% and locally reaches 15%. The present HI values range from less than 100 to more than 600 mg HC/g TOC. In the Mesopotamian Basin maturities range from 1.2-1.5% Ro, while in the fold belt it ranges from 0.5-1.9 Ro. Oil generation is connected to the late Cretaceous and reached completion in the late Paleogene.

Structural traps in Mesopotamian Basin are large, broad N-S striking basement-cored anticlines, while NW-trending compressional folds that formed by inversion over extensional faults dominate the fold belt. Trapping forming mechanisms formed in response to reactivation of deep-seated faults and diapiric growth, synorogenic faulting and restricted movements. While in the fold belt traps development involved multiple phases of folding that occurred in the late Cretaceous and was subsequently overprinted by late Cenozoic folding and faulting.

It is this wide distribution of important formations and various geological settings which has made Iraq the prolific oil producing country of the Middle East. It is believed that a large proportion of Iraq hydrocarbon wealth has not, as yet, been discovered and should it arise, any opportunity to undertake further exploration should be looked upon favorably, where there are possibilities of stratigraphic as well as structural traps in many parts of the region.
This new study is a comprehensive report on “Petroleum Geology of Iraq” and is based on the analysis of an extensive database. The report contains a combination of well data, field summaries, the geological / sequence stratigraphy and hydrocarbon habitats and prospective areas of Iraq.

The aim is to provide an up-to-date overview of the petroleum geology of the region relevant to hydrocarbon exploration. The report assesses the various plays and provides a comprehensive database of wells and fields and hydrocarbon exploration potential in the country.

The report is in SIX volumes:

Volume 1: Details of the country geological/structural framework with a new sequence stratigraphy, lithofacies maps, hydrocarbon habitat and potential plays.

Volume 2: Summary data sheets for the 115 oil and gas fields with cross sections and maps.

Volume 3: 69 exploration wells with basic information on each wells, formation thickness with age and general lithology.

Volume 4: 49 wells with composite logs, electric logs with Arabian Plate sequence stratigraphy followed by data sheet on each well includes formation, lithological description with thickness, top and bottom interval, production test, oil and gas shows, and casing interval.

Volume 5: Fields with basic information on each well in the field, include formation thickness and age, general lithology, casing and status of each well.

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The report provides a comprehensive evaluation of the country. It includes on regional geological setting sequence, stratigraphy, lithostratigraphy, structural evolution, geological history and exploration and production history. It then goes on to analyse the factors controlling hydrocarbon generation and entrapment with sections on geochemistry/hydrocarbon character, source rocks, thermal maturity, hydrocarbon migration, reservoirs, seals and traps. Particular trap types illustrated by descriptions of appropriate fields. Production data and a review of the petroleum infrastructure are also incorporated.

The final section is an assessment of the unexplored hydrocarbon potential plays of the country. The report contains numerous text figures and tables as well as accompanying maps, charts and cross sections (including isopach, structure and facies maps).

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