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PETROLEUM GEOCHEMISTRY OF ORGANIC MATTER FROM THE CHEJU BASIN, NORTHEASTERN PART OF THE EAST CHINA SEA

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The Cheju Basin, located in the northeastern part of the East China Sea Shelf Basin, is a series of rift basins along the continental margin of the East China Sea. The sedimentary layers of the basin can be subdivided into two parts by a regional unconformity marked at around 1,000m. According to paleontology and seismic facies, the upper part corresponds to marine sediments of Plio-Pleistocene and the lower part to nonmarine sediments of Miocene to Oligocene age.

Various geochemical analyses were carried out on the whole rocks, isolated kerogens and separated bitumens from seven exploratory wells in the Cheju basin to understand the source rock potential of the basin by evaluating characteristics of organic matter, level of thermal maturation and hydrocarbon genetic potential.

Based on the organic richness, the sediments of the middle to late Miocene sequences in the Geobuk-1, Okdom-1, Dragon-1, JDZ V-1 and JDZ V-3 wells have poor TOC. However, the lower Miocene and Oligocene sediments of the Geobuk-1 and Okdom-1 wells contain more than 1 % of TOC. According to kerogen analysis, these sediments contain mixed organic matter of Type I and III. The optical observation of kerogens represents significant contribution of amorphous kerogens which show fluorescence. Autochthonous lacustrine organic matter and its related biomarkers are identified from the sediments. The sediments from this horizon show both high S2 and HI values, indicating fair to good oil source potential. Based on geochemical data, the depositional environments of this interval is lacustrine setting with anoxic condition, which acts favorable to preserve the authochthnous organic matter. However, based on the transitional characteristics of organic matter from biomarker parameters, proposed paleoenvironment is the ephemeral lake in which the input of terrestrial organic matter was also frequent.

In case of the JDZ VII-1 and JDZ VII-2 wells, middle to late Miocene sediments are rich in TOC up to 20%. The input of coaly shales is responsible for the organic richness of these sediments. The kerogens from the non-marine sediments of the JDZ series wells are largely composed of woody, terrestrially derived organic matter. The depositional

environment inferred by the results of geochemical analyses is fluvial setting with swamp and floodplain.

The different characteristics of organic matter reflect the location of the wells in the isolated small subbasins and their depositional environments throughout the geologic time.

Most wells reached oil generation zone in the penetrated sections, and for two wells, JDZ VII-1 and JDZ VII-2, reached dry gas generation stage. Samples from these two wells may have generated limited amount of hydrocarbons, show a progressive decrease of hydrogen index (HI) with depth, probably due to the thermal degradation with increased burial.

In the aspect of organic richness, characteristics and level of thermal maturation, hydrocarbon genetic potential of the early Miocene and Oligocene fine sediments is fair, especially the area of small subbasins with lacustrine depositional setting as indicated from the Geobuk-1 and Okdom-1 wells.

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