

Paper Number: 4172

Linxi Formation shale gas resources prospect of Late Permian in the middle-southern part of Da Hinggan Mountains in China

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This paper is based on field geological work of the regional geological survey and outcrop profile measurement and drilling material etc. Through the analyse of sedimentary characteristics, hydrocarbon source rock distribution characteristics and organic geochemical characteristics, the results show that Late Permian Linxi Formation has a wide distribution, large thickness, and the thickness of the dark mudstone ranges from 775m to 1000m.

In the lower part of Linxi Formation, the paleosalinity ranged from 5.25‰ to 21.81‰, with an average value of 13.22‰. In the upper part, the paleosalinity ranged from 6.03‰ to 8.62‰, with an average value of 7.70‰. The results show that the lower part of Linxi Formation formed in the brackish-water environment, while the upper part section formed in the freshwater environment. Furthermore, the water salinity appeared the decreasing trend in the sedimentary period of Linxi Formation. To be specific, the lower part strata corresponded to the brackish-water lake environment, while the upper part strata corresponded to the freshwater lake environment. The brackish-water lake environment could provide the favorable condition for developing thick source rock.

Total Organic Carbon (TOC) content ranges from 0.21 to 2.04 weight percent with an average value of 0.80 weight percent. According to the relationship between the ratios of Pr/n-C₁₇ and that of Ph/n-C₁₈, also the steranes C27-C28-C29 triangle figure, the organic matter type is mainly of II type. Vitrinite reflectance (Ro) ranges from 0.96 to 3.12, with an average of 2.28, illite crystallinity (K.I°) ranges from 0.43 to 0.68, with an average of 0.50. Vitrinite reflectance and illite crystallinity show that the source rock owed its conversion into highly-mature to over-mature stage, mainly dry gas.

In conclusion, Linxi Formation is an important hydrocarbon source rock. It is the most favorable shale gas exploration formation of the Late Paleozoic in this area.

