Study on Gas Accumulation Mechanism of Dehui Fault Depression in Songliao Basin

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Dehui Fault Depression is located in the southeastern part of the Songliao Basin, which is a Mesozoic sedimentary basin and developed on the basement of the Late Paleozoic metamorphic rocks. The area is 2700km^2. At present, the hydrocarbon gas is found in the Nongan, Xiaohelong, Buhai, etc. The gas produced from the Lower Cretaceous Huoshiling Formation, Yingcheng Formation, Denglouku Formation and Quantou Formation. The Lower Cretaceous Yingcheng Formation is composed of volcanic rocks and debris sedimentary rocks. The stratum is buried at 2000m below the surface and has a layer thickness of about 1000m. The layer has been found to coexist with hydrocarbon gas and inorganic CO_2 gas, in which the hydrocarbon gas began to form at the end of the Quantou Formation, and the gas enriched process untill the late Nenjiang period. There are four magmatic activities in the early and middle late Cretaceous of the southern Songliao Basin; there are two biggest volcanic eruptions of 31 × 10^{6}a and 9.9 × 10^6 ~ 15 × 10^{6}a in the Paleogene- Neogene, the mantle-derived magma eruption and intrusion is frequent in this two period, and the mantle-derived CO_2 gas enriched in the trap near the deep source fault to form a CO_2 gas reservoir. The high-purity inorganic CO_2 gas field was found in the Wanjinta structure in the northwest of the fault depression. The gas-bearing layer was the Yingcheng Formation and the Quantou Formation. In the center of the Dehui Fault Depression, the bottom of the Quantou Formation of DS7 well has obtained 3 × 10^{4}m^3/d inorganic CO_2 gas. In the east of the well, there is only a small amount of CO_2 gas in the Yingcheng Formation of DS5 well , this may due to the regional tectonic return of the YanShan movement IV episode (the end of the Cretaceous), which made the early enrichment of inorganic CO_2 gas dispersed along the fault depression in the Yingcheng Formation.

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