

# Main Controlling Factors of Enrichment and High-Yield of Shale Gas in the Da'anzhai Member in Yuanba Area

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## Abstract

Many wells have obtained industrial gas flow in the continental shale section of the lacustrine Da'anzhai member in Yuanba Area, Northern Sichuan Basin. However, the test capacity of different wells is quite different (0.21-50.7×10,000 cubic meters per day). In this paper, the main controlling factors for the enrichment and high-yield of the shale gas in Da'anzhai member in Yuanba area were studied by organic geochemistry, X-ray diffraction, helium porosimeter, scanning electron microscopy, micro-CT, and methane isothermal adsorption. The results show that the total organic matter(TOC) of the shale averages 0.83%, the type III is dominant, and  $R_o$  averages 1.62%; The shale has good physical properties, average porosity is 4.06% and average permeability is 2.26md. It develops clay mineral pores, organic pores and brittle mineral pores and nano-micro multi-scale micro-fracture, Micron CT experiments showed that the porosity of micro-fractures averaged 0.82% and its contribution to porosity averages 21%; The total measured gas content of shale is 1.23m<sup>3</sup>/t on average, and the loss gas is about 68%. Using the Langmuir equation and the real gas state equation, the free gas is about 80% and the adsorbed gas is about 20%. According to the analysis, the shale gas enrichment and high-yield in the Da'anzhai member is mainly controlled by sedimentary facies, micro-fractures and preservation conditions: The shallow lake to semi-deep lake facies organic-rich shale is the basis of shale gas enrichment. The development of multi-scale micro-fracture is an important condition for high-yield of shale gas. Preservation conditions are an important guarantee for shale gas enrichment and high-yield and established a

shale gas enrichment and high-yield model in the Da'anzhai member in this area.

*Key words: Yuanba area, Da'anzhai member, shale gas, enrichment, high-yield, main controlling factors*

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