

Comparison Study of Pore Properties of the Unconventional Gas Reservoir of the Longtan Formation in the Pu'an Area of Guizhou Province: A Case Study of Well Qianpudi-1

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Abstract: The development of pores of the reservoir have very important influence on migration and occurrence of the unconventional gas in the coal-measure facies. The nitrogen isothermal adsorption and mercury injection experiments have been undertaken to perform a comparative study on the pore properties of coals, shales, and sandstones, collected from the Well Qianpudi-1, of the Longtan Formation in this paper. This study shows that the average porosity ratio among the coal, shale, and sandstone is 1: 0.176: 0.249, with typical characteristics of low porosity and permeability. The mercury injection experiment study finds that the pore diameter and penetrating quality of the coal are respectively bigger and better than those of the shale and tight sandstone. In addition, the analytical results of the Nitrogen isothermal adsorption experiment also show that the pore diameter of the coal is obviously bigger than those of the shale and tight sandstone, with even bigger pore volume in the coal. The nitrogen isothermal adsorption curves of all samples are generally shown as the reversed S-shape curves. The capillary condensation occurred in the process of nitrogen adsorption. The pores of samples pore are open. The pore structure has certain irregular pore characteristics, which mainly consists of two open cylinder holes at both ends and parallel plate holes around. Moreover, the pores in each pore size stage are relatively developed and have good connectivity, which is conducive to natural gas migration.

Keywords: The unconventional gas in the coal-measure; the Longtan Formation; gas reservoir; Well Qianpudi-1; the mercury injection experiment