
Paleoenvironmental characteristics of the Jiusi Formation and potential for shale gas exploration of Zhaotong shale gas demonstration zone, southwest of China

Wang Pengwan, Li xianjing, Huang Lin, Jia dan, Ma Liqiao

(1. PetroChina Hangzhou Institute of Petroleum Geology, Hangzhou, 310023, China)

Abstract: Silurian shale gas has been commercially extracted Zhaotong shale gas demonstration area, in order to realize the sustainable development of this place and search for new potential target strata of shale gas, well A targeted at the carboniferous Jiusi formation shale gas exploration was deployed and implemented to explore the gas content of Jiusi formation shale gas. Based on the systematic testing of organic carbon, major content, trace amount and rare earth elements in well A, combined with petrology, biological relic fossil characteristics and chromatography-mass spectrometry, the geochemical characteristics of elements in Jiusi formation in well A were analyzed, and the REDOX conditions in Jiusi sedimentary stage were identified, revealing the sedimentary environment for the development of black shale. The research results show that the petrological characteristics, major, trace and rare earth elements of Jiusi formation in A well of Zhaotong shale gas demonstration area are quite different from those of Wufeng formation and Longmaxi formation. The organic carbon content of Jiusi group in well A drilling is relatively high, with an average value of 1.13%, and the TOC content is not strongly correlated with depth. The content of Al_2O_3 in the main elements of Jiusi formation is high, mainly calcareous shale and clayey shale. The REDOX indexes such as trace elements and rare earth elements indicate that the depositional stage of the Jiusi formation was a relatively oxygen-rich environment, which was mutually verified with the content of TOC. Chondrites combination fossil and shale chromatogram mass spectrum characteristics in the gray mudstone of the Jiusi formation also reveal that the Jiusi formation developed in the paleosedimentary environment of the transition facies of sea and land, and its paleoproductivity was lower than that of the Wufeng formation and Longmaxi formation, and the abundance of organic matter in the Jiusi formation was relatively low. Field gas content test proves that Jiusi formation in Zhaotong shale gas demonstration area has good potential for shale gas exploration.

Key words: Zhaotong shale gas demonstration area, Jiusi Formation, Geochemical characteristics of elements, paleosedimentary environment, organic matter enrichment