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库车坳陷中侏罗统页岩气地质特征及有利区预测

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Geological Features and Favorable Area Prediction of the Mid-Jurassic Shale Gas in Kuqa Depression

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摘要/Abstract

摘要 :

库车坳陷中侏罗统发育富有机质的煤系烃源岩和湖相泥页岩,具有良好的页岩气勘探前景,综合运用有机地球化学、岩石学和等温吸附等分析测试手段,系统分析库车坳陷中侏罗统富有机质泥页岩分布特征、有机地球化学特征、储层特征和含气性,初步优选了页岩气富集有利区。库车坳陷中侏罗统陆相泥页岩厚度较大,有机质类型以II<sub>2</sub>-III型为主,总有机碳含量平均值约为3.1%,镜质体反射率多介于0.5%~1.6%之间,具有良好的页岩气生成条件。矿物组成主要为石英和黏土矿物,黏土矿物以伊利石和伊/蒙混层为主。孔隙度介于0.5%~7.3%之间,渗透率多小于0.1×10<sup>-3</sup>μm<sup>2</sup>,属于低孔超低渗透层。储集空间主要包括纳米—微米级矿物基质孔、有机质微孔、构造微裂缝和成岩微裂缝等类型。最大吸附气量多介于0.5~8m<sup>3</sup>/t之间,含气性主要受有机碳含量和矿物成分的影响。综合分析得出克拉苏构造带北缘和依奇克里克构造带克孜—依西地区是库车坳陷中侏罗统陆相页岩气富集有利区。

关键词: 页岩气, 地质特征, 有利区, 中侏罗统, 库车坳陷

Abstract:

The Mid-Jurassic organic-rich coal-bearing source rocks and lacustrine shale developed in the Kuqa Depression are identified as potential exploration target for shale gas. The methods of organic geochemistry, petrology and tests were applied to conduct a comprehensive analysis on the organic-rich Mid-Jurassic shale distribution features, organic geochemical characteristics, reservoir characteristics and gas bearing, and the favorable areas for shale gas was also discussed. The Mid-Jurassic continental shale in the Kuqa Depression is widely distributed with great thickness and burial depth, kerogen of type II<sub>2</sub>-III, high TOC content with an average value of 3.1%, R<sub>o</sub> of 0.5%-1.6%, and is of great shale gas generation potential. The Mid-Jurassic shale is mainly composed of quartz and clay minerals dominated by illite and I/S mixed-layers. The shale is typical tight reservoir characterized by low porosity of 0.5%-7.3% and ultra-low permeability smaller than 0.1×10<sup>-3</sup>μm<sup>2</sup>. The nano-micron mineral matrix pores, organic pores, structural fractures and diagenesis fractures are mainly developed. The maximum methane adsorption capacity varies from 0.5m<sup>3</sup>/t to 8m<sup>3</sup>/t which has positive correlation with TOC and total clay mineral content. The northern margin of Kelasu Structural Belt and Kezi-Yixi area of Yiqikelike Structural Belt are considered as favorable areas for Mid-Jurassic shale gas accumulation.

Key words: Shale gas, Geological feature, Favorable area, Mid-Jurassic, Kuqa Depression

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