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陆相页岩热演化与甲烷吸附性实验研究

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Experimental Study of the Impact on Methane Adsorption Capacity of Continental Shales with Thermal Evolution

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摘要/Abstract

摘要 :

为揭示热演化过程中地质因素演变对页岩甲烷吸附能力的影响,选择鄂尔多斯盆地东南部延长组长7段张家滩页岩为研究对象,经过热模拟实验获得7个不同模拟埋深的模拟样品,对各样品的有机地球化学参数、矿物组成、孔隙结构以及甲烷吸附量进行测试分析。研究发现,热演化过程中影响页岩甲烷吸附能力的地质因素可以分为比表面积和孔隙等物性因素、TOC值和成熟度等有机地球化学因素以及黏土矿物和伊/蒙混层含量等矿物成分因素等3类。地质因素对于页岩吸附能力的影响是复杂的,综合考虑各因素会增加其与吸附量的相关性。微孔是影响页岩甲烷吸附能力的最重要的因素,两者呈正相关。由于有机质热演化产生的微孔增加了吸附空间,所以吸附量随TOC值的降低而增加。此外,页岩埋深与其吸附能力负相关,且埋藏越深吸附能力下降越快。

**关键词:** 热演化, 甲烷吸附, 影响因素, 陆相页岩, 鄂尔多斯盆地

**Abstract:**

In order to reveal methane adsorption capacities influenced by the geological factors in the process of thermal evolution,a shale sample of the Yanchang Formation Chang 7 member in southeastern Ordos Basin was collected to get 7 different simulation burial depth samples through the thermal simulation experiment.The organic geochemical parameters,mineral composition,pore structure and methane adsorption capacities were measured.According to this study,the influence factors on methane adsorption capacity with thermal evolution can be divided into three kinds:Physical factors such as specific surface area and pore diameter,organic geochemical factors such as TOC and thermal maturity,and mineral composition factors such as clay minerals and andreattite.Geological factors have intricate impacts on the methane adsorption capacity and the consideration to combine each factor together may increase the relevance of the adsorption amount and influence factors.Micro-pore,which is the most important factor,has a positive correlation with the methane adsorption capacity.The adsorption quantity increases with the decrease of TOC due to the thermal evolution of organic produced micro-pores that increases the adsorption space.In addition,the adsorption capacity of the shale has a negative correlation to the burial depth,and the deeper it buried the faster the adsorption capacity decreased.

**Key words:** Thermal evolution, Methane adsorption, Influence factors, Continental shale, Ordos Basin

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