

论文

煤层气/页岩气开发地质条件及其对比分析

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摘要:

从煤层气、页岩气基本概念入手, 系统分析了煤层气/页岩气开发地质条件, 主要包括成藏地质条件、赋存环境条件和开发工程力学条件3个方面, 进一步对煤层气/页岩气开发地质条件进行了对比分析, 揭示了煤层气/页岩气开发地质条件的共性和差异性。煤层气/页岩气赋存于煤层/页岩中的一种自生自储式非常规天然气, 其富集成藏主要取决于“生、储、保”基本地质条件是否存在、质量好坏以及相互之间的配合关系。在一定埋藏深度范围内煤层气/页岩气都发生过解吸-扩散-运移, 并普遍存在“垂向分带”现象, 有机质演化程度越高解吸带深度越小, 风化带越深解吸带深度越大, 解吸带内煤层气/页岩气富集在一定程度上服从于常规天然气的构造控气规律; 原生带内煤层气/页岩气富集却可能更多地受控于煤储层/页岩层的吸附特性。不同赋存环境条件下所形成的煤/页岩储层差异性大, 使煤/页岩储层中吸附气和游离气相互转化, 导致煤层气/页岩气成藏类型、规模和质量等方面的差异性。影响煤层气开发的主要地质因素有: 煤层厚度及其稳定性、含气量大小或煤层气资源丰度、构造及裂隙发育与渗透性和煤层气保存条件等方面; 影响页岩气开发的主要地质因素包括页岩厚度、有机质含量、热成熟度、含气量、天然裂缝发育程度和脆性矿物含量等。

关键词: 煤层气 页岩气 开发地质 对比分析

Geological conditions of coalbed methane and shale gas exploitation and their comparison analysis

Abstract:

ased on the basic conceptions of coalbed methane (CBM)/shale gas, the geological conditions of coalbed methane/shale gas exploitation are systematically analyzed, which mainly includes the following three aspects: the geological conditions of reservoir formation, the conditions of occurrence environment and engineering mechanics conditions of exploitation. Furthermore, the geological conditions for extracting coalbed methane and shale gas are comparatively analyzed. The similarities and differences of the geological conditions between coalbed methane and shale gas are also revealed. Coalbed methane/shale gas is a kind of unconventional natural gas which is self-generated and self-stored in coal seam/shale. Their enrichment accumulations depend primarily on the existence and the quality of basic geological conditions of source-reservoir-preservation as well as their mutual cooperative relations. All coalbed methane/shale gas within a certain burial depth have undergone desorption-diffusion-migration process, and the phenomenon of vertical zoning exists universally. The higher evolution degree of organic matters, the smaller the depth of desorption zone, while the deeper of weathered zone, the greater depth of desorption zone. The enrichment of the coalbed methane/shale gas in the desorption zone to a certain extent complies with the rules of structure controlling gas accumulation in the conventional natural gas accumulation; whereas the enrichment of the coalbed methane/shale gas in the primary zone is more controlled by the characteristics of coal seam/shale's adsorption. The coal/shale reservoir varies from occurrence environment conditions, on which adsorbed gas and free gas in coal/shale reservoir transforms into each other, which results in the differences of the coalbed methane/shale gas in reservoir type, scale, quality and other aspects. The main geological factors affecting the CBM development are coal seam thickness and its stability, gas content or resource abundance of CBM,

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structure and fracture, permeability and preservation conditions of CBM, etc. The main geological factors affecting the development of shale gas include shale thickness, organic matter content, thermal maturity, gas content, nature fracture and brittle mineral content, etc.

Keywords: Coalbed methane; shale gas; exploitation geology; comparison analysis

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