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Accumulation Dynamics Mechanism and Gas Origin of Coalbed Methane in Huainan and Huaibei Coalfields, Eastern China

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Coalbed gas or coalbed methane as a clean nonconventional natural gas has been caused a widely attention in the world. Although there were many countries engaging in the coalbed gas exploration and development, only few countries, such as America, Canada and Australia have achieved commercialized development. Based on the coalbed gas genetic type, the basins in these countries can be divided into two types: one is the basins mainly in biogenic gas, such as Power River basin, Surat basin and Alberta basin; the other is mainly in thermogenic gas basins, such as San Juan basin and Qinshui basin. Recently, mixture gas with biogenic and thermogenic gases is gradually discovered in many basins or coalfields in the world (Tao et al., 2007).

CBM origin and CBM accumulation dynamic mechanism are the most important research content in CBM region. Scott et al. (1994) presented the concept of secondary biogenic gas and divided the coalbed gas generation stage into three types: primary biogenic gas, secondary biogenic gas and thermogenic gas when they researching the distribution regularity of coalbed in overpressure zone at San Juan basin. As for distinguishing the CBM origin, Whiticar et al., (1986) proposed that $\delta^{13}C$ and δD of methane, $\delta^{13}C$ of ethane, $\delta^{13}C$ of propane and $\delta^{13}C$ of carbon dioxide were the most important indexes for dividing the CBM origin. Tectonic condition, burial depth, coal rank, coal thickness, gas content, permeability, reservoir pressure, desorption pressure and hydrogeological conditions are the main factors controlling CBM enrichment and accumulation (Gayer and Harris, 1996). While tectonism is the most important and direct factor for it controlling not only the formation and evolution of basin, but also every process in gas generation, accumulation and lost.

Huainan and Huaibei coalfields, located in the eastern China, have suffered multiple stages of tectonic and thermal activities since the late Paleozoic. The CBM origin and accumulation process was complex in this region. Based on the analysis of gas composition and carbon and hydrogen isotopic compositions in Xinji, Panji and Zhangji mining areas of Huainan coal field, Linhuan and Luling mining areas of Huaibei coal fields, the gas origin and accumulation mechanism under thrust-nappe structure were studied. Results show that CBM in these mining areas are all mixed CBM, while the main gas composition is biogenic CBM in Xinji, Panji, Zhangji and Luling mining areas, the main thermogenic CBM in Linhuan mining area. The CBM enriching area located in top structure and water convergence area in Huainan and Huaibei coalfields. The gas was preserved by hydraulic seal or fault shield, containing unsaturated thermogenic CBM and complemented secondary biogenic CBM.

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