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Effects of geological pressure and temperature on permeability behaviors of middle-low volatile bituminous coals in eastern Ordos Basin, China

Shuang Wu ^{a,b}, Dazhen Tang ^{a,b*}, Song Li ^{a,b}, Haiyong Wu ^{a,b}, Wenqing Liu ^{a,b}

^a*School of Energy Resources, China University of Geosciences (Beijing), Beijing 100083, China*

^b*Coal Reservoir Laboratory of National Engineering Research Center of Coalbed Methane Development & Utilization, Beijing 100095, China*

*Corresponding author: Dazhen TANG. School of Energy Resources, China University of Geosciences (Beijing). NO.29 Xueyuan Road, Haidian district, Beijing 100083, P.R.China.

Tang@cugb.edu.cn

Abstract

Coal permeability is of great importance for coalbed methane (CBM) development from coal reservoirs. The abundant CBM resource in middle-low volatile bituminous coals in the eastern margin of Ordos Basin has necessitated study on seepage features of these coal reservoirs. In order to better understand the control mechanism of geological pressure and temperature on coal permeability, this paper systematically addressed the permeability behaviors of different middle-low volatile bituminous coals from eastern Ordos Basin with different gases (helium and nitrogen) under various pressures and temperatures. The results show that the permeability decreases exponentially over effective stress. Coals with a great proportion of macro- and mesopores have a higher permeability level and a faster permeability decreasing rate to effective stress than coals with micro- and transition pores in majority. Under a constrained state, the permeability decreases over temperature because of the interaction between thermal stress and interior stress inside coal body. When the temperature is quite high, the permeability sensitivity to

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