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综述与评述

煤中矿物/金属元素在生气过程中的催化作用

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摘要：

传统煤化作用理论认为，煤层气生成是煤中有机质在地层温度/压力或微生物作用下发生降解或裂解的结果，近年来国内外相关研究成果却对这一传统理论提出了重大质疑。为此，从沉积有机质中具有催化作用的矿物/金属元素、催化模拟实验与其结果表征、催化作用机制3个方面，总结了国内外关于有机质催化生气作用研究的进展，讨论了本领域今后研究工作的重点和发展方向。认为在模拟煤中有机质的矿物/金属元素催化生气时，应考虑有机质和无机质之间的相互作用，兼顾矿物与矿物之间的反应，使之尽可能接近于真实的地层条件; 以地质学和化学两大学科的理论为基础，借鉴化工界研究成果，在微观层面上深入研究煤中有机质—无机质作用的态—态催化作用、选键催化作用和微观反应机理。建议重视煤岩学、煤中矿物学、煤无机/有机地球化学与催化化学的综合研究，探究煤中矿物/金属元素催化生气的实质，寻找催化生气的判识标志，针对具体对象建立定量的催化反应速率数学模型和催化生气产率数学模型。

关键词： 煤层气成因 矿物 金属元素 催化作用

Catalysis of Mineral/Metal Elements during Coal Bed Gas Generation

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Abstract:

It is traditionally assumed that the Coal Bed Gas (CBG) formation is the effect of thermolysis (cracking) of the bulk coal organic matter by stratum temperature/pressure or animalcule. However, some researchers have debated the validity of that view. The advances in research on CBG catalytic generation are selectively summarized in three aspects: The minerals/metal elements as the gas generation catalyzer; the catalytic simulated experiment and its results token; the catalysis mechanism. Then the research emphases and development direction are discussed. The reaction under geological condition is more complicated than the lab condition. Therefore, during the gas generating simulation process, we should not just study the effect of some natural minerals but also consider the reaction between organic and inorganic and the effect during the different inorganic minerals in the idiographic geological condition, and try best to make the condition close to the actual stratum condition. It is advised that based on geology and chemistry, the results of chemical industry be used to investigate the microcosmic state state and bond selective catalysis between organic and inorganic matters. Importance should be attached to the integration of coal petrology, mineralogy in coal, coal organic and inorganic geochemistry, catalytic chemistry to explore the catalysis essential of mineral/metal elements, and to search the catalytic symbol aiming at the idiographic object to set up quantificational catalytic reaction speed and gas productivity math model.

Keywords: Coal bed gas origin; Mineral; Metal elements; Catalysis

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