

AAPG HEDBERG CONFERENCE
“NATURAL GAS GEOCHEMISTRY: RECENT DEVELOPMENTS, APPLICATIONS, AND
TECHNOLOGIES”
MAY 9-12, 2011 – BEIJING, CHINA

Shale Gas: A New Clean Gas Resource, Potential and Challenge

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Shale gas is a new emerging natural gas resource, which can only be commercially produced through artificial fracturing with large-scale. It is also a new kind of clean energy coming up recently and has been successfully developed and utilized in the United States. This paper offers a brief introduction to the forming conditions and basic characteristics of shale gas.

The forming conditions of shale gas are influenced by various factors. The shale generally has high organic matter abundance, high thermal maturity, high quartz content, high brittle, and high Gas In Place (GIP). The mode of occurrence of shale gas can be divided into two main types, one is free gas and adsorbed gas, the other is deep shale gas, which is mainly formed by oil cracking. It is apparent that shale gas generated from Type I and Type II₁ organic matters has the highest value in economic property, the reason lies in the fact that oil-prone organic matters with high hydrogen content generate much more liquid hydrocarbons that can be cracked into gas in high maturity, which greatly enhances its resource potential and economic value (Fig.1).

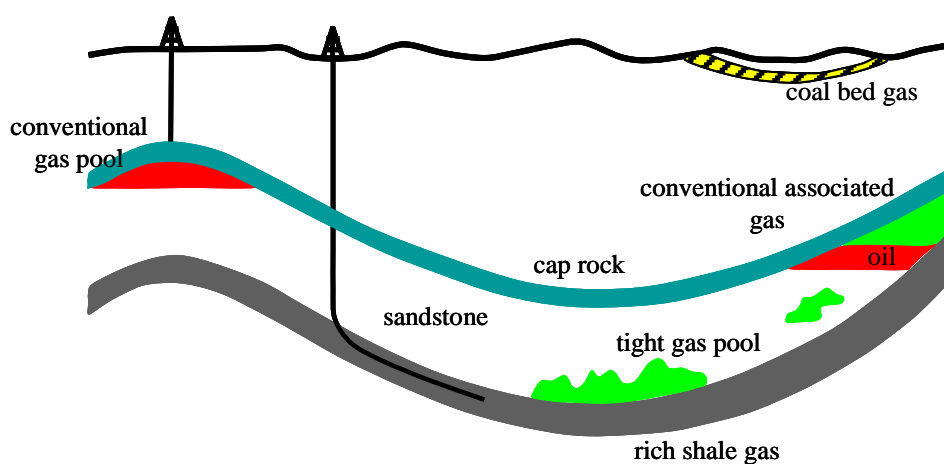


Fig1. Schematic diagram of profile distribution of shale gas.

Shale gas reservoir with industrial value shows the following five characters. They are a continuous deposition of thick layers of shale with high organic matter abundance, a core region exists in shale zone that is rich in gas, some amount of porosity in the shale, considerable scale of stable distribution area, and one process of uplift after deep bury.

The study of comparison on the similarity and difference between shale gas and *natural gas relaying generation model* (abbreviated as *relay model*) is also carried out (Fig.2). It is clear that both the relay model and shale gas are emphasized on the homology of natural gas derived mainly from the cracking of liquid hydrocarbons retained in the source rocks. However, the relay model is proposed much earlier than shale gas in the following aspects: paying attention on the dispersed liquid hydrocarbons retained in the shale as source materials generating natural gas, dominant cracking window of oil to gas, and the potential and effectiveness of conventional natural gas accumulations contributed by dispersed liquid hydrocarbon cracking within the source rocks. Therefore, the relay model is more significant in expanding the natural gas exploration in China. In addition, this paper also discusses the development status of natural gas in China's future energy consumption. It is strongly believed that the natural gas resources with several origins are abundant in China, and the gas production will high possibly exceed crude oil in the next 20-year period. Both conventional and unconventional natural gases(including shale gas) will no doubt playing key role as the clean energy to improve energy consumption structure and realize the low-carbon economy.

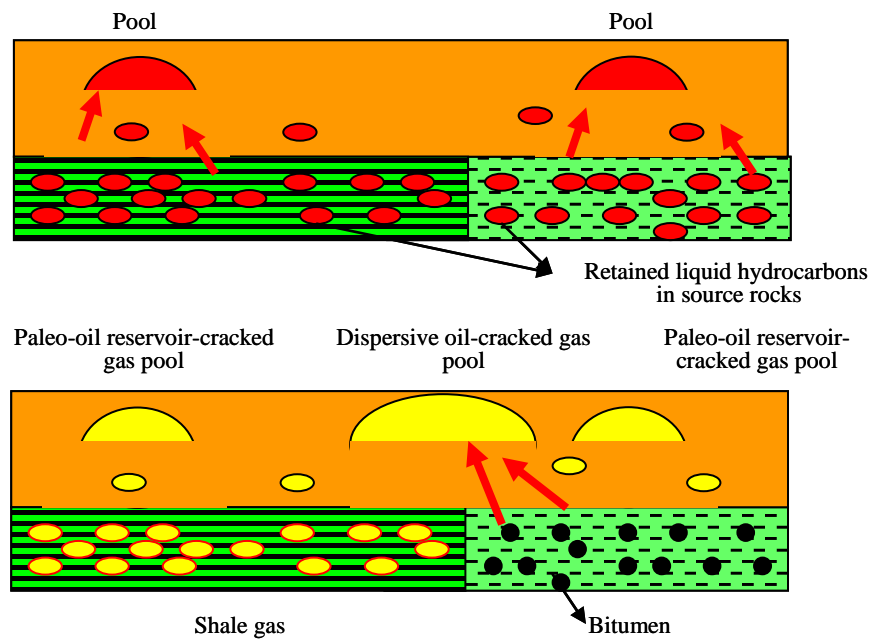


Fig2. Comparison of similarity and difference between shale gas and natural gas relaying generation model.