

# **The Authigenetic Mineral Association Succession of Dawsonite-Bearing Sandstones of the Cretaceous Quantou Formation in South of Songliao Basin , NE China : The displacement of Oil by mantle CO<sub>2</sub>**

MIAO. YU<sup>1\*</sup>, LI. LIU<sup>1</sup>, NA. LI<sup>1</sup>, FULAI. LI<sup>2</sup>  
AND SHUANG ZHAO<sup>1</sup>

<sup>1</sup>College of Earth Sciences, Jilin University, Changchun,  
130061, China (\*correspondence: Yumiao0950@163.com)

<sup>2</sup>China University of Petroleum, Qingdao, 257061, China

Dawsonite ( NaAlCO<sub>3</sub>(OH)<sub>2</sub> ) ,as a tracer mineral of CO<sub>2</sub> migration and accumulation on geological scale , is a carbonate mineral contain sodium and aluminium and formed under the condition of high CO<sub>2</sub> partial pressure. This means the dawsonite-bearing sandstone could serve as an idealized, natural laboratory for studying fluid evolution of CO<sub>2</sub> basin and the mineral trapping of CO<sub>2</sub>. Dawsonite is abundant in the sandstone of the Cretaceous Quantou Formation in southern Songliao Basin, which provides a good geologic basis for this study.

In this research, observation of polarizing microscope, scanning electron microscope and fluid inclusions have been taken on 32 sandstone samples from 4 wells. The result indicated that the paragenetic sequence of authigenetic minerals is as follows: clay, quartz overgrowth, dawsonite, calcite and ankerite. The overgrowth quartz is easily observed and contains abundant brown-dark brown primary hydrocarbon fluid inclusions in the shape of oval or irregular with the size of 4–15µm, revealing light yellow to pale yellow-green light under the UV fluorescence. Dawsonite occurs as foliated columnar or radial cluster, chrysanthemum and randomly oriented fibers, is the most abundant authigenetic mineral and filling in intergranular pores as cement or replacing the earlier quartz overgrowth.

Diagenetic sequence and fluid inclusion observation indicate dual infilling of early hydrocarbon and late CO<sub>2</sub> exists in the studying area. Na Liu(2009) and Jinxing Dai (1995)'s conclusions of inorganic magmatic origin of CO<sub>2</sub> provide further evidence for the determination of the timing of charging events. And the influx of later mantle CO<sub>2</sub> could possibly lead to a property change and redistribution of crude oil, which provides new insights for oil and gas exploration.

This research was financially supported by Key Development Plan of Science and Technology Project of Jilin Province in China (20110426) and the Science and Technology major Projects of China (2011zx05016-002).