

**Bitumen in dawsonite-bearing
sandstones of Honggang,
Southern part of Songliao Basin,
NE China--A product of
Petroleum Displacement by
Inorganic CO₂**

NA LIU, LI LIU*, LEI YU

College of Earth Sciences, Jilin University,
Changchun 130061, China

[*correspondence:liuli0892@vip.sina.com]

Bitumen, with the content between 0.65% and 7.20%, developed well in the dawsonite-bearing sandstones of the Qingshankou Formation in Honggang Oil Field, south of the Songliao basin. Bitumen occurs usually in the residual pores left by feldspar, or in the inner-crystal of the radial dawsonite assemblages; some other parts of the bitumen as the veins present in the crack. Paragenetic sequence of the dawsonite-bearing sandstone show that bitumen formed later than dawsonite and other authigenic minerals.

Fluid inclusions recorded two generations of hydrocarbon injection in Honggang Oil Filed. The first one normally grew in detrital quartz or inside quartz overgrowth, with the groups appearing as discontinuous belt, the homogenization temperatures ranged from 70°C to 90°C. The second one was lying outside of quartz overgrowths, or in calcite and dawsonite, the homogenization temperature was 100~120°C. CO₂ flooding occurred just between the two generations of hydrocarbon injection. Currently, dawsonite is used as a trace mineral for CO₂ migration. Therefore, the occurrence of bitumen, growing in the dawsonite assemblages, suggests that the formation of bitumen was later than CO₂ flooding.

The bitumen might be a product of petroleum displacement by inorganic CO₂. The evidences are: i) CO₂ was found in the oil-associated gas of the well H73, with the $\delta^{13}\text{C}(\text{PDB})$ lies in the ranges of -5.32 ~ -5.80(‰), implying that inorganic CO₂ once dissolved in the crude oil. ii) There is a weak positive association between the contents of dawsonite cements and the bitumen, which distributed in both oil and dry layers. Apparently, a genesis relationship should exit between the bitumen and the CO₂ contributing to dawsonite precipitated. iii) The fluid inclusions, developed in the micro-fractures of detrital quartz and quartz overgrowths, were detected to be contained with gas CO₂, liquid CO₂, CO₃²⁻ and CH₄, indicating that an extraction for hydrocarbon occurred during CO₂transgression.

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