

## **Effects of hydrocarbon emplacement on the cementation of the Eocene Shahejie formation sandstone reservoirs in the Chexi area, Bohai Bay Basin, Eastern China**

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Diagenesis progress alternately with hydrocarbon emplacement in sandstone reservoirs, resulting in an extremely complex reservoir-quality evolution. The influence of hydrocarbon emplacement on the cementation of sandstone reservoir is still debated. Microscopy, cathodoluminescence, SEM, stable carbon and oxygen isotopes, and fluid inclusion analyses have been used on 16 representative samples which were selected based on different oil saturation (oil saturation, oil immersion, oil patch, fluorescence and no show) to determine the influence of hydrocarbon emplacement on the cementation of the Eocene Shahejie formation sandstone reservoirs in the Chexi area, Bohai Bay Basin, Eastern China. Two episodes of hydrocarbon emplacement events were identified. The first oil charged during 28-25 Ma ago, and the second within 15-0 Ma. Three phases of carbonate cementation and quartz cementation were identified according to their relationships with comprehensive analysis and hydrocarbon emplacement events. Oil inclusions formed during the first stage of hydrocarbon emplacement were found trapped in quartz overgrowth or detrital quartz/quartz overgrowth boundary, indicating that the first phase hydrocarbon emplacement did not effectively inhibit the early quartz cementation. Large-scale hydrocarbon emplacement occurred in the second stage, with high oil saturation, and oil fluid inclusions mostly developed in the quartzose grain cracks, late quartz cementation was weak, indicating that the filling in the second stage effectively inhibited late quartz cementation. Samples with high oil saturation had low carbonate cements while the contents of carbonate cements were higher in samples with low oil saturation. Low oil saturation in early emplacement did not effectively inhibit the early carbonate cementation, thus the contents of carbonate cements were higher in samples with low oil saturation, which was not propitious to late oil charging. The cementation was mainly dominated by ankerite in the samples associated with high oil saturation. Therefore, ankerite may be good mineralogical signatures of oil charging and migration.