Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.27748

Evolution of diagenesis fluid and geochemical characteristics of ultra-deep tight gas reservoir--a case of Cretaceous Bashijiqike in Kuqa depression of the Tarim basin, China

ZHANG RONGHU SR.

PETROCHINA HANGZHOU RESEARCH INSTITUTE OF GEOLOGY, Petrochina Hangzhou Research Institute of Geology

The ultra-deep reservoirs in Kuqa foreland thrust belt are very important target for gas exploration and development at present. To elucidate the diagenetic fluid types and geochemical characteristics of the Cretaceous Bashijiqike reservoir, this paper is based on the analysis of electron microprobe composition, inclusions homogenization temperature, X-ray diffraction, scanning electron microscope, confocal laser scanning microscope, casting thin sections, salinity and vapor composition, laser carbon and oxygen isotope of diagenetic mineral, and regional geological background. Results indicated that the crystalline dolomite cement has low concentration of Sr, high concentration of Mn and higher carbon isotope, showing the crystalline dolomite is affected by meteoric fresh water, associated with the tectonic uplift of late Cretaceous. Little changed $\delta^{13}C$ and negative deviated $\delta^{18}O$ with increased diagenesis and combining with the differentiation of the concentration of Fe and Mn, the diagenetic fluid of the vein dolomite cement is homologous with the diagenetic fluid of thecrystalline dolomite cement, temperature and depth are the dominant factors of differential precipitation between these two carbonate cements. Anhydrite cements have high concentration of Na, extremely low concentration of Fe and Mn content. Based on these dates, anhydrite cements can be thought to be related to the alkaline fluid overlying gypsum-salt layer produced by dehydration. The barite vein has abnormally high concentration of Sr, ultra-high homogenization temperature and high-density gas hydrocarbon inclusions, which is speculated to be the forward fluid by intrusion of late natural gas. Coexistence of methane inclusions with CO_2 gas proves existence of acid water during the accumulation of natural gas in the late stages. Therefore, the alkaline environment and associated diagenesis between the meteoric fresh water in epigenesist and carbonic acid in the late diagenesis have dominated the process of diagenesis and reservoir, the secondary porosity and fracture zone formed by gas accumulation is a favorable play for the exploration of ultra-deep reservoirs. Clay mineral content is 5-12% composed by illite and illite-montmorillonite mixed-layer mainly and chlorite secondly Fig.1,Fig.2 .The characteristics and distribution of clay minerals with great geological significance to evaluate the sandstone reservoir properties and to predict the distribution of favorable reservoirs.