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鄂尔多斯盆地北部杭锦旗区块下石盒子组自生石英形成机制

The genetic mechanism of authigenic quartz in Lower Shihezi Formation of Hanggin Banner, northern Ordos Basin

中文关键词: 自生石英 胶结作用 杭锦旗区块 硅质来源 鄂尔多斯盆地

英文关键词: autogenetic quartz cementation Hanggin Banner area origin of quartz cement Ordos Basin

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中文摘要:

通过观察石英阴极发光颜色、扫描电镜及偏光显微镜下颗粒的微观特征，同时结合自生矿物的宏观分布特点及硅质来源阶段分析，发现鄂尔多斯盆地北部杭锦旗地区下石盒子组砂岩储层中石英硅质来源包括长石溶蚀、粘土矿物的转化及压溶作用，且以前两者为主；硅质运移及沉淀机制分析认为，长石溶蚀和粘土矿物蚀变形成的硅质以层内流体平流携带和扩散运移为主，压溶作用产生的硅质在颗粒表面沉淀或与蚀变提供的硅质来源混合发生运移；酸性流体侵入产生的pH值变化是控制石英沉淀的主要因素，温度、压力以及油气的充注对石英沉淀影响很小。

英文摘要:

The cementation of quartz is one of the very common and important diagenetic actions in sandstone reservoirs. A thorough study of the characteristics and formation mechanism of autogenetic quartz is therefore an indispensable means in revealing the reservoir characteristics, analyzing the evolution of diagenesis, and forecasting and evaluating the reservoir. According to the formation mechanism of serrated edges and the microscopic features of quartz in Lower Shihezi Formation and underlying Shanxi Formation, the authors found two corrosions and one overgrowth, with the corrosions taking place respectively before and after the overgrowth. The dissolution of feldspar is considered to be one of the main siliceous sources on the basis of the dissolution theory of feldspar and the residual structural analysis. The distribution of authigenic minerals is characterized obviously by the gradual upward decrease of quartz, the positive correlation with authigenic calcite and kaolinite, and the negative correlation with illite. Therefore, the transformation of clay minerals is considered to be another main siliceous source. The Shanxi Formation microscopically has features of pressure dissolution. In combination with the cathodoluminescence features of the quartz, it is held that there exists the siliceous source of pressure dissolution, which, however, is not the main source. On the basis of the microscopic pressure solution in underlying Shanxi Formation and the cathodoluminescence features of quartz, the pressure solution is thought to serve as a minor siliceous source. The advection flow and the diffusion migration in the reservoir made up the main migration pattern for the silicon derived from the dissolution of feldspar and the transformation of clay minerals, whereas the silicon derived from the pressure solution migrated to pores by chemical potential between particles and pores and precipitated at the grain surface or moved in the mixed source. The change of pH resulting from the invasion of acid fluids was the main factor controlling silicon deposition, while the temperature, pressure and oil-gas filling had little effects and the wrapping action of clay minerals on the grain surface had no effects on quartz deposition.

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