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Silicification of Ordovician dolomite reservoirs, Tarim Basin, NW China

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The quality of Ordovician dolomite reservoirs in the Tarim Basin, NW China has been greatly impacted by the latest hydrothermal fluids related to faulting. The products of this diagenetic event are saddle dolomite, fluorite, chalcedony and euhedral quartz precipitated in pores and vugs. The chalcedony cement, lining in vugs and filled in fractures. The euhedral quartz crystals generally occur locally in pore and vug. Major and rare element data from chalcedony and quartz of Ordovician dolomite reservoir are consistent with hydrothermal diagenetic origin. The rare earth element of δEu anomaly both in chalcedony and quartz varies from 1.754 to 6.195, the highest is up to 22.608. the amount of δCe ranges from 0.397 to 0.743. the ratio of $\text{SiO}_2/\text{TiO}_2$ is about 2083 to 9574, the ratio of $\text{Al}_2\text{O}_3/(\text{Al}_2\text{O}_3+\text{Fe}_2\text{O}_3)$ ranges from 0.411 to 0.755. The homogenous temperatures of fluid inclusions from quartz range between 108°C and 169°C. The paragenetic relationship between chalcedony and quartz shows that the chalcedony often occurs as the first generation of cement in grainstone and the euhedral quartz as the second generation of cement with increasing crystalline size towards the pore center. Based on our observation of cores, the chalcedony and euhedral quartz occurs mainly in the fractures and vugs. The silicification of dolomite reservoir is interpreted to be related to hydrothermal fluids migrated along the faults and fractures.

