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Saddle dolomite cement in Upper Paleozoic clastic reservoir rocks from Ordos Basin and the effect on reservoir properties

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Dolomite cements within Upper Paleozoic sandstones in the Ordos Basin displays common saddle morphology features including wavy extinction. Saddle dolomite cements are abundant in Benxi Formation of Carboniferous age, and the Taiyuan Formation and the lower part of Shanxi Formation of Permian age, which formed in a marine environment. Mineralogy, petrology and geochemical characteristics of these dolomites may be helpful to identify the origins of the saddle dolomite, as well as the relationship between saddle dolomite and reservoir quality. Petrographic, chemical composition, stable (O,C) and radiogenic(Sr) isotope, cathodoluminescence image and XRD data suggest that: 1) The high Fe content (13 to 23 mol% $FeCO_3$) imply that these **dolomite**s can be defined as ankerites. 2) Quartz overgrowths in the **sandstone**s followed by saddle **dolomite** precipitation and the temperature of formation of saddle dolomite ranges from 80 to 120℃. 3) the $\delta^{18}O$ composition of the precipitating fluids varied between -6 and +3‰ SMOW, which indicates that the fluids responsible for precipitating of the saddle dolomite were slightly more saline than the value of Permian seawater. 4) Carbon isotopic analyses of these dolomites reveal that the inorganic carbon in seawater was the dominant source in the formation of saddle dolomites 5) Radiogenic $^{87}Sr/^{86}Sr$ ratios for **saddle dolomite**（0.707116-0.725223）suggests the participation of some radiogenic Sr, which was derived from fluids that had interacted with the clastic rock of the Upper Paleozoic itself. 6) Where saddle dolomite is not the abundant diagenetic constituent (about <5 bulk vol.%), it may have contributed to the preservation of porosity and the formation of saddle dolomites is a retention process. Otherwise, the process of saddle dolomite development is a destructive process, thus its effect on reservoir quality may be negative.