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Dolomitization of the Lower Cambrian Longwangmiao Formation in the Anyue Giant Gas Field, Sichuan Basin, China

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The reservoirs of the Anyue Giant Gas Field, the largest marine gas field in China to date [1], are mainly the Lower Cambrian Longwangmiao Formation dolomites. The XRD, trace elements, rare earth elements (REE), carbon and oxygen isotopic compositions and strontium isotopes were analyzed to characterize the petrological and geochemical characteristics and discuss the dolomitization of the Lower Cambrian Longwangmiao Formation in the Anyue Giant Gas Field, Sichuan Basin. The analytical results of the dolomite samples demonstrate that the Longwangmiao Formation has a high content of dolomite, with an average value of 99.75%; the order degree values of the dolomites are relatively low, range from 0.53-0.69, with the average value of 0.63; the Mgo content of the dolomites ranges from 19.98%-24.66%, average of 21.94%, while the Cao content is 25.55%-29.81%, average of 28.94%, and the Mg/Ca values are very high, with the average value of 1.06; the dolomites are characterized by relatively high Fe, Mn, Na content and low Sr content; the dolomites have very low REE content and similar REE distribution patterns, which are generally characterized by enrichment of light REE, losses of heavy REE and obviously negative anomaly of Eu; most of the $\delta^{13}C$ values and $\delta^{18}O$ values of the dolomites are relatively heavier than those of the coeval seawater[2], showing the character of evaporative water body under arid climate; and most of the $^{87}Sr/^{86}Sr$ values of the dolomites are significantly higher than those of the coeval seawater. Combined with the geological settings and geochemical characteristics of the dolomites, the Longwangmiao dolomites probably underwent the seepage reflux dolomitization during the early diagenesis, which could extensively preserve the pre-existing pores, and the burial dolomitization in the buried environment , respectively.

[1]Zou et al(2014). PETROL EXPLOR DEV+, 41: 278-293.
[2]Keith &Weber (1964). GCA, 28, 1787-1816.