

THE STUDY ON CHARACTERISTICS AND ORIGIN OF GAS IN MARINE BASIN, CHINA

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Sichuan Basin, Ordos Basin and Tarim Basin are the most important marine basins in middle-western china. Marine deposition has been continuing from Proterozoic era till the late Permian stage. The three basins enrich in gas resources, but have distinct feature separately. In Tarim Basin, oil found is more abundant than gas while the high dry coefficient gas (>0.99) exit in the other two basins and bare oil accumulation is located in marine formation. This discrepancy should be caused by source rock types and thermal evolution.

Palaeozoic group high quality hydrocarbon source rocks are mainly composed of mudstone, marlstone and coal, most of which have been in high-post mature state. Except for relative low revolution degree in Tarim basin, the rest two source rocks have R_o values beyond 2.0% in Cambrian, Ordovician and Silurian marine formation. This should be resulted from deep burial oil crack on a series of thermal evolution and TSR effect.

Transitional facies source rock is another significant gas generation source. Ordos Basin coal bed in Carboniferous formation and Sichuan Basin carbargilite in Longtan formation tend to gas producing on account of high revolution degree, while Tarim Basin is less potential for short of coal bed.

Marine origin gas in China is dominant of methane ($>70\%$). Ethane, propane and butane make up 6%, 1.2%, 0.4% separately and dry coefficient (C_1/C_{1+}) is 0.92 universally. CO_2 , N_2 , and H_2S make the large composition of nonhydrocarbons and mainly distribute in Feixianguan formation large-scale gas collection as well as Weiyuan gas field in Northeastern Sichuan Basin, Jingbian gas field in Ordos Basin, Tarim Basin and carbonate gas reservoir in Hetianhe gas field, among which the CO_2 content is generally over 3%. H_2S is also abundant in Feixianguan formation that should have certain genetic association with CO_2 while N_2 enriched basins ($>5\%$) chiefly include Hetianhe gas field and Weiyuan gas field. Long-term thermal revolution makes high mature oil cracking, associated TSR effect in well preserved reservoir and later rearrangement should be the likely reasons responsible for the commonly

verified nonhydrocarbon composition of marine gas.

The carbon isotope of hydrocarbons has a wide range distribution, for example, methane $-37.8\sim-29\%$, and ethane $-38\sim-22\%$ (Fig 1). Obviously, reverse carbon isotope distributions in figure 1 reflect the complexity of multi-origin injection trait, which should be closely related to the high revolution degree, diversified source rocks as well as TSR effect.

The research show that marine gas in China mainly belongs to coal origin ($>80\%$); oil crack gas has majority accumulation in Sichuan Basin and Tarim Basin in which the thick highly-developed coal bed source rocks, are of great potential for gas exploration. Thus we can get to the conclusion that in China, high-post mature coal bed and TSR effect are the important factors to make gas built up in marine basin.

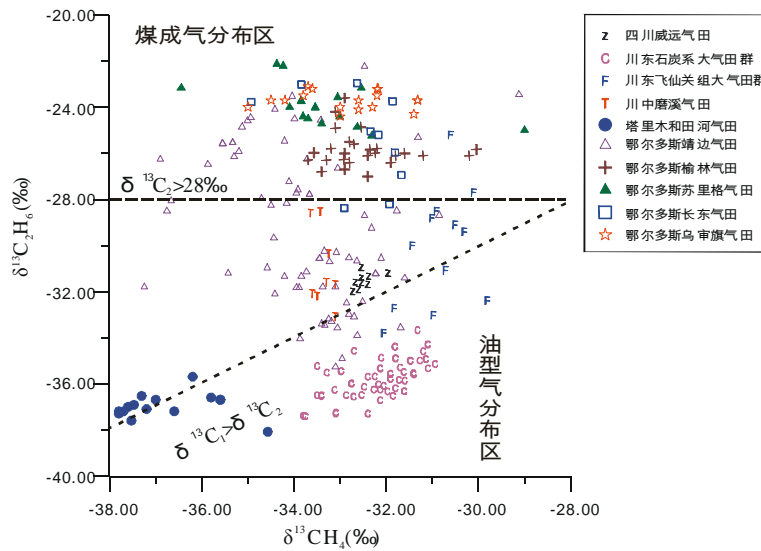


Figure 1. Carbon isotope correlation between methane and ethane in marine basins, China.