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The Effects of Thermochemical Sulfate Reduction on Carbonate Reservoir

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Abstract: The thermochemical sulfate reduction is the key cause of high hydrogen sulfide content in deep carbonate reservoir, and its effects on the reservoir is controversial. Based on the pressure and the mechanism of overpressure identification, this paper analyzes the relationship between the pressure and porosity of the Feixianguan-Changxing formation gas reservoirs in the northeastern Sichuan basin, the Dengying formation gas reservoirs in the paleo-uplift of Central Sichuan basin and the Yingshan formation condensate gas reservoirs in Tazhong area. The effect of thermochemical sulfate reduction on the carbonate reservoir is further discussed. The results show that the effect of thermochemical sulfate reduction on the carbonate reservoir is related to the degree of reaction. The degree of thermochemical sulfate reduction of the Dengying formation gas reservoirs and the Yingshan formation of condensate gas reservoirs are low and it decreases the porosity of gas reservoirs. The thermochemical sulfate reduction decreases the porosity of gas reservoirs generally in the Feixianguan-Changxing formation gas reservoirs. But in the rich hydrogen sulfide area, such as the well Puguang 3, the degree of thermochemical sulfate reduction is so high and it increases the porosity of gas reservoirs. The Effect mechanism of thermochemical sulfate reduction on the reservoir is analyzed. It is found that the main functions of increasing porosity include anhydrite alteration formed calcite and H2S corrosion, and porosity decreased is mainly caused by the precipitation of solid bitumen and calcite and pyrite.
Keywords: thermochemical sulfate reduction; pressure; porosity; carbonate reservoir