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Shale microstructures: Experimental and fractal characterization

Wednesday, 2 June 2021 10:00 (1 hour)

The microstructures of shale gas reservoirs are significant for the study of gas transport mechanisms and the formulating of the gas exploitation plan. In this work, the composition, scanning electron microscopy images, and adsorption information of Longmaxi shale samples are experimentally obtained. The fractal features of shale microstructures are systematically analyzed based on fractal theory. The correlation analyses are widely conducted among the microstructures of shale. The results show that the microfractures, intergranular pores, intragranular pores, dissolved pores, and organic pores make up the complex pore network of shale. For the studied Longmaxi shales, the adsorption isotherm is type IV and the hysteresis loop is type H3. The total organic carbon content of shale has some influences on the adsorption capacity and nanopore distribution positively. The surface fractal dimensions in the van der Waals force regime and the capillary condensation regimes are close for the marine shales evaluated, which is quite different from the two-section characteristic of continental and marine-continental shales. The statistical self-similar property of shales studied is further confirmed according to the analytical fractal equation. The large differences among the pore fractal dimensions manifest the strong heterogeneity of pore distribution of shale. Moreover, the heterogeneity of pore distribution can be quantitatively represented by the normalized lacunarity. Some universal correlations among the microstructures are found and logically explained for the shales evaluated.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

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Primary authors: TIAN, Zhenhua (China University of Geosciences, Wuhan); Prof. CAI, Jianchao (China University of Geosciences, Wuhan); Dr WEI, Wei (China University of Geosciences, Wuhan); XIA, Yuxuan (China University of Geosciences, Wuhan); XIONG, Yihua (China University of Geosciences, Wuhan)

Presenter: TIAN, Zhenhua (China University of Geosciences, Wuhan)

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