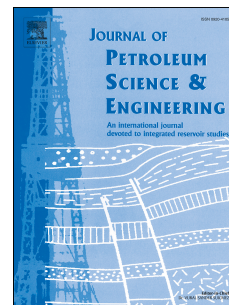


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The wettability of shale by NMR measurements and its controlling factors

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Abstract: In this study, shale samples from the Zhanhua Sag in the Jiyang Depression of the Bohai Bay Basin were used to test the wettability of shale by nuclear magnetic resonance (NMR). The organic matter abundance, movable hydrocarbon content, clay content and carbonate content of shale samples with different wetting characteristics were compared. The results demonstrated that the TOC content of shale samples with mixed wettability was greater than that of water-wettability samples. This finding indicates that with the increase in TOC content, pores can be changed from water-wetting to oil-wetting, and the inorganic pores become organic. The above analysis demonstrates that the existence of organic matter is the basic reason that shale porosity exhibits oil wettability. Further, the shale samples with mixed wettability were higher in mobile hydrocarbon content (S_1) than were those with only water wettability. The shale samples with mixed wettability showed higher clay content than did those with water wettability, indicating that organic matter is associated with clay minerals. However, the samples with water wettability had greater carbonate content than those with mixed wettability, indicating that inorganic pores are formed primarily by carbonate rock. In summary, shale with mixed wettability in the Zhanhua Sag

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