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The influence of lithofacies on shale oil mobility and storage, case study from the Upper Triassic Yanchang formation,Ordos basin, China

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Shale oil reservoirs have strong heterogeneity, both in lithofacies and pore structure, which have a significant influence on oil transportation in shale reservoirs. To quantify the shale oil charge and storage capacity, shale samples with different lithofacies, including sandstone, mudstone, massive shale, and laminated shale were selected. The organic petrology, petrophysics and physicochemical methods were applied to elucidate the influence of lithofacies on oil charge and storage. The results reveal that: (1) Different lithofacies exhibit distinct pore types. Laminated shale and massive shale have more developed pore-fracture systems. Movable oil is present in their bedding fractures, structural fractures, and dissolution pores, (2) Laminated shale has the highest content of saturated hydrocarbon, with content of around 60 percent, while asphaltene content plays a dominate role (around 40 %)in the soluble organic matter which was extracted from the rest litho-type, (3) The aperture distribution of studied samples shows a single peaked around 50 nm, but turns to a bimodal with peaks around 3 nm and 50 nm after extraction, this phenomenon suggest more light hydrocarbon stored in 3nm pores. With the pore size increases, the proportion of free-state shale oil becomes higher. The laminated shale, characterized by a large number of intergranular pores and microfractures, exhibits strong liquid absorption capacity and contains the highest amount of movable oil.