

## Comparison of formation mechanism of fresh-water and salt-water lacustrine organic-rich shale

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Based on the core and thin section observation, major, trace and rare earth elements test, carbon and oxygen isotopes content analysis and other geochemical methods, a detailed study was performed on formation mechanism of lacustrine organic-rich shale by taking the middle Permian salt-water shale in Zhungaer Basin and upper Triassic fresh-water shale in Ordos Basin as the research target. The results show that, the middle Permian salt-water shale was overall deposited in hot and dry climate. Long-term reductive environment and high biological abundance due to elevated temperature provides favorable conditions for formation and preservation of organic-rich shale. Within certain limits, the hotter climate, the organic-richer shale formed. These organic-rich shale was typically distributed in the area where palaeosalinity is relatively high. However, during the upper Triassic at Ordos Basin, organic-rich shale was formed in warm and moist environment. What's more, if the temperature, salinity or water depth rises, the TOC in shale decreases. In other words, relatively low temperature and salinity, stable lake level and strong reducing conditions benefits organic-rich shale deposits in fresh water. In this sense, looking for high-TOC shale in lacustrine basin needs to follow different rules depends on the palaeoclimate and palaeoenvironment during sedimentary period. There is reason to believe that the some other factors can also have significant impact on formation mechanism of organic-rich shale, which increases the complexity of shale oil and gas prediction.