Paleosalinity Reconstruction of Lacustrine Basins through the Evaluation of Boron

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ABSTRACT

Recent years, shale oil have been discovered in China, which most relates to saliferous sediments. Many previous studies have proved that saliferous sediments can be as good source rock for hydrocarbon generation. Paleosalinity reconstruction of the sedimentary basins not only enable evaluation of palaeoenvironment evolution, but also is crucial for the potential of hydrocarbon generation, especially for continental shale oil in China.

Previous methods of paleosalinity reconstruction are mainly based on marine system, rarely for lacustrine system. The objective of this project is try to establish a method to reconstruct paleosalinity of ancient lacustrine basin by boron element analysis of modern sediments. Meanwhile, we try to calculate the paleosalinity of Dongpu Depression, and evaluate palaeoenvironment evolution, and analyze the characteristic of source rock with saliferous sediments.

Based on the difference of "boron uptake ability" of the various clay minerals, Couch (1971) refined the "uptake boron" by "Kaolinite boron", and calibrated the Freundlich isotherm for Nigeria system. Because of the consideration of differences in reactivity of different clay minerals with boron, the Couch's equation has been used to calculate the paleosalinity widely. However, a serious problem should be taken into consideration, the calibration of Freundlich isotherm was based on the marine system, and may not be suitable to calculate the paleosalinity in lacustrine system. This project try to modify Couch's equation to calculate the paleosalinity of ancient lacustrine basin, through analyzing the relationship between boron concentration and salinity in typical modern lacustrine saliferous sediments. In this project, X-ray diffraction and geochemical analyses would be carried out to the samples obtained from modern and ancient lacustrine saliferous sediments. We expect to obtain an equation to calculate the paleosalinity of ancient lacustrine basin. This project is instructive for palaeoenvironment evolution of source rock of shale oil in terrestrial basin.

Paleosalinity reconstruction of the sedimentary basins is instructive and significant for palaeoenvironment evolution of source rock of continental shale oil in China.