Differences on Condition and Mechanism of Potash Deposited in O$_2$m$_{5-6}$ Subsection of Northern Shaanxi Salt Basin

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The Northern Shaanxi salt basin locates in the east of the Ordos basin. In this area, the thick layer salt sediment exists in the Majiagou Formation of Ordovician. Especially in the sixth subsection of the Majiagou fifth member, it finds the sylvite mineralization and the thin layer of potash with the industrial grade, which indicates the good prospect of potash forming. The study on the drilling well material and the seismic interpretation indicate that the Northern Shaanxi salt basin shows the paleo-tectonic pattern of “the two depressions and the one uplift area”, containing “the eastern salt depression”, “the western salt depression”, and “the middle uplift area”. The “eastern salt depression” and “western salt depression” can be divided into five secondary salt concaves. The comparison of the thickness of the strata, the salt/strata ratio in each salt concaves reveal that the thickness of m56 strata is thicker in the east area than in the west area generally, possibly as the original depositional center. Moreover, the salt/strata ratio is very low in the west two salty concave, indicating the desalination strongly, which demonstrates the west two salt concave is adjacent to the orientation of seawater supply possibly.

The further discussion on the sediment circumstance, geochemistry, petrology, the potash display in the east and west salt depression indicates that the drilling core in the Suijia 1 well shows the high potassium content, the thick mineralization thickness, which represents the character of the east salt depression. Most of salty shows the maroon, middle-fine particle size generally, reflecting the character of the shallow lake, salt flat, the playa, depositing above the oxygen and reduction interface. An abundance of muddy rock interlayers, the grayish-green, both of which representing the circumstance of the oxygen and close to the land material source. The muddy rock is the roof and the floor of the section with the high content potassium. The muddy content is rich in the roof and the floor of other rock type, reflecting the potassium source is relative with the muddy closely. In the west salt depression, the salt show the gray white, the smoky gray, the big grain size, the low potassium content, and the salt is very pure and cracked, reflecting the deep and desalting water. It indicates the salt deposits under the oxygen and reduction interface, representing the deep lake and semi deep lake circumstance.

The observation under the microscope reveals that the content of the mud, the anhydrite, the sylvine is different apparently in the east and west salt depression. In the east depression, the content of the mud is very high and the sylvine stays in the inner of the intergrowth salt particle or the edge of the salt, showing the rounded and boundary dissolution shapes. It infers that in the primary deposited stage, the potassium exists in the intercrystalline bittern, then crystallizes as the cement between the salt particle. But because of the recrystallization in the late stage, most of sylvine is dissolved and corroded; a small amount remains between the salt particles; the rest become the inclusions in the inner of salt particle. In the east salt depression, it isn’t found the syline particle till now. The surface of salt particle is very clear; the content of anhydrite is high, distributing in the contact boundary of the salt particles, or as the inclusion distributing in the inner of the salt particle. The character of rock type under the microscope and the core description is consistent with the potassium content analysis.

The geochemical analysis indicates that the change trend of K$^+$ and the Br/Cl×1000 with the depth show the
character of north, middle, south zoning, reflecting the difference in the process of the bittern evolution in each salt concaves. The K⁺ show the character of the single peak or double peaks, and poor correlation with the Br/Cl×1000, which indicate there exist many kinds of potassium material sources besides the marine water evaporating and condensation. Considering the Br/Cl×1000, the bittern is salinization gradually in the east two concaves, but not in other concaves. So, only the east two concave is good for the potash depositing in the m56 stage.

By the comparison between the east salt depression and the west depression in the aspect of the salt/strata ratio, the potassium mineralization, the sedimentary circumstance, the geochemistry, the observation under the microscope reveal the marine water may enter into the salt basin from the direction of the west two concave. The east salt concave, mainly the east two concave is the center of the bittern condensation and the potash depositing. Both the Br/Cl×1000 and K⁺ distributions in each concaves reveal that it is possible that the west salt depression is the preparation basin of the east salt depression depositing the potash. The east two concave is the favorable potassium district.

Key words: North Shaanxi, salt basin, m56 subsection difference, sediment circumstance, geochemistry mechanism of potash forming

References