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Potash Mineral Characteristics and Geochemical Studies in the West of Bieletan Section

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Qarhan Salt Lake is located in the eastern part of the Qaidam Basin, which is first discovered the large potash deposit in the late 1950s. The Bieletan section is located in the west of Qarhan Salt Lake, where saline sediment began to appear since epipleistocene and salt-containing system is divided into four group. In previous studies in Salt Lake potash mineral distribution, the majority view that carnallite potash minerals are the main (Yan et al., 1993, 1993; Yuan et al., 1995), there exists polyhalite mineral in the Bieletan (Sun and Lock.1984; Cai and Jianhua in 1994; see Yuan et al, 1995;), but did not pay sufficient attention. the other studies suggest that polyhalite is the main mineral (Li et al., 2010),which in a small study area .In order to identify the types of potash minerals in the west of Bieletan section, solid samples ware collected in three drilling of Q_h^{S3} salt layer , and using thin section analysis,XRD and SEM three methods to identify the mineral, While study the trace element geochemical characteristics.

Studies show that in the Bieletan section two potash minerals exist: polyhalite and carnallite, which previously dominated. The mineral identify reveals the polyhalite has two ways to yielding. The first is secondary origin by replacement of sulfate minerals (gypsum, hemihydrate, gypsum, anhydrite), carnallite or halite; The second is primary orign which polyhalite mineral forms nemaline or petaloid, polyhalite growth in halite crystals and associate with detrital mineral. Polyhalite mainly forms in halite layer with two ways disseminated or layered. The layered polyhalite distributes in depth for 2.70–3.40 m, forming by replacement of gypsum and anhydrite and interbedded with halite layer as guide bed. Carnallite is mainly distributed in the pores or cave of halite crystal with depth for 4–14 m, whitch mostly forms automorphic crystal and partly appeared metasomatic reaction with polyhalite.

The element geochemistry data have shown that average concentrations of Li^+, Sr^{2+}, Br^-, $B3^+$, I^- are 52.48 ppm, 91.15 ppm, 12.28 ppm, 268.15 ppm, 0.16 ppm，respectively, and Sr^{2+} and Br- are generally lower than marine origin potash deposits，revealing the nonmarine origin. Correlation studies show a negative correlation of the Br and the B, which is due to growth in differences the layers. Br is mainly distributed in the salt evaporation, while B is mainly stored in clay minerals. The major and trace element cluster analysis shows: Na^+ and Cl^- clustered together; Ca_2^+ and SO_4^{2-}clustered into one group, then with Sr_2^+ clustered together, reflecting the Ca_2^+, Sr_2^+ has the same source and revealing the deep material mixed with surface water in salt formation period; K^+ and Mg_2^+ first clustered together, Li^+ and CO_2 together as a class, then these four components together as a large group, revealing the contribution of volcanoes, geothermal activity on salt accumulation.

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