

TAN Qi, ZENG Ying and GUO Shanshan, 2014. Research Progress about the Mixing Brine Method to Produce Low- Sodium Carnallite from Saline Lake Brine. *Acta Geologica Sinica* (English Edition), 88(supp. 1): 372.

Research Progress about the Mixing Brine Method to Produce Low- Sodium Carnallite from Saline Lake Brine

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Mixing brine method, which founded on the common-ion effect, is widely used for low-sodium carnallite production. Compared with traditional carnallite preparation techniques, the mixing brine method possess a series of advantages, such as shorter metallogenic time, lower product sodium content and no other chemical reagents are needed.

The researchers carried out some studies on mixing brine method for different types' salt lake. Chloride type brine mixing process was designed based on the stable phase diagram of system Na^+ , K^+ , Mg^{2+} // Cl^- - H_2O . With the material balance and process calculation, the suitable mixing brine ratio (carnallite separating brine vs old brine) was confirmed as 1~1.3 (Bao et al, 2006). Raising temperature at room temperature was advantageous to improve the yield of carnallite (Li et al., 2007). In order to improve the purity of carnallite, the target brine, used for precipitation carnallite, was modulated to enhance its quality by mixing the old brine and raw brine with a certain ratio (Shi et al., 2011). According to the different size of carnallite with sodium crystal during the brine mixing process, crystallizer was used to separate sodium chloride from carnallite, and a new process was developed (Cheng et al., 2001). Researches on the mixing brine method for magnesium sulfate subtype salt lake brine are mainly focus on two ways: 1. By adding the old brine, the raw material composition was regulated and then the precipitation law was changed to seed out low-sodium K-Mg mixing salt, the target products was sulfate of potash-magnesia (Yang et al., 1995); 2. The potash deposition stage brine was first mixed with old brine for separating most of sodium chloride, then the old brine was mixed in once again for low-sodium carnallite production, two steps mixing brine method was established (Han et al., 2011; Gu et al., 2013).

West Taijinar Salt Lake, abundant with sodium, potassium, lithium and magnesium, is of a magnesium sulfate subtype salt lake. The ore district's temperature changes significantly with the season, thus research focus on the suitable mixing brine technique under different temperature is necessary.

Presently, our group is conducting the mixing brine method research focused on the West Taijinar salt lake. The process under different temperatures (15°C, 25°C, 35°C) are studying with the guidance of the metastable phase diagrams at low temperature. And the tailings brine will be recycled by this method too.

Acknowledgements

Project supported by the Sichuan Youth Science and Technology Innovation Research Team Funding Scheme (2013TD0005), Innovation Team of CDUT (KYTD201405) and Qinghai CITIC Guoan Science and Technology Development Co., Ltd.

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