MU Pengtao, ZENG Ying and YU Xudong, 2014. The Research Progress on Preparation of Battery-Grade Lithium Carbonate from Salt Lake. *Acta Geologica Sinica* (English Edition), 88(supp. 1): 359-360.

The Research Progress on Preparation of Battery-Grade Lithium Carbonate from Salt Lake

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Battery-grade lithium carbonate (Li_2CO_3), plays an irreplaceable role in the preparation of electrolyte and anode materials, are employed in the lithium-ion batteries. It contributes to better cycle and safety performances of the battery (Nagaura et al, 1990). In China, reserves of lithium are abundant with about 3 million tons, and salt lake lithium resources account for about 79 % (Zheng, 2001; Nie et al, 2010). While, nearly 30 % battery-grade Li_2CO_3 were imported from abroad in China, according to the statistics data in 2013 (Li, 2013). So that, the technology of preparation battery-grade Li_2CO_3 from salt lake will be the major direction for further research.

Up to now, the methods of recrystallization (Makno et al, 1982), causticizing (Niwa et al, 1986), electroosmosis (Niwa et al, 1987), carbonation (Yi et al, 2010), and ion-exchange (Kim et al, 2012) are mostly used for the preparation of battery-grade Li_2CO_3 from salt lake. In the recrystallization process, the effect of impurities removing is remarkable, while small solubility and slow dissolution speed cause a time-consuming production cycle. In the methods of causticizing, ion-exchange and electroosmosis, high-purity raw materials, expensive adsorbent and ion-exchange membranes were required respectively. The cost of production was increased accordingly. By comparison, the carbonation is a technology with wide application prospect. The research aiming at purification of Li_2CO_3 by carbonation process at atmospheric pressure has been reported so far (Zhou et al, 2012). The carbonation process at high pressure and subsequent operations (ion-exchange and thermal decomposition) have not been studied systematically yet. The optimum technological parameters used in the industrial trial have not been obtained.

At present, our group is carrying on the preparation of battery-grade Li_2CO_3 with the combination methods of carbonation at elevated pressure, ion-exchange and decomposition. The focus of our research is finding the optimal technological condition to increase the carbonation efficiency, impurity removal rate and lithium recovery ratio, and in order to obtain the battery-grade Li_2CO_3 production. Figure 1 is the XRD photograph of the Li_2CO_3 production of our research. The analysis results show that the purity of Li_2CO_3 is up to battery grade.

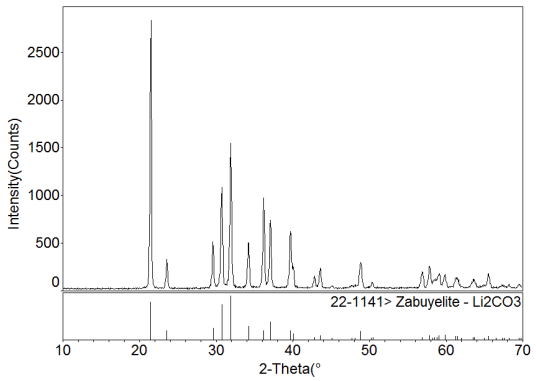

Fig. 1. X-ray diffraction pattern of primary production.

Key words: Battery-grade lithium carbonate, Preparation, Research progress.

Acknowledgements

Project supported by the Sichuan Youth Science and Technology Innovation Research Team Funding Scheme (2013TD0005), and Innovation Team of CDUT (KYTD201405).

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