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Preparation of leucite from analcime by ion exchange process: An experimental study**Qianqian Chang**

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The preparation of leucite from K^+/Na^+ ions exchange process of analcime in K_2CO_3 solution was studied. Abundant K^+ in leucite after exchange is beneficial for the application in agriculture as slow release fertilizers. This is a good method to translate non water-soluble potassium resources into water-soluble potassium resources. It can solve the problem of the shortage of water-soluble potassium resources. It is also a new and popular way for the preparation of slow release fertilizers. In this study, X-ray diffraction (XRD), Fourier transformation infrared spectrometry (FTIR) and scanning electron microscopy (SEM) were utilized to characterize the as-exchanged samples. Flame photometry was applied to determine the concentrations of potassium oxide. XRD data and FTIR results determined that leucite was prepared from K^+/Na^+ ions exchange process of analcime in K_2CO_3 solution at 60°C, 90°C and 120°C for 1 h, 2 h, 4 h, 6 h and 10 h. The crystal structure of analcime and leucite show that potassium atoms surrounded by six oxygen atoms in leucite are located in the sites of water molecule in analcime. The preparation of leucite from analcime in K_2CO_3 solution is a reversible chemical reaction. The K^+/Na^+ ions exchange was stabilization at higher temperatures (90°C and 120°C) and longer time according to the K_2O contents in samples. It turned out that the reaction rate was controlled by product layer diffusion from the experiments and analysis of kinetics according to shrinking core model. It shows that the potassium oxide of samples maximum is 17.10% (in theory is 21.58%) obtained from analcime reacted with 4 mol/L K_2CO_3 solution ($KAlSi_2O_6/K_2CO_3$ mole ratio=1:10) at 120°C for 4 h.

Biography

Qianqian Chang is a Post-graduate student at the China University of Geosciences (Beijing) in Material Science and Engineering. Currently, she is working on the preparation of leucite from analcime by ion exchange. Leucite processed in this method is used as a slow release potassium fertilizer. Preparation of leucite from analcime by ion exchange of K^+/Na^+ is significant for the application of analcime in fertilizers, which can not only supply the necessary potassium element to plants and enhance dissolution of the rock phosphate, but also can reduce the loss of nutrients and water as well as the environmental pollutions compared to traditional chemical fertilizers.

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