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Crystallization Kinetics of Potassium Sulphate in Aqueous System Mg^{2+} , K^+ // Cl^- , SO_4^{2-} - H_2O

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As an excellent chemical fertilizer, Potassium Sulphate (K_2SO_4) could provide both potassium and sulfur elements for crops. However, it is well known that potassium resource is very poor in China. To understand the Crystallization Kinetics (CK) of K_2SO_4 could be conducive to utilize the limited potassium resource, promote the yield and purity of K_2SO_4 .

In this study saturated solution of potassium sulphate was prepared according to the phase diagram of Mg^{2+} , K^+ // Cl^- , SO_4^{2-} - H_2O at 25°C by dissolving $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ and KCl into pure water. To investigate the growth curve of potassium sulphate crystals in microscopic cell, the super-saturation was obtained by controlling temperature of recycle solution. Digital Microscope Camera was used to monitor and measure the growth of crystals on line. The result showed that the process of crystallization of potassium sulphate belongs to the control of surface reaction in given system according to the diffusion theories of crystal growth.

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Fig. 1. crystallization of K_2SO_4 nucleus.

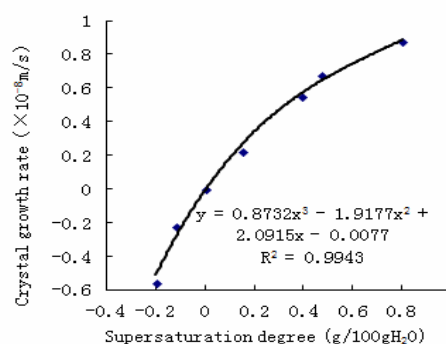


Fig. 2. the relationship between super-saturation and crystal growth rate.

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References

- Shen Jun, 2003. Summarization and prospect of production of potassium sulphate in China. *Industrial Minerals & Processing*, 7:1-4 (in Chinese).
- Cheng Fangqin, 2003. Production technique of potassium sulphate. *Sci/Tech Information Development and Economy*, 4: 55-56 (in Chinese).
- Mullin J. W., and Garside J., 1967. *Transactions of the Institution of Chemical Engineers*, 45(7):285-290.
- Ding Xuhuai and Tan Qiu, 1985. *Industrial Crystallization*. Chemical Industry Press (In Chinese).
- Zhang Shibin and Yuan Jianjun, 1990. *Proceedings of the 11th Symposium on Industrial Crystallization*, 18-20.
- Yu Ping, Guo Wali, Jiang Wei, et. al, 2002. Crystallization Kinetics of Potassium Sulphate (I). *Journal of Shenyang Institute of Chemical Technology*, 16(2):104-107 (in Chinese).

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