

Solubility experiment in subsystems of Sr-Ca-Mg-Cl-H₂O at 298 K

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Celestite is the most important strontium containing mineral in nature. There are many celestite resources distributed in the provinces of Hubei, Qinghai, Sichuan, and Yunnan in China^[1]. During the past decade, China's strontium sector developed quite rapidly, while after more than 20 years of exploitation, most of the high-grade resources had been depleted, and the deposit of strontium tailings was more serious. Commonly, the utilization rate of strontium is usually below 75 %, which caused huge waste of the resources waste. In the technology of extraction strontium from strontium tailings leaching solution which uses HCl as lixiviant, the main components of the leaching solution can be described with the system Sr²⁺, Ca²⁺, Mg²⁺ // Cl⁻ - H₂O. In the system mentioned above, many types of hydrate salt, double salt, and solid solution can be formed.

Phase equilibria is of a particular importance for the purification of chemical produces, element geochemistry and element cycles^[2]. Accordingly, the phase equilibria of three subsystems of Sr²⁺, Ca²⁺, Mg²⁺ // Cl⁻ - H₂O at 298 K have been done by using isothermal dissolution method and Schreinemakers wet residues method. Results show that: (1) system Sr²⁺, Mg²⁺ // Cl⁻ - H₂O belongs to simple type with two single salts SrCl₂·6H₂O, MgCl₂·6H₂O formed. (2) system Sr²⁺, Ca²⁺ // Cl⁻ - H₂O belongs to complex type with one solid solution [Sr, Ca]Cl₂·6H₂O formed, and the solid solution has the largest crystallization field occupies 50 % phase region. (3) system Ca²⁺, Mg²⁺ // Cl⁻ - H₂O belongs to complex type with double salt 2MgCl₂·CaCl₂·12H₂O formed, and the solid solution has the largest crystallization field.

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