

# XPS analysis for mechanism of the interaction between $\text{Ca}^{2+}$ and muscovite

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**Abstract:** The muscovite samples were characterized by XPS analysis and the interaction mechanism of  $\text{Ca}^{2+}$  on the muscovite in the sodium oleate system has been investigated. The results show that the floatability of muscovite can be significantly improved by adding  $\text{Ca}^{2+}$  when the pH values of the pulp are in the alkaline range. Especially, the muscovite recovery rate can reach to 65.20 % under conditions of the pulp pH value of 12, the sodium oleate concentration of  $9.20 \times 10^{-4}$  mol/L, and the  $\text{Ca}^{2+}$  concentration of  $2.70 \times 10^{-4}$  mol/L. The reason for the improvement of the floatability of the muscovite by  $\text{Ca}^{2+}$  is that  $\text{Ca}^{2+}$  can be firstly adsorbed on the muscovite surface in forms of  $\text{Ca}^{2+}$ ,  $\text{Ca}(\text{OH})^+$ , and  $\text{Ca}(\text{OH})_2$  which were interacted with oleate ions in the pulp to have formed hydrophobic calcium oleate. Moreover, at the  $\text{Ca}^{2+}$  concentration of  $2.70 \times 10^{-4}$  mol/L for the pulp, the zeta potential on surface of the muscovite can be positively increased to  $-7.73$  mV. This will result in the increase of the local positive region on surface of the muscovite, then the enhancement of electrostatic adsorption capacity of oleate ions on surface of the muscovite, and finally the improvement of floatability of the muscovite.

**Keywords:** Sodium oleate; Calcium ion; Muscovite; Activation; Mechanism