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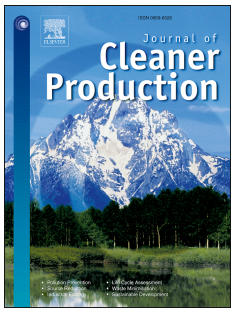

Silicate removal from recycled wastewater for the improvement of scheelite flotation performance

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Silicate removal from recycled wastewater for the improvement of scheelite flotation performance

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Abstract

This study investigates the effects of silicate removal from recycled wastewater on scheelite flotation performance. Systematic experiments were conducted to identify and evaluate the mechanisms underlying the influence of sodium silicate on scheelite flotation and silicate removal. When the sodium silicate concentration exceeds 1×10^{-2} mol/L, scheelite recoveries decrease from 80% to 20% because excess sodium silicate strongly competes with sodium oleate for adsorption sites on the scheelite surface. Under treatment with 5 g/L calcium chloride, silicate removal can reach 90%, and system pH decreases from 12.5 to 11. The reduction of system pH to the range of 11–9 is conducive to promote silicate polymerization and improve silicate removal. The micromorphology and crystal structure of the precipitates that formed under different reaction pH levels were analyzed through scanning electron microscopy coupled with energy dispersive spectrometry, X-ray diffraction, and Fourier transform infrared. The results of these analytical tests confirm that calcium chloride removes silicate through the formation of amorphous calcium silicate hydrate precipitates with low crystallinity. Continuous pilot-scale tests on recycled wastewater treatment and reuse further demonstrate the feasibility and stability of silicate removal. Silicate removal can reach 90%, and system pH can decrease from 11 to 9.5. The use of treated water increases scheelite roughing grade from 0.47% to 0.63% and

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