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Flocculation as an Alternative to Increase the Recovery of Ultrafine Particles of Pyrite in Flotation of Tailings

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Nowadays, flotation is the most commonly used method for mineral concentration. However, conventional flotation circuits are not suitable for ultrafine particles, and this is a challenge for the concentration of finely disseminated minerals. Moreover, tailing contain a considerable amount of very fine particles which can include valuable and hazardous minerals that have the potential to be recovered. Concern about ultrafine particles has increased as they are present in a wide variety of mineral pulps and can contain valuable minerals that have been lost to the tailings. Several alternatives have been proposed to improve the recovery of ultrafine particles in flotation, for example, decreasing the size of the air bubbles, column flotation, selective agglomeration of particles, etc. Among all, selective polymeric flocculation represents a promising option. The current study focuses on the use of polymeric flocculation to increasing the size of pyrite particles aiming to improve its recovery in the flotation of sulfidic tailings. Flocculation was performed with pyrite particles presenting P80 < 4 mm, in aqueous medium and alkaline conditions. Two polyacrylamides and a new nanocellulose-based chemical were used as flocculants. Microflotation tests were performed, without the addition of collector, to evaluate the formation of flocs through the reduction of the mechanical entrainment of pyrite after being submitted to flocculation.