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Effect of Cationic Surfactant Addition on the Electro kinetics and Stability of Silica/Kaolinite Suspensions under Conditions Relevant to Copper Hydrometallurgy

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Introduction

e production of mineral complexes as a result of interactions between particles in the mineral solid matrix, which are transferred by the leaching solution to the next step of solvent extraction, is one of the major challenges in the industrial process of bene ciating oxidized copper ore. e operational conditions of low pH and high ionic concentration result in these interactions, which naturally cause aggregation processes that nally lead to the development of crud during solvent extraction. Just to refresh your memory, crud is a layer of scattered particles that occurs at interfaces and is traditionally attributed to the presence of small solid particles at the contact between droplets of the dispersed phase and the surrounding continuous phase. Solid particles that behave both hydrophilically and hydrophobically have a speci c propensity to produce crud. It is clear that high density particles don't pose issues because they quickly settle to the bottom of the separation vessel and are simple to remove from the copper solution. Smaller particles present a far more challenging situation since they will either oat to the top or remain suspended, creating so-called " sh-eyes." e majority of the time, silica and clays make up the crud. e hydrometallurgy process' operating conditions low pH, high ionic strength, and particle concentration above 3 percent), which are most conducive to occulation due to the decrease in electrostatic repulsive forces, are complicated by the instability of the colloids that make up the crud. To reduce the e ects of the mineral dragged with the solvent extraction method of heap leaching, which is one of the primary causes of waste formation, is one of the metallurgical industry's major issues.

Subjective Heading

e inclusion of chemicals that can encourage the sedimentation of the sludge particles under certain circumstances is a potential solution. One possibility is the use of a cationic surfactant at low concentrations in a way that the stability is changed by a variety of surface phenomena related to I the nature of the structural groups in the solid, the molecular structure of the surfactant, and the properties of the aqueous phase. e addition of surfactants has a variety of consequences. First, the polar head can neutralize the electro kinetic charge density of the particles upon adsorption of the surfactant molecule, causing their occulation. Only a charged, hydrophilic group in the molecule, the. Surfactants also increase the water repellency of aqueous media due to increased solid-liquid interfacial tension and increased particle-liquid contact, which in turn increases the likelihood for particles to occulate. e e ects indicated can be obtained with surfactant concentrations much lower than those of ions, and the impact is more e ective the longer the surfactant chain, which is a bene t of using surfactants over inorganic ions of the same charge. If the surface coverage is low, bridging occulation can also occur in this situation, allowing one molecule to join two particles such that uncovered patches can accept the chain end It is equally e ective for shorter sequences

Discussion

Polymers, either ionic or nonionic, are frequently used to control the stability of concentrated slurries. e most e ective way to monitor and interpret changes in the stability of such suspensions is based on electroacoustic tests that simultaneously determine particle size and zeta potential. is was demonstrated by in the instance of kaolinite and spectate suspensions. Although di erences between polymers could be detected and linked to their various chemical functionalities, as demonstrated by zeta potential determinations, these authors discovered that polyethylene oxide or polyacrylamide-acrylate were

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use, distribution, and reproduction in any medium, and ideal dose of surfactant is however necessary for this approach in these compli
for assessing CTAB adsorption on silica/kaolinite mixes at low pH and high ionic strength indirectly. with a particle concentration of more than 3%. The electroacoustic approach (ESA) demonstrates its suitability for predicting the impact of surfactant addition on silica and kaolinite individual particles as well as combinations of such particles. The findings conducted with fine particles
construction of structures between particles as a result of the addition of CTAB are supported by images taken using a scanning electron microscope (SEM). This inquiry may help to resolve operational issues related to the production

which the specifed suspensions focculate and separate from the continuous.

e ective in occulating and dewatering the clay suspensions. In the subject of mineral ore bene ciation by separation of, interfacial

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