

Título: The inhibition of bacterial growth by cysteine

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Resumo:

The technological development of industries related to mining and metallurgy has increased in recent decades due to the constant search for improvements in quality of life. On the one hand, the demand for metals is growing, however, on the other, the mining industry faces the problems relating to the reserve's exhaustion. This imposes the need to extract metals from low level's ore and industrial waste.

Therefore, processes that require low investment and low operation costs are needed in order to make the extraction economically feasible. Of all the technologies studied, bioleaching is the one that appears as the main alternative on conventional processes. However, bacterial slow oxidation rate remains a major problem to be resolved. Thus, strategies to improve bacterial activity on the surface of mineral sulfide have been widely exploited by many authors. Recently, L-cysteine (Cys), an important sulfur amino acid aroused considerable interest due to its ability to accelerate the bioleaching process.

The main microorganisms involved in this process are the mesophilic bacteria *Acidithiobacillus ferrooxidans* and *Leptospirillum ferrooxidans*, organisms that can get energy from the oxidation of ferrous ions and reduce sulfur compounds.

In this context, this study aims to evaluate the inhibition of bacterial growth by cysteine to determine the optimal concentration for future uses in bioleaching processes. The lineages *At. ferrooxidans* and *L. ferrooxidans* were evaluated individually in the presence and absence of the ore chalcopyrite. The inhibition assay was performed in shake flasks at 150 rpm, 30 °C, in the presence of T&K medium, 120 mmol.L⁻¹ Fe²⁺, 5% (v/v) inoculum on various concentrations of cysteine.

The vials containing the bacterium *At. ferrooxidans* and 10⁻³M cysteine showed complete oxidation of the ferrous ions in 48 hours, matching control with the absence of the amino acid. On the other hand, the vials containing the bacteria *L. ferrooxidans* and 10⁻³M cysteine showed complete oxidation at 160 hours, equaling to the control with no amino acid, thereby determining the inhibitory concentration for both strains. No difference was obtained at the end of the test for the absence and presence of ore in the medium.

Palavras-chaves: Bioleaching, inhibition, cysteine, *At. ferrooxidans*, *L. ferrooxidans*

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