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Influence of CO₂ supplementation on bioleaching kinetics in stirred tank reactor (STR)

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ABSTRACT

In bioleaching processes using autotrophic bacteria, CO₂ is the carbon source for the growth of the microorganisms and its availability is dependent on gas mass transfer in the bioreactor. In this study the demand in CO₂ was investigated during bioleaching of several sulfidic materials (pyritic tailings, Cu concentrate, coal waste) in STR using the "BRGM-KCC" bacterial consortium. The results show (i) that Fe oxidation (and thus microbial activity) is delayed when air is injected without CO₂-supplementation, and (ii) that CO₂-supplementation improves leaching kinetics. The study proposes also a methodology to determine G/L transfer components and to assess CO₂ limitations in the system. It shows that the microorganisms are not only sensitive to the transfer rate of CO₂ from the gas to the liquid phase, but also to the availability of CO₂ in solution.

Key-words: bioleaching, carbon dioxide, CO₂-supplementation, mass transfer, sulphide