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Influence of nutrients on bioleaching efficiency of polymetallic sulfidic mining residues

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Our study aimed at assessing the influence of nutrient medium on the bioleaching of a polymetallic and polymineral mining residue. Bioleaching experiments in 2 L-stirred tank reactors maintained at 55°C with 20% solid concentration, in the presence of variable concentrations of ammonium and potassium, were compared. Increasing nutrient concentration enhanced the dissolution yields of Co and sulfides, suggesting a decrease of the microbial activity with nutrients-poor media. Ni, Zn, and Cu yields remained the same, which confirms results from a previous study showing their dissolution is mainly chemical [1]. The composition of the nutrient medium also highly affected the precipitation phenomena, thus modifying the solid-liquid separation and the acid demand. Changes in biomass concentration were correlated to nutrients consumption and showed lower ammonium concentration was detrimental to biomass growth, while lowering potassium concentration did not limit the growth but rather the maintenance of the cells during the stationary phase.

[1] Hubau, A., Guezennec, A.-G., Joulian, C., Falagán, C., Dew, D., Hudson-Edwards, K.A., 2020. Bioleaching to reprocess sulfidic polymetallic primary mining residues: Determination of metal leaching mechanisms. Hydrometallurgy 197, 105484. https://doi.org/10.1016/j.hydromet.2020.105484