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## Bioleaching of mining wastes: inoculum selection

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**Abstract:** Bioleaching is a technology potentially applicable in circular economy ambits and constitutes an attractive alternative for managing mining wastes. Obtaining depolluted residues and valorizing metals, including iron, are targets that must be reached from a strongly restrictive economy approach. Inoculum choice can be considered a design key factor since usual technical resources such as fed conditioning, thermal activation, reagent/catalyst addition and air enrichment may incur unacceptable costs. In the framework of the H2020 RAWMINA project, two different mining wastes from the Iberian Pyrite Belt that contain more than 30 % of sulfides were bioleached for recovering Co, Cu and Sb using two different inocula: 1) KCC mainly consists of *Leptospirillum ferriphilum*, *Acidithiobacillus. caldus* and *Sulfobacillus* spp. This consortium tolerates temperatures up to 48°C but inhibition phenomena are observed at pH < 1; 2) FNN mainly consists of *Leptospirillum. ferrooxidans* and *Acidithiobacillus. ferrooxidans*. This consortium tolerates pH < 0.8 but is hardly adaptable to temperatures higher than 30°C. At 10 % of pulp density, 90 % of Fe was bioleached with both inocula. Slight kinetic advantages were achieved when KCC was inoculated at 42°C, which can be related with Fe precipitation (>5 % Fe). Less than 1 % of Fe precipitated when FNN was used as inoculum at 30 °C without alkali addition for controlling pH; 70 % of Fe was bioleached in less than 6 days. This study shows that the inoculum selection can lead to different operational scenarios with technical and economic consequences. Thus, the microbial consortium selection should be thoroughly considered as an important factor of the design of bioleaching process, particularly in the mine waste reprocessing context.

**Keywords:** bioleaching, inoculum, microbial diversity.

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