

CHEMICAL AND BIOGENIC ORGANIC ACID LEACHING OF
LOW-GRADE, POLYMETALLIC PRIMARY ORES AND
SECONDARY INDUSTRIAL RESIDUES

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Europe does not possess vast, easily accessible deposits containing critical and economically valuable metals. However, it does have substantial amounts of low-grade, polymetallic primary ores and secondary industrial residues (tailings, sludges, slags and dusts), which contain significant concentrations of various metals.

A broad screening of metal recovery from these materials is presented for metal recovery of Zn, Cu, Cr and Ni. First using synthetic organic chelating organic acids (citric acid, gluconate and oxalate) as chemical analogues to those produced *via* microbial heterotrophic respiration. Followed by application of biogenic organic acids produced by relatively benign yeast cultures of *Candida Viswanathii* and *Saccharomyces Cerevisiae*.

An extensive fractional factorial design of experiments (DOE) for fast track screening, evaluation and optimization of bioleaching phenomena is presented. Testing pulp density, mixing speed (50 – 150 rpm), various mixtures of citric, gluconate and oxalate, leaching time (3 – 20 hrs) and organic acid concentrations (50 – 150 mM). Based on best case bioleaching, further process and rudimental modelling of bioleaching kinetics and mass transfer are also presented.

This work is support by project METGROW+, funded by the European Union's Horizon 2020 Research and Innovation program under Grant Agreement n° 690088.