TUNGSTEN RECOVERY FROM W-TAILINGS: CONCENTRATION TESTS AND PRELIMINARY BIOLEACHING RESULTS. PERSPECTIVES.

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Abstract

In the frame of the H2020 RAWMINA project (Grant Agreement nº 958252), recovery of critical raw materials such as tungsten (W) in mining waste is evaluated by various innovative (bio)hydrometallurgy techniques.

As a first step, the recovery of W from W-mining waste is carried out by applying mineral processing techniques and, then it is bioleached to treat sulfide content and reduce acidity in final residue. Representative sample (500 kg) was sampled on a mine site in Portugal and prepared at BRGM facilities to obtain homogenised sub-samples according to well established procedures: – drying, crushing, grinding, splittering.

Concentration tests have been performed by gravimetric separation taking advantage of scheelite density (5.9-6.1 g/cm^3). The first pre-treatment step was the classification on four particle grain size (< 100 µm; 100 µm – 250 µm; 250 µm - 500 µm; 500 µm - 1 mm) since scheelite was observed at particle size up to 1 mm by UV shortwave radiation (blue spots of scheelite bright fluorescence). Then, a separation step was carried out using a gravimetric Mozley table on 100 g sample. W content in the concentrate product was increased by 10 fold (from around 2000 ppm to 2-5 wt%) by quantification with portable XRF technology. The W concentration in 50 kg sample was evaluated using shaking table on the coarser fractions (> 100 µm) and similar W concentration than in smaller sample is observed. Multi Gravity Separator (MGS Mozley) technique is also planned to treat fine fraction (< 100 µm) then, optimal flowsheet of the concentration process will be established.

Bioleaching tests are currently being performed on shake flakes to adapt a selected acidophile microbial consortium to the bioleaching of W-concentrated sample. The next steps include the inoculation of 2-L reactors with the adapted microbial consortium and a progressive increase of the pulp density in batch experiments to bioleach sulfides and provide sulfide-free samples.

Perspectives under RAWMINA project will be applying alkaline leaching followed by the W selective recovery using nanofibrous composite materials and electrowinning.