

BIOPROCESSING FOR COBALT AND NICKEL RECOVERY FROM LATERITES IN BRAZIL

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Cobalt (Co) and Nickel (Ni) are indispensable in battery production, particularly for EVs (electric vehicles) which currently show considerably increasing global demand projections. Especially for Co, currently, around 70% of European demand is covered by imports from countries that are classified as geopolitically and economically unstable. Brazil is home to several lateritic Ni-Co deposits and the country's risk, as well as the raw material supply risk from Brazil, is considered to be comparatively low. In fact, despite its great potential, no cobalt is currently produced in Brazil due to the high CAPEX and OPEX that conventional methods of lateritic processing ores present. Biohydrometallurgy is an innovative approach to processing these lateritic ores, especially for the extraction of cobalt. It promises an integrated, low CAPEX and OPEX, environmentally safe process for recovering metals like Co, Ni, as well as Cu, Sc and V from laterites. The Geological Survey of Brazil (CPRM), together with the BGR (Federal Institute of Geosciences and Natural Resources of Germany) and CETEM (Centre for Mineral Technology of Brazil) seek, through bioleaching, to expand the use of cobalt contained in lateritic nickel deposits. Brazil has resources in the order of 1 billion tons with an average nickel content of 1% and cobalt contents between 0.05 and 0.15%. Lateritic silicate ore is responsible for most of the nickel extracted in Brazil (75%), mainly in the states of Goiás and Pará. In these mines, as well as in unexplored deposits, there are considerable volumes of limonitic ore without viable processing. A microbially mediated reductive dissolution process in a circulatory system (i.e. in a bioreactor) is in development, in order to significantly minimize acid consumption and acidic waste. Process optimization includes, for example, bacterial selection, pH, temperature, carbon source and nutrient composition, reactor agitation rate and pulp density. On a laboratory scale, the processes have already been tested, but requires resizing. By scaling up the technology, the project aims to achieve a pilot scale for the process. This technology is being developed to establish itself as a technically viable and cost-effective solution that aims at increasing metal recovery for mines and deposits in Brazil, transforming unexplored ores and limonitic ore resources into valuable reserves of these critical raw materials. The project also aims to evaluate and compare the economic impact of the biohydrometallurgical process in the recovery of metals from laterites. The economic feasibility of different bioleaching approaches and methods must also be evaluated in comparison with conventional leaching methods and the extraction of Co from lateritic ores. The second approach will be to quantify the impact of the biohydrometallurgical process on the final prices of the metal and compare it with the prices practiced on the international market.