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# Feasibility Study of Mine Tailing's Treatment by Acidithiobacillus thiooxidans DSM 26636

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**Abstract :** Among the diverse types of pollutants produced by anthropogenic activities, metals represent a serious threat, due to their accumulation in ecosystems and their elevated toxicity. The mine tailings of abandoned mines contain high levels of metals such as arsenic (As), zinc (Zn), copper (Cu), and lead (Pb), which do not suffer any degradation process, they are accumulated in environment. Abandoned mine tailings potentially could contaminate rivers and aquifers representing a risk for human health due to their high metal content. In an attempt to remove the metals and thereby mitigate the environmental pollution, an environmentally friendly and economical method of bioremediation has been introduced. Bioleaching has been actively studied over the last several years, and it is one of the bioremediation solutions used to treat heavy metals contained in sewage sludge, sediment and contaminated soil. Acidithiobacillus thiooxidans, an extremely acidophilic, chemolithoautotrophic, gram-negative, rod shaped microorganism, which is typically related to Cu mining operations (bioleaching), has been well studied for industrial applications. The sulfuric acid produced plays a major role in bioleaching. Specifically, Acidithiobacillus thiooxidans strain DSM 26636 has been able to leach Al, Ni, V, Fe, Mg, Si, and Ni contained in slags from coal combustion wastes. The present study reports the ability of A. thiooxidans DSM 26636 for the bioleaching of metals contained in two different mine tailing samples (MT1 and MT2). It was observed that Al, Fe, and Mn were removed in 36.3±1.7, 191.2±1.6, and 4.5±0.2 mg/kg for MT1, and in 74.5±0.3, 208.3±0.5, and 20.9±0.1 for MT2. Besides, < 1.5 mg/kg of Au and Ru were also bioleached from MT1; in MT2, bioleaching of Zn was observed at 55.7±1.3 mg/kg, besides removal of < 1.5 mg/kg was observed for As, Ir, Li, and 0.6 for Os in this residue. These results show the potential of strain DSM 26636 for the bioleaching of metals that came from different mine tailings.

**Keywords :** A. thiooxidans, bioleaching, metals, mine tailings
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