Utilization of Waste Materials for Extraction of Strategic Metals – a Biogeochemical Approach

av

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Abstract


Worldwide the modern society produces vast amounts of waste materials containing strategic and valuable metals. Some of them are of substantial economic or environmental significance if controlled recovery of metals can be performed or if uncontrolled release to the environment occurs.

By cultivating *Agrostis capillaris* on historical sulfidic mine waste the leachate composition can be altered and its volume reduced. In combination with additives such as bark compost and water works granules the concentration of several hazardous metals decreased significantly already after eight weeks. Limited actions can therefore be used to decrease the environmental impact from such waste.

Shale in general contains considerable amounts of strategic metals. If naturally occurring microorganisms are provided with a source of nutrients, increased mobilization of strategic metals can be obtained. By using wood chips as the nutrient source the mobilization of vanadium and uranium increased significantly. Highest mobilization efficiency was observed when the carbon source was put on top of the shale.

Analysis of strategic metals is often performed by argon plasma techniques such as ICP-QMS. However, the use of argon increases the analytical costs. If isotopic information is not needed and slightly higher uncertainties can be accepted, several strategic metals can successfully be quantified by the nitrogen plasma based MP AES. The analytical cost can then be cut with more than 99%.

*Keywords*: biogeochemistry, ICP-QMS, MP AES, strategic metals, vanadium, uranium, mine waste, steel slag, shale residues

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