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Comparative efficiencies of chemical stabilization agents to reduce molybdenum mobility from excavated materials

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Large amounts of rocks and soils are excavated every year from civil engineering construction. These materials can present significant concentrations of leachable contaminants, among those pollutants, oxyanions are frequently found. The pollution can be either from natural origin or linked to anthropogenic contamination. Their valorization obeys to strict regulation and a reduction of the mobility of the contaminants is often necessary. Chemical stabilization is a promising way of treatment by trapping rapidly, durably and extensively oxyanions at low cost and for a large variety of materials.

In this study, the ability of various stabilizing agents was tested to reduce molybdenum and sulfates mobility from naturally-polluted limestone sludge from tunnel boring. Leaching tests were based on the standardized European test EN 12457-2 and the US-EPA method 1313. Solid characterization and geochemical modeling were carried out in addition to provide for a first understanding of the retention mechanisms of molybdenum in the untreated and treated limestone tunnel sludge.

The tested agents were clayed materials, metal (hydr-)oxides and precursors, hydraulics binders and mixes thereof. A combination of magnesium oxide and alumina cement was found efficient to reduce both sulfates and molybdenum mobility. Different contents and mix ratios were then tested to optimize the recipe for molybdenum and sulfates retention.