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ANALYSIS OF FACTORS DETERMINING THE BEHAVIOUR OF CHROMIUM IN SOME ROMANIAN SOILS

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Abstract

Chromium (Cr) is one of the most common metal contaminants in soil because of its use in ore refining, production of steel and alloys, metal plating, tanneries, wood preservation, and pigmentation. In soil environment, the most stable oxidation states of chromium are Cr (III) and Cr (VI). While Cr (III) is considered an essential trace element for the functioning of living organisms, Cr (VI) is toxic and carcinogenic to humans via inhalation for long exposures, since it is easily soluble and mobile in soils and can be leached into surface water or groundwater, and taken up by plants. The efficacy of remediation processes are highly dependent on chromium sorption and desorption kinetics and on the influence of competing solute anions. Models to predict the transport of Cr(VI) in soils must therefore incorporate these effects.
The objective of the study was to speciate and to evaluate various soil Cr species in relation to soil properties. Adsorption and reduction of added Cr(VI) were characterized in soils with contrasting pH, organic matter contents, and chemical and mineralogical properties.
Batch experiments are used to determine equilibrium sorption parameters for chromium by soil and to study sorption kinetics that are relevant to soil contamination sites. The distribution of metal contaminant in soils can be strongly localized by transport limitations and redox gradients within soil aggregates. The soils adsorption and reduction capacities were eventually overwhelmed, however, and permitted the passage of Cr(VI) into the underlying ground water.

Key words: chromium, sorption, isotherm, heavy metals

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