Trace elements and organic matter interactions : Futur Challenges

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OM is found in soils and sediments at concentrations of 0.1-10% by weight. OM binds a variety of trace elements and typically contains 2-10 equiv kg^{-1} of ionizable groups. The binding of protons and metal ions to OM is important for the speciation, transport, and toxicity of many trace metals, but it has proven difficult to find equations that describe this binding over a wide range of conditions. The direct measurement of their speciation in natural matrices is challenging since the analytical methods used should be sensitive for low concentration, and highly specific to the element and compartment of interest. In order to circumvent these potential analytical limitations, various speciation models are developed and included in software assuming a thermodynamic equilibrium.

However in natural systems, individual metals exist as components in mixtures with organic and inorganic substances and/or particulate matter. While the concepts encompassing mixture fates and modeling have been around for decades, only recently have new approaches been expanded to consider metal mixture scenarios to understand the fate and the availability of trace elements. Although current environmental regulations rarely requires an assessment of chemicals mixtures, research on these mixtures in the environment are essential for future regulatory demands and vital for ensuring adequate environmental protection. Interpretation of speciation and bioavailability results from metal mixtures can be very complex and demanding, due to the existence of several chemical interactions between the various media constituents that can affect metal speciation, culminating in different transformed metal-containing products

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