Sorption of organic cations to Soil organic matter and

Cell organic matter

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Using consistent HPLC column methodologies, sorption affinities have been determined of a large set of organic cations for several sorbents that are relevant for environmental risk assessment. These sorbents include for example Pahokee peat, representing soil organic matter (SOM), and phospholipid membranes, representing a major sorbing phase in biotic tissue. Organic cations sorb relatively strong to both charged organic matrices, peat and phospholipids, although these sorbents differ a lot structurally. Which sorption processes and sorption interactions play a role in these two organic matrices? The sorption data sets on organic cations contains several series of analogue structures, for example with increasing alkyl chain lengths, or different polar groups on a constant cationic building block (e.g. beta blockers). This study will first evaluate the influence of specific molecular moieties that are varied in these series on the sorption affinities to both sorbents, i.e. which groups contribute in a comparable trend and which contributions are clearly different? This could elucidate which sorption interactions are dominant in both sorbents for organic cations.

A further evaluation of these two sorbents with other phases abundantly present in soils and cells, such as clay minerals and proteins, can be made for a smaller selection of organic cations. This comparison may determine to what extent SOM and phospholipids determine the overall sorption affinities in soils and cells. A similar HPLC based sorption data set for cations to SOM is available for clay minerals. Can environmental distribution models ignore binding to phases other than SOM, as is common for neutral contaminants? Extensive data sets are available in literature for binding of pharmaceuticals to plasma proteins. With the current data collections we now also would like to explore how these plasma protein sorption coefficients for organic cations compare to the sorption affinities to phospholipid membranes? And how relevant are plasma protein binding coefficients compared to sorption coefficients to membranes for fish bioaccumulation studies or pharmacological whole-body drug-distribution (PBPK) studies?