Soil Sorption, Binding Modes and Transfer of Sulfamethoxazole

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Sulfamethoxazole (SMX) is a sulfonamide antibiotics widely spread in natural soils and waters. Its sorption and reactive transfer properties were investigated on a surveyed silty-loam agricultural soil (INRA Versailles, Feucherolles). SMX revealed to be a weak sorbent (only 10% sorbed at a solid/solution mass ratio of 0.1 at the soil pH of 6.1), its sorption strength increased at pH < 6. Covering parts of the surface sites with copper(II) or zinc(II) ions increased the sorption strength of SMX. The equilibrium analysis of the batch data evidenced the existence of Soil-Cu(II)-SMX type ternary surface complexes and the major role of soil organic matter. We determined that SMX sorbs on humic acids with a comparatively slightly decreased sorption strength. Thus the high reactivity of degraded organic matter relates primarily to its comparatively higher site density (4.3 for humic acid versus 0.1 mmol/g for the whole soil in our experiments). Also, other binding modes than ternary complexes necessarily account for the sorption of SMX, in agreement with studies performed on model compounds **[1]**.

The PHREEQC-based equilibrium model derived from the batches reproduced conveniently the column transfer experiments (SMX spikes in saturated conditions, Figure 1) including the effect of Cu(II) and Zn(II) added to the soil.

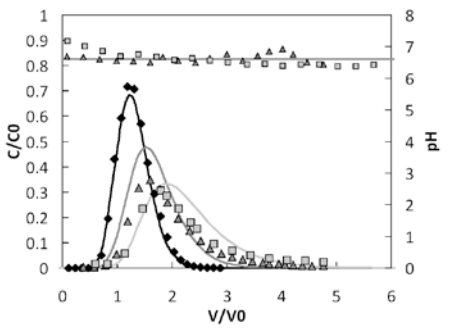

Figure 1. Concentration (V0) and pore volume (V0) normalised column elution curve data (points) and models (lines) of KBr tracer (black) and SMX spikes of soils contaminated (light grey) or not (dark grey) with Cu(II).

[1] Wu *et al*. (2012) *Sci. Total Environ*. 427–428, 247–252.