Geophysical Research Abstracts,
Vol. 11, EGU2009-5308, 2009
EGU General Assembly 2009

Ad-/desorption behavior of Sulfadiazine on soil and soil components

N. Meng, H. Lewandowski, R. Kasteel, H.-D. Narres, E. Klumpp, and H. Vereecken

Agrosphere, ICG-4, Forschungszentrum Jülich GmbH, D-52425 Jülich, Germany (h.lewandowski@fz-juelich.de)

Sulfadiazine [4-amino-N-(2-pyrimidinyl)benzene sulfonamide, SDZ] belongs to the widely used antibacterial veterinary pharmaceuticals which reach the environment by the application of manure. Therefore the adsorption and desorption behavior of ^{14}C labeled sulfadiazine was investigated with different inorganic soil components including Al_2O_3, goethite, illite and compared with air-dried topsoil. The batch sorption experiments with $Al_2O_3$and soil were performed in natural pH-values (8.2 and 7.5, negatively charged SDZ). Experiments with illite and goethite were done with pH-values of 4.2 and 6.8 (natural pH of illite and goethite, neutral and partly negatively charged SDZ) and also done in buffer solution about pH 8 for comparing the adsorption on all adsorbents in same pH range.

The adsorption isotherms on all sorbents are strongly nonlinear and can be fitted well by the Freundlich equation. From the initial slope of the isotherm the partition coefficient K_d could be determined. The adsorption of SDZ on illite at pH 4.2 and on goethite at pH 6.8 has higher K_d-values than at pH 8, which demonstrates that the negative charge of SDZ obstructs the adsorption.

The desorption isotherms show hysteresis effects for all adsorbents. The strong hysteresis was found for goethite and soil indicates strongly physical or chemical binding. On the other hand, the low hysteresis effect for Al_2O_3 and illite indicates the weak binding of the adsorbed SDZ. The properties of the inorganic matrix and especially the charges of the inorganic compounds in relation to the charge of SDZ are important parameters for the sorption process. The data could be described by modeling with different sorption rates and sites.