



Sorption and degradation of selected pharmaceuticals in representative soils of the Czech Republic

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Knowledge of contaminant behavior (e.g. its sorption onto soil particle, degradation etc.) is essential when assessing contaminant migration in soil and groundwater environment. This study was focused on evaluating sorption isotherms and half-lives for 7 pharmaceuticals (clarithromycin, trimethoprim, metoprolol, atenolol, clindamycin, carbamazepine, sulfamethoxazole) on 13 soils of different soil properties. Sorption of ionizable compounds was highly affected by soil pH. The sorption coefficient of sulfamethoxazole was negatively correlated to soil pH and thus positively related to hydrolytic acidity and exchangeable acidity. Sorption coefficients for clindamycin and clarithromycin were positively related to soil pH and thus negatively related to hydrolytic acidity and exchangeable acidity and positively related to base cation saturation. Sorption coefficients for the remaining pharmaceuticals (trimethoprim, metoprolol, atenolol, and carbamazepine) were also positively correlated with the base cation saturation and cation exchange capacity. Degradation rates in some degree reflected sorption of studied pharmaceuticals on soil particles and increased with decreasing sorption.

The highest mobility in studied soils was observed for sulfamethoxazole, but this pharmaceutical was relatively quickly degraded. The second highest mobility was found for carbamazepine, which mostly did not noticeably degrade during our experiments. Thus this pharmaceutical has the highest potential to migrate in water environment. The lowest mobility was observed for clarithromycin. However, this pharmaceutical due to its stability may be retained in an environment for a long time.

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References: Kodesova, R., Grabic, R., Kocarek, M., Klement, A., Golovko, O., Fer, M., Nikodem, A., Jaksik, O., Pharmaceuticals' sorptions relative to properties of thirteen different soils. *Science of the Total Environment* 511 (2015) 435–443.