

Sorption of potentially toxic metals in soils developed in the area of the Zagreb aquifer system, Croatia

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The objective of this work was to create a sorption isotherms of potentially toxic metals (copper, cadmium, zinc) in soils developed in the area of the Zagreb aquifer system, Croatia. Potentially toxic metals (PTMs) form the main group of compounds involved in the contamination of soil and groundwater of the research area. The accumulation of PTMs in the soil, and their transport through the soil into the aquifer, is a serious problem in the preservation of the soil and groundwater quality, which is used for the human consumption.

The Zagreb aquifer is unconfined shallow aquifer, which is in very vulnerable to contamination. Potential sources of contamination near the sampling areas are industrial plants, traffic and intensive agriculture.

The study of sorption properties of the soil is important because it can be used to provide more efficient soil and groundwater protection measures. The two empirical models most frequently used to describe PTMs sorption in/on soil components are Freundlich and Langmuir isotherms. In our study, we used Freundlich isotherm model. A total of 11 samples from two soil profiles located in the area of Zagreb aquifer were sampled for the sorption experiments. PTMs were added to the solutions in the form of nitrates and chlorides.

Apart from sorption experiments, physic-chemical data of studied soils were used in the correlation analyses.

Correlation analysis was made for 14 investigated parameters. In general, first results have shown moderate to very good positive correlation of sorption values with pH, carbonates and sand content and moderate to very good negative correlation with CEC, clay content, organic matter and electrical conductivity.

Preliminary statistical analysis have generated unexpected results and future research will be probably focused on clay mineralogy of the investigated soils.

In the case of potential accidents and contamination with PTMs, it is probable that cadmium and copper will be more bonded to soil particles in comparison to zinc.