Student Research - SR 2024.003

Sorption of amphetamine-type substances to soil

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Dumping of illicit drug production waste of amphetamine-type substances (ATS) is an issue that Dutch authorities continually grapple with due to the concentrated production of such drugs in the Netherlands.

In this study, the soil sorption of MDMA, methamphetamine, APAAN and BMK was studied to enhance the understanding of how these chemicals behave in the soil system and whether they can affect groundwater that is used for drinking water production. Sorption experiments were performed with a field collected soil collected at a drinking water abstraction area. The main outcome is the determination of the sorption behavior of the selected chemicals. Sorption isotherms were obtained and fitted with a Freundlich model. The Freundlich sorption coefficients at an aqueous concentration of 1 ug/L were 24.29 for MDMA, 7.51 for methamphetamine, and 207.1 for APAAN. Data for BMK was insufficient for calculation of a Freundlich coefficient, but does show practically no soil sorption. Results of MDMA and methamphetamine were in line with (scarce) literature data but especially the sorption of APAAN showed order of magnitude higher sorption coefficients than predicted from generic sorption models.

These results are relevant for drinking water companies that use groundwater for drinking water production and provinces that are responsible for the management and quality of the groundwater.

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Keywords: illicit drugs, drug production, chemicals, environment