

ID: W1993926520

TITLE: Occurrence, fate, and removal of pharmaceutical residues in the aquatic environment: a review of recent research data

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ABSTRACT:

The occurrence and fate of pharmaceutically active compounds (PhACs) in the aquatic environment has been recognized as one of the emerging issues in environmental chemistry. In some investigations carried out in Austria, Brazil, Canada, Croatia, England, Germany, Greece, Italy, Spain, Switzerland, The Netherlands, and the U.S., more than 80 compounds, pharmaceuticals and several drug metabolites, have been detected in the aquatic environment. Several PhACs from various prescription classes have been found at concentrations up to the microg/l-level in sewage influent and effluent samples and also in several surface waters located downstream from municipal sewage treatment plants (STPs). The studies show that some PhACs originating from human therapy are not eliminated completely in the municipal STPs and are, thus, discharged as contaminants into the receiving waters. Under recharge conditions, polar PhACs such as clofibric acid, carbamazepine, primidone or iodinated contrast agents can leach through the subsoil and have also been detected in several groundwater samples in Germany. Positive findings of PhACs have, however, also been reported in groundwater contaminated by landfill leachates or manufacturing residues. To date, only in a few cases PhACs have also been detected at trace-levels in drinking water samples.

SOURCE: Toxicology letters

PDF URL: None

CITED BY COUNT: 2651

PUBLICATION YEAR: 2002

TYPE: review

CONCEPTS: ['Effluent', 'Environmental chemistry', 'Aquatic environment', 'Surface water', 'Clofibric acid', 'Sewage', 'Environmental science', 'Groundwater', 'Leachate', 'Groundwater recharge', 'Contamination', 'Subsoil', 'Chemistry', 'Environmental engineering', 'Biology', 'Ecology', 'Aquifer', 'Biochemistry', 'Geotechnical engineering', 'Soil water', 'Engineering', 'Soil science']