

Abstract

In the waste water treatment plant of Bayreuth aerosol-bound emissions of aerated waste water treatment tanks have been investigated. The aerosol concentrations showed variations in time, a finding which could not be explained by changes in the aeration rate, wind direction or temperature. The objective of this study has been to investigate the relationship between the steroid concentrations in waste water and in waste water born aerosol particles.

Therefore, in January and February 2003 steroid concentrations were measured in the waste water of the pre-aeration tank of the waste water treatment plant of Bayreuth as well as in aerosol particles emitted from this tank. The examined steroids were eight sterols, with cholesterol and coprostanol being the most important ones, as well as three estrogens. Since there was no suitable method for the determination of steroids in waste water, an extraction method had to be developed. The central element of this method is a solid phase extraction which was optimized by variation of the stationary phase and the eluents.

The concentrations of coprostanol and cholesterol were found to be 30 - 180 $\mu\text{g L}^{-1}$ in waste water and 400 - 5000 pg m^{-3} in aerosol particles. All the other steroids were present in lower concentrations. The steroid concentrations in both waste water and aerosol particles varied over time, but no clear relationship could be detected. This could be due to additional factors influencing steroid concentrations in aerosol particles. The concentration of surface-active compounds in the waste water can influence the emission process or the background concentration of steroids in urban aerosol particles can affect the measured aerosol concentrations.

Furthermore, some inorganic ions have been measured in waste water and aerosol particles. In contrast to the examined steroids, the time dependent behaviour of ammonium and potassium concentrations in waste water and aerosol particles seemed to interact. For the other ions no relationship between the concentrations in waste water and aerosol could be shown.

Additionally, enrichment rates of steroids relating to an inorganic ion have been determined. The calculated rates showed that non-polar substances like steroids are enriched in aerosol particles compared to waste water. Consequently, non-polar substances are more likely emitted from surface films than from the aqueous phase.