WASTEWATER TREATMENT PLANT INFLUENT ANALYSIS TO DETECT EMERGING PFAS

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Introduction: PFAS are man-made chemicals that include thousands of different molecules that are harmful for the environment and humans. With the awareness of their toxicity, the search for alternatives to PFOA and PFOS led to the production of PFAS that currently emerge in the environment.[1,2] Wastewater treatment plant (WWTP) influent samples may reflect the current use of PFAS in households and industry, providing a better knowledge of which are being utilized. Monitoring PFAS in WWTP influent is an effective technique to better assess population exposure to PFAS to aid future mitigation legislation and risk assessments.[3] We developed an extraction method for WWTP influent samples for suspect and nontarget analysis, to identify emerging PFAS for which pure standards are currently lacking. After identification the PFAS standards will be synthesized at Chiron AS. To evaluate the extraction method regarding its capability to extract PFAS in general, we performed target analysis and studied the PFAS presence in influent samples in the Netherlands. **Materials and Methods**: Influent samples were collected from six WWTPs in the Netherlands, with PFAS influent concentrations previously demonstrated to range from high to low. After centrifugation, the samples were extracted using solid-phase extraction with an HLB cartridge, followed by dispersive solid phase extraction. The extracts were analyzed using LC-MS/MS and the concentrations of thirty-six PFAS were determined using isotopically labeled standards. For suspect and nontarget analysis Quadrupole time-of-flight (QTOF) analysis will be performed. **Results**: As expected, out of the six WWTP influent samples the most contaminated were the two directly influenced by industrial production of PFAS (Dordrecht and Bath), with a total concentration of PFAS of 880 and 1128 ng/L, respectively. Among the PFAS investigated, 6:2 fluorotelomer sulfonate (6:2 FTS) was present in the Bath sample with 510 ng/L, which is higher than previously reported for WWTP influent in literature.[3-4] Another emerging PFAS is *N*-methyl perfluorobutane sulfonamidoacetic acid (MeFBSAA), which is not commonly measured for target analysis of influent WWTP, with a concentration of 130 ng/L in the Bath sample. Hexafluoropropylene oxide dimer acid (Gen-X) appeared to be present in 67% of the samples. **Conclusions:** Thirty-six PFAS were assessed in influent samples from six Dutch WWTP. From the six WWTP influent samples, two were significantly polluted (880 and 1128 ng/L) and two contained low amounts of PFAS (23 and 33 ng/L). The high PFAS concentrations in Dordrecht and Bath are probably due to the presence of the PFAS industry in the region, i.e. Chemours and 3M, respectively. Unsurprisingly, short-chain PFAS were more abundant in the water phase than longer-chain PFAS, which accumulate in the solids. We could detect some emerging PFAS in significant concentrations, such as 6:2 FTS, MeFBSAA, and Gen-X, as well as the legacy ones, i.e. PFOA, PFBA, and PFBS. This exploratory research demonstrates the need of monitoring PFAS production and leakage into the environment. Ongoing work, is focusing on the identification of more emerging PFAS in these samples through suspect and nontarget screening.

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