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Microplastics in Wastewater Treatment Processes

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Introduction

Based on the water content of the influent and the effluent discharge level, wastewater treatment plants are built to provide different water treatment method configurations of different water treatment facilities. Pre-treatment, primary care, and secondary treatment are all part of traditional wastewater treatment. Bar screening, degreasing, air flotation, primary sedimentation, biofilm process/activated sludge process, and secondary sedimentation are among the treatment methods used. Tertiary treatment with (sand) filtration, advanced oxidation, and membrane filtration are used to further increase effluent efficiency. So far, no treatment procedure has been formulated explicitly for the removal of MPs, and only a few studies have looked at the thorough removal efficiencies of MPs at various levels of WWTPs.

In different treatment procedures, the removal efficiencies of MPs vary from one another. MP removal efficiencies in various phases are usually in this order: primary care > secondary treatment > tertiary treatment. However, because of the various treatment methods and sampling, comparing precise removal efficiencies is difficult. As a primary treatment, the WWTP used screening and grit and oil removal, followed by a primary settling tank and biological treatment. In the tertiary level, bio filters were used, and the overall removal rate of MPs from the sludge was 90%. 1000–5000 m MPs made up 45 per cent of the overall volume in the influent, but they were fully eliminated after tertiary care. This WWTP's influence included 180 textile fibres and 430 plastic particles per litre.

Main sedimentation separated the bulk of micro plastic fibres, while secondary sedimentation settled the majority of MP fragments. Biological filtration in tertiary care boosted the efficacy of MP elimination even further. The final effluent contained an average of 4.9 (±1.4) fibres and 8.6 (±2.5) particles per litre after treatment. Artificial textile fibres and synthetic plastic particles were found to be the most prevalent MPs in the WWTP effluent and receiving sea water, supporting the WWTP's position as a conduit for MPs entering the sea.

Sanitation and sewage infrastructure are not complete without wastewater treatment plants. The collection, disposal, and purification of waste, as well as the purification and return of the water to the environment, are all essential components of public health and protection. Several physical, chemical, and biological treatment inhibitors are used in wastewater treatment. In a conventional wastewater treatment system, screens and grit chambers are used to extract larger and denser material, supplemented by main settling tanks to remove material that is slower to settle. The water that comes from these processes is mostly particle-free, and it is sent to a biological treatment point, where high-density colonies of bacteria known as activated sludge biodegrade the carbon and nutrients in the water. Depending on the season and local practise, the filtered water is often disinfected with UV light or chlorination before being added to rivers, reservoirs, and streams as a form of water reclamation.

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