Removing microplastics from industrial wastewater

Process improvements through the use of flocculants

Identification of input pathways has shown that microplastics can enter wastewater along the complete value chain (production – processing – shipping). Filtration, flotation and sedimentation processes are best suited to removing them from wastewater. The efficiency of these processes could be significantly improved by specially developed flocculants.

Separation efficiency of flotation and sedimentation processes increased to 99.9 %

Physical process technologies are typically used to remove particles from industrial wastewater. Ultrafiltration membranes have pore sizes in the range of approx. 0.01 - 0.1 mm and are therefore able to reliably retain microplastics (< 5 mm). Disadvantages include high costs for the membranes and a high energy demand compared to other process technologies.

Flotation and sedimentation processes, on the other hand, are significantly more energy-efficient (at the expense of lower separation efficiency). However, by adding specially developed flocculants, the removal efficiency for microplastic particles could be increased to 99.9 %. Flotation and sedimentation processes thus represent a high-performance, low-energy and cost-effective alternative to filtration processes.

What should be considered when selecting the right process?

The separation efficiency of the processes depends largely on the wastewater composition, which in turn is determined by the production process. The decisive factors for process selection are the types of plastics used in the production process, their density and particle size, the type and composition of additives and cleaning agents, as well as temperature, solids and surfactant content in the wastewater.

Filtration processes retain particles to varying degrees. Ultrafiltration is an absolute barrier to microplastics. Fact sheet 5.1 of the BMBF research focus “Plastics in the Environment” (duration 2017-2022) is available at the BMBF’s website www.bmbf-plastik.de/en. The authors are solely responsible for the contents of the fact sheets. They do not reflect the official opinion of the BMBF.

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