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What happens to microplastics in nature

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The ever-increasing amount of microplastics in water is a serious environmental problem. In addition, their detection is also complicated, so information about their quantity and types is rather missing. For this reason, it is necessary to obtain more information regarding their occurrence in the aquatic environment. However, to determine the microplastic amount in aqueous solution is far from easy and to distinguish between the individual types of microplastics is even more difficult, because the obtained data are skewed by their degradation in the environment. Degradation of microplastics can be caused, for example, by sunlight, abrasion, contact with chemicals, or a combination of these effects.

This work was focused on preparation of microplastic particles which correspond to microplastics in the environment. The five most used plastics (polyethylene, polyamide, polytetrafluoroethylene, polyethylene glycol terephthalate, and polystyrene) were used for preparation. Microplastics were prepared by grinding common used plastics to match the actual microplastics present in the environment as closely as possible. The shape and size of the prepared particles were obtained by scanning electron microscopy. Raman and infrared spectroscopy were used to characterize the microplastic structures. Simultaneously, methodology to determine the amount of microplastic particles in simulated water samples was developed. Furthermore, the effect of UV degradation by a medium-pressure mercury lamp and also the effect of abrasion on structure of microplastics was investigated on the prepared microplastics. The results provided information concerning changes of the spectra for the individual types of microplastics during the long-term exposure by UV radiation or abrasion. The knowledge from these experiments will lead to improved microplastic detection and their fate in real samples.



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