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Removal of Contaminants from Water

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One of the global serious environmental issues is the increasing amount of organic contaminants and microplastics in water resources. Moreover, various studies have already mentioned a narrow connection between microplastics and micropollutants. Harmful effects of microplastics are magnified by their ability to adsorb various organic contaminants. Moreover, these compounds usually pass through sewage treatment plants without changes. For these reasons, this work is focused on a comprehensive solution to this problem.

This issue is closely related to mapping microplastic occurrence in the aquatic environment including their elimination. This study deals with commonly used plastics; polystyrene (PS), polytetrafluorethylene (PTFE), polyamide (PA), polyethylene glycol terephthalate (PET), polyethylene (PE), *etc.* Microplastic samples were prepared by abrasion from commonly available plastics to simulate real microplastic occurrence in the environment. Prepared samples were characterized by scanning electron microscopy (SEM), Raman spectroscopy and infrared spectroscopy (IR) to obtain their fingerprints. These characteristics can be applied as standards for characterization of real microplastics.

Further research was focused on possible changes in characteristic fingerprints due to solar radiation. Degradation by UV radiation was simulated by a medium-pressure mercury lamp. Changes regarding the individual microplastics were evaluated and compared with the original ones.

The prepared microplastics were also used to set the methodology for determination of the individual microplastics. Removal of different types of microplastics was tested on the functionalized natural clays by various liquids. Simultaneously, a special sorption set-up was designed and constructed for microplastic removal. Determination of the adsorption effectiveness revealed the crucial effect of applied liquids. Modification of the sorbents also significantly increased the adsorption capability.



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