The aim of this study is to investigate the sorption capacity of selected pharmaceuticals on the surface of the most often identified microplastics in the aquatic environment.

Microplastics are the fragments of plastic capable of passing through a sieve of up to 5 mm. Currently, they are systematically found all around the world. World production of these materials continues to grow and in 2013 reached 299 million tons [1]. This state of the matter is due to the fact that traditional materials such as glass, metal and paper are replaced by more cost-effective plastic products. These materials get into the aquatic environment through multiple anthropogenic sources: plastic waste left on the beaches, lost or discarded tools used by the fishing fleet, losses during shipping, outflows from processing plants, sewage contaminated by fibers from washing clothes, some cosmetics (peeling), toothpaste and spray abrasives [2–9].

Since these materials have a hydrophobic nature, their potential to change the bioavailability of other contaminants in the environment is subject to testing. Available literature sources describe experiments on the sorption of e.g. persistent organic pollutants (POPs) such as polychlorinated biphenyls (PCBs) and dichlorodiphenyltrichloroethane (DDT), on the surface of plastics and their desorption under simulated physiological conditions. Results of these studies confirmed the accumulation of non-polar substances on the surface of plastics, effectively influencing the distribution and transport of organic pollutants in the environment. This kind of interactions represent a significant influence on the potential environmental risks represented by the adsorbed substances, since they are concentrated in one point and can be released for example by consumption of microplastics by aquatic fauna [2,3,10–14].

However, as of today, impact studies of microplastics on the bioavailability of so-called new emerging pollutants, which include residues of pharmaceuticals, have not yet been performed. Drugs deserve special attention due to the fact that they have a great potential impact on the environment, confirmed by numerous publications in the field of ecotoxicology. Large quantities of pharmaceuticals are consumed not only for human therapy, but also in veterinary medicine (i.a. in prophylaxis) and livestock. It is known, that they are not totally eliminated in target organisms and are excreted (30-90%), either unchanged or in the form of metabolites. As a result, they are transferred via different routes into the environment and are identified in many ecosystems [15–18].

Therefore this project includes defining the sorption capacity of selected pharmaceuticals from 3 groups belonging to the most frequently used and detected in the environment: anticancer drugs, veterinary antibiotics and beta-blockers. The elected representatives of plastics materials are four most commonly used polymers: polyethylene of high and low density (HD-PE and LD-PE), polypropylene (PP) and polyvinyl chloride (PVC). The studies will be carried out in accordance with the OECD 106 procedure and they include: selecting the optimum microplastic/solution ratio, designating the adsorption kinetics and adsorption isotherms, and assessing the influence of pH and salinity changes of the aqueous solution on the abovementioned factors.

The planned research is of a pioneering nature, since interactions between the chosen existing aquatic pollutants (pharmaceuticals and plastics) has not yet been explored. The research conducted under this project will increase the current state of knowledge of pollution of the aquatic environment, providing answers to the question whether plastic may affect the bioavailability, and thus the potential environmental risks represented by the residues of selected pharmaceuticals in the aquatic environment.

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