

Synopsis of the PhD thesis by MSc Alan Puckowski

Titled: Analytics, sorption and ecotoxicological evaluation of mixtures of selected veterinary pharmaceuticals in the aquatic environment

The main aim of the presented Ph.D. thesis was to assess, whether veterinary pharmaceuticals, commonly detected within the aquatic environment can have negative effects on non-target aquatic organisms, and whether these effects may be greater if mixtures of the aforementioned pharmaceuticals are present. In order to ensure the quality of results the studies are enriched through the use of HPL-UV-Vis technique to evaluate the behavior of test compounds under the conditions of ecotoxicological tests.

An additional aim of the study was to assess the sorption of selected pharmaceuticals on the surface of newly emerging environmental pollutants in the form of microplastics, which could potentially have a significant ecotoxicological impact.

The group of selected veterinary pharmaceuticals was represented by 3 fluoroquinolones: enrofloxacin, ciprofloxacin and norfloxacin, and 2 benzimidazoles: flubendazole and fenbendazole.

The results show that the selected substances can cause negative effects at low concentrations to non-target organisms. Furthermore, where applicable, mixture studies were performed, which illustrated that the toxicity of drugs from the same pharmaceutical group is additive, resulting in toxic effects below the NOAEC concentrations of the individual drugs in the mixture.

The conducted microplastic sorption experiments have shown that there is an interaction between the mentioned water pollutants. However, it can be stated that microplastics in the aquatic environment will not significantly affect the distribution and bioavailability of residues of the pharmaceuticals selected for research, due to the very weak interactions between them. Ionic strength has been established as a key factor in the sorption process, significant interactions occur only under conditions not occurring in the natural environment (in distilled water).