DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Pharmaceuticals is one of the new emerging groups of pollutants that enters the environment along with the sewage from households, farms and hospitals. Due to the fact that these compounds are delivered in small, but continuous doses to living organisms (including humans) they influence their growth and development. Therefore, it is important to monitor the levels of pharmaceuticals in the environment. One of the techniques used for this purpose is passive dosimetry (extraction). This technique involves the free flow of the test substances from the environment, called the donor phase, to the inside of a device called a passive sampler. Samplers are usually constructed of two-membrane-bonding disks, usually covered with a solid sorbent (receiving phase) on their inner side. A good example is a polar organic chemical integrative sampler (POCIS). These devices are usually placed in the environment for more than 7 days. During this time, the test substances are accumulating inside the sampler. At the end of the experiment, the average concentration of these substances in the donor phase is determined.

In the Department of Environmental Analysis UG, a new type of passive sampler was designed, where ionic liquids (ILs) are used as the receiving phase. Solvents of this type are characterized by unique properties - despite the ionic structure they are liquid at temperatures below 100 ^{o}C. In addition, due to their very diverse structure, they interact with the tested substances in a variety of ways, giving them almost perfect solvent properties. Therefore, several years ago it was decided to use ionic liquids as the receiving phase in the passive extraction of pharmaceuticals from water, and this technique was called PASSIL (PASSive Sampling by Ionic Liquids). Previous studies have shown that the technique can be an alternative to the current passive technique in which a solid sorbent is used. It has been observed that substances in the water, which ae neutral or charged negatively, are more likely to accumulate inside the sampler. In addition, the procedure of PASSIL extraction is primarily dependent on the pH and salinity of the donor phase, but also on the temperature, flow of the donor phase and the presence of humic acids. Similar conclusions regarding physicochemical conditions were made on the basis of a literature review and preliminary studies on POCIS samplers. In this case, there is no selective extraction with respect to the groups of pharmaceuticals or their charge. Almost all previous studies have been carried out using standard solutions of pharmaceuticals made in deionized water.

Due to the possibility of the future use of the PASSIL technique, it was decided to conduct PASSIL passive extraction from surface water and wastewater in comparison with the POCIS technique. Initially, it is planned to conduct studies on the effect of dissolved organic matter and the flow of the donor phase on extraction using PASSIL and POCIS for the analysis of drugs from environmental water using already constructed static and flow systems. The next step will be to investigate the impact of selected ionic liquids on living organisms in order to identify potential environmental hazards. Lastly, the most prospective samplers will be used to determine the concentration of residues in wastewater and surface water. During the last step of the project our samplers will be placed in a sewage system (Wastewater Treatment Plant Gdańsk-Wschód) or surface waters (surface water in Straszyn).

The presented project will greatly enrich current knowledge on analytical chemistry, in particular water analysis. The consequence of this project will also complement the information currently used POCIS sampler. In addition, the general knowledge about ionic liquids will be expanded, and in the future may become an alternative to the currently used solid sorbents used as receiving phases. The conducted research has a positive impact on the development of science and the standard of living of modern society.