



Abstract of doctoral dissertation of M.Sc. Marta Borecka, entitled:

**Study on exposure and potential consequences of the presence of pharmaceutical residues
in the coastal area of the southern Baltic Sea**

Pharmaceuticals comprise one of the few groups of chemicals specifically designed to act on living cells. Therefore the occurrence of their residues in the environment presents a special risk and is currently intensively discussed in environmental sciences. The presence of drug residues in environmental samples (surface-, ground-, drinking- and wastewaters) has been reported in the last years in a number of studies. However information about their occurrence and fate in marine environment is still sparse.

Therefore, the aim of the doctoral dissertation was to develop sensitive and selective analytical method for the simultaneous determination of pharmaceuticals in seawaters and to determine their presence in marine waters from the coastal area of the southern Baltic Sea. The developed method comprise of several steps involving the use of solid-phase extraction technique followed by the liquid chromatography separation finally coupled to the tandem mass spectrometry (in multiple-reaction monitoring mode). To prove the quality of the obtained results, beside validation parameters of the applied method, additional parameters such as expanded uncertainty, matrix effects, absolute recoveries and extraction efficiency were determined.

The seawater samples were collected in 2012-2014. The obtained results show that the target compounds were present in environment at concentration range of ng L^{-1} . The highest concentrations of the analyzed compound were found in samples collected close to the discharge points of wastewater treatment plants and also in bays and river mouths. The most frequently detected compounds were trimethoprim, diclofenac, sulfamethoxazole and sulfapyridine.

The second task was to examine the environmental fate of selected compounds in seawater by determining their hydrolytic stability. The obtained results shown that under tested conditions selected pharmaceuticals are hydrolytically stable.

Moreover, in the presented work the assessment of the ecotoxicity of four selected compounds towards the green algae – *Chlorella vulgaris* and the examination of the influence of salinity on the ecotoxicity were performed. The acute toxicity tests were carried out according to OECD guideline 201. The determined EC_{50} values ranged from 1.0 to 123.2 mg L^{-1} . The obtained results shown also the tendency that the toxicity of selected pharmaceuticals decreases with increasing salinity.