Recently, global production of plastics has exceeded 322 million tons annually. While some waste plastics is subjected to recycling processes, the rest is stored at landfills, where proceeds a slow degradation processes. However, despite attempts postconsumer waste management of plastics much of it gets into the environment, in particular for natural waters, where they undergo various physico-chemical processes leading to their partial decomposition and interact with other contaminants present in the water. As a result of these processes micro- and nano-plastics are often formed. The composition of micro- and nano-plastics and a large surface to volume ratio allow sorption of contaminants both organic and inorganic on their surface making them even more dangerous for the aquatic fauna, compared with plastics did not contain the contaminants adsorbed on the surface. Numerous studies have demonstrated that even small organisms are able to accumulate waste plastics. In conjunction with data on sorption of organic and inorganic contaminants on the surface of the plastics must be concluded that often accumulate in biota are contaminated particles of plastics.

It is therefore necessary to determine to what extent the plastics are degraded in the environment depending on different conditions. In addition, an important aspect is to quantify the ability to accumulate contaminants by degraded plastics. Another object of this project is to determine the sorption capacity and the binding strength of plastics waste previously subjected to different types of aging in respect of organic contaminants (PAHs) and inorganic (heavy metal ions). In addition to determining the sorption of contaminants by plastics subjected to various processes of "aging" under study it planned to carry out ecotoxicological tests providing information about the direct effect of the test materials on living organisms. Important stage of the project is to determine the degree of desorption of contaminansts by means of simulating gastric fluid.

It will test plastics, which, according to literature data, get the largest amount of an aqueous medium and have different structure, eg. polypropylene (PP) and high density polyethylene (HDPE) which crystalline structure and poly(vinyl chloride) (PVC) characterized by amorphous structure. Plastics will be subject to conditions simulating aging processes occurring in the environment, ie.the photo- and thermooxidation, the aging under controlled conditions in the laboratory in the waters coming from reservoirs with different physico-chemical characteristics. Then testing of adsorption abilities of plastics in respect to selected compounds of PAHs and heavy metals will be performed. The choice of contaminants will depend on the results of the first stage of research on contaminated plastics collected from the environment. In addition to direct sorption studies in order to understand the mechanisms of binding pollution by plastics of varying severity degree of aging research will be conducted plastic surfaces in order to obtain complete information about the mechanism of binding pollution by selected materials (SEM/TEM, FTIR). In the last stage it is planned to assess risk based on ecotoxicological tests using *Daphnia magna* invertebrates, *Vibrio fisheri* bacteria (Microtox®) and algae *Pseudokirchneriella subcapitata CCAP 278/4*. In addition, to determine the potential transfer of contaminants from plastic organisms will be carried out kinetics of desorption from the surface of the plastics using the simulant gastric fluid and determining its impurities.

Undertaken research interests due to its innovative nature is of great importance both cognitive and practical. Led multifaceted, combining elements of materials chemistry, surface chemistry, analytical chemistry and environmental chemistry, will make a realistic assessment of the risks associated with the impact of pollution from post-consumer waste plastics. Particularly valuable will be the information obtained from desorption studies are to fully define the impact of plastics on living organisms.