

### ***Summary of the PhD thesis***

Chemical and electrochemical companies, which deal with coating of metals, produce a significant amount of sewage of various content. There are companies among them producing printed circuit boards which, in regard to applied production processes and quality-quantity characteristics of sewage, deserve a special attention. In those companies printed circuit boards are produced by way of mechanical, chemical and photochemical processes. In chemical and photochemical processes there is sewage, which in regard to pollution contained in it and the risk of environmental contamination, has to be subject to proper purification processes, which is a significant issue in environmental engineering. In the thesis issues were presented regarding the removal of heavy metals ions and organic compounds from sewage originating from the printed circuit boards production. On the basis of the conducted analysis of literature data, the up-to-date solutions in sewage purification, the study of legal and technical-technological conditions and own initial research, technological solutions have been put forward, which enable the removal of heavy metals and organic compounds from sewage. For this purpose, sodium trithiocarbonate was used, which has not been applied so far in purification of sewage from the printed circuit boards production containing heavy metals in complex form and a combination of interconnected acidification methods and Fenton photocatalytic reaction. In the thesis the results of research on model solutions and real sewage containing heavy metals and coordination complex currently applied in industry have been presented. In the research chelating agents was also used on recommendation of USEPA. The removal of organic compounds was conducted by way of a currently used method, which provides initial acidification with Fenton photocatalytic process. In planning of the experiment there were statistic methods of planning and analysing experiments (response surface method) used. Mathematical models of removal of heavy metals using sodium trithiocarbonate and organic compounds with application of Fenton photocatalic reaction have been created, which were verified in laboratory and industrial conditions. The obtained experimental and model results were subject to a critical discussion, possible reasons for a specific course of reaction were given or the efficiency of the proposed methods, on the basis of data from non-organic chemistry, analytical chemistry and technology of industrial sewage purification. Moreover, the provisions of technology of heavy metals and organic compounds removal were presented and algorithms of conduct were created, which are helpful in introduction of the proposed solutions on an industrial scale. On the basis of the results from the experimental and model research, general, detailed and applicable conclusions have been made and elements have been presented, which might be a subject of further improvement.