DESCRIPTION FOR THE GENERAL PUBLIC

During sludge management in the municipal wastewater treatment plant, reject water is produced. Biological nitrogen removal is difficult because the composition of this wastewater is unfavorable for the microorganism, especially because of a high concentration of nitrogen compounds and low ratio between organic and nitrogen compounds. To date, standard technologies for the treatment of reject water have not been developed, therefore, this wastewater is usually treated in multi-stage systems, which generates high capital and operational costs. An alternative solution may be the application of a one-stage reactor filled with supports, in which slow-growing microorganisms responsible for the conversion of nitrogen will be retained. Intermittent aerobic and anoxic phases in the reactors will provide conditions for the growth of different groups of microorganisms and ensure the effective removal of nitrogen in a variety of metabolic pathways. Physical and chemical factors will be used to improve the metabolic activity of microorganisms. The support will contain metallic iron, which will be corroded and released from the support to the reject water, becoming available for microorganisms. In addition, the reactor will be placed in a static magnetic field (SMF). The use of SMF for an improvement of biological processes has been documented in the range of technological solutions in environmental engineering. The project aims to determine the effect of iron in the support and SMF on the effectiveness of the nitrogen conversions, microbial activity and species composition of a biofilm.

Analysis of the basic physical and chemical indicators in reject water will be supplemented by measurements of microbial activity and species composition. Microbial activity will be determined respirometrically, enzymatically and on molecular level. Multidirectional analysis of the results will determine the major metabolic pathways of nitrogen removal from the reject water and the effect of physico-chemical factors on the activity and species composition of bacteria involved in nitrogen conversions. The combination of technological and microbiological aspects will enable the development of an efficient technology to remove nitrogen from the reject water in the one-stage reactor. The use of molecular methods in the technological studies to determine the relationships between groups of microorganisms will provide novelty and interdisciplinary aspects, which give wide scope for the interpretation of the results. These results will help shed light on ecological questions regarding the complex bacterial communities in reject water treatment systems.