DESCRIPTION FOR THE GENERAL PUBLIC

Recent years have seen a number of new technical solutions, the alternative to the classic nitrification-denitrification, aimed at improving the efficiency of processes to remove nitrogen from wastewater and striving to reduce energy intensity in sewage treatment plants. The important role is to ensure appropriate conditions for the growth and activity of various groups of nitrifying microorganisms responsible for carrying out defined and specific to their metabolic processes, what is a prerequisite for obtaining the appropriate removal N efficiency. It should be underlined that the individual functional groups of microorganisms used in biotechnology to wastewater treatment, require different, and in many cases even contradictory, conditions for the development and achievement of high metabolic activity. Ability to verify that issue of the provided research, among others, is the type BT (OUR, AUR) or SBR test, with a combination of selected technological parameters (concentration of activated sludge and the resulting share of biomass developed in the form of sludge and/or biofilm in the form of solid granular sludge age strategy aeration, temperature, pH, concentration of nitric acid (III) and ammonia overload) in one reactor.

The proposed project involves the carrying out of complex technological and microbiological research of all groups of microorganisms relevant to the elimination of N wastewater compounds and processes for optimal route, eg. short-cut nitrification (i.e., to achieve full inhibition of bacteria NOB) along with efficient AOB bacteria culture, at a dosage of activated sludge to the reactor, which is unique in such studies and may contribute to meet the conditions necessary to maintain and stable running of the process and increase knowledge in this field of science. The results of these experiments will contribute to the development of three disciplines: engineering, environmental biotechnology and mathematical modeling, and in particular a better understanding of biological processes driving strategy removal N compounds from wastewater. It should be noted that in addition to detailed knowledge related to waste water treatment in the SBR, the results of the proposed project will contribute to the analysis of the transformations of N in other types of biological reactors. These experiments will also contribute to the development of microbiological research and research methods in mixed populations AOB-NOB. Precious added value will also be the possibility to compare the results obtained with with different techniques of molecular biology and to confront them with the results of technological research, mathematical modeling and computer simulation.

The reason for taking the above presented research topics are on the one hand, the continuing lack of clear data on the interaction of two different AOB-NOB functional groups of bacteria simultaneously present in the process of nitrification and their impact on the effectiveness of sewage treatment, and on the other hand the conviction that the results of the project will not only allow to know possibility of more efficient nitrogen removal process in SBR reactors depending on the variable technological bioreactor conditions, but also, by identifying biocenoses present next to each other regardless of activated sludge, to confirm the tracks to remove N, pre-defined solely on the basis of theoretical considerations and / or technological research and compare them with the results obtained from mathematical modeling and computer simulation.