

## FATE OF THE SEWAGE ORGANIC LOAD IN A SEWERAGE SYSTEM

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### EXTENDED ABSTRACT

The aim of the work is to investigate experimentally and simulate the effect of retention time and temperature on the fate of sewage organic load in the sewerage networks and specifically the variations of the different fractions of COD. These alterations are evaluated on the basis of their influence to the performance and operation of an activated sludge system with nutrients removal. Increased amounts of readily biodegradable substrate may positively affect certain the biological processes (e.g. biological phosphorus and to a lesser extent nitrogen removal), while at the same time its abundance and/or the presence of partly hydrolysed materials can cause disturbances during the operation of a wastewater treatment plant (e.g. filamentous bulking and foaming).

A sewer and a wastewater treatment plant are similar when comes to the predominant microbial processes. As a result a mathematical model, based on ASIM No1, for the simulation of the process of hydrolysis of the particulate slowly biodegradable COD to readily biodegradable COD and the decomposition of the latter is developed. The effect of the biofilm and suspended biomass is considered for the processes of hydrolysis and degradation. The coefficients that are applied in the mathematical modelling were determined from literature and by lab scale experimentation of the system, while the validation of the simulation model is based on separate experimental data.

The experimental and simulation results obtained showed that for moderate retention times and high temperatures, the combination of the phenomena of hydrolysis and degradation, although retain total COD, however alter the synthesis of COD, since the amount of readily biodegradable substrate increases with simultaneous reduction of slowly biodegradable substrate. For very long retention times a significant reduction of both total and easily degradable COD can be anticipated.

Considering the importance of the COD composition to the operation of the wastewater treatment plants, future work should focus on the experimental field in order to investigate each process involved, in a sewerage system, separately and thus, estimate representative values for the kinetic parameters and further develop the mathematical model to include all processes involved in order to apply the knowledge gained to specific case-studies.

**Key words:** Wastewater; gravity sewer; hydrolysis; degradation; organic matter; mathematical modelling.