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UTILIZATION OF A RESPIROMETRIC TECHNIQUE FOR THE AEROBIC TREATMENT OF INDUSTRIAL WASTEWATER

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Abstract

The aerobic biodegradation of different types of industrial wastewaters in an industrial activated sludge WWTP with preanoxic denitrification has been the aim of the present study. The considered wastewaters were produced from textile industries, dairy farming, landfill leachate, and composting.

Aerobic biodegradation was studied by respirometric tests, being the respirometry a widely used technique for the characterisation of wastewater and activated sludge. Respirometry is the measurement and interpretation of the biological oxygen consumption rate under well-defined experimental conditions. Because respiration rate is directly linked to substrate removal and biomass growth, respirometry is an effective tool in the control of the activated sludge process.

Respirometric test were carried out continuously measuring the dissolved oxygen concentration and pH and ORP values inside the reactor. Measured data were recorded by a data acquisition unit.

A mathematical model based on the Activated Sludge Model No.1 was developed and calibrated using the experimental results from the lab-scale plant. Non linear differential equations of the model were implemented in a self-made software in order to obtain the biomass kinetic parameters and the COD fractionation in classes of biodegradability.

The respirometric technique applied was helpful for the description of the microbial activity of the considered (heterogeneous complex) wastewaters/WWTP activated sludge systems. Consequently, useful suggestions about operating conditions were obtained, by which the obtained purification efficiencies for COD, ammonia and nitrates were about 60%.
