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Research area: Process aims

Anaerobic wastewater treatment

Key words:

Anaerobic sludge, concentration of biomass, impact of additives, process control, flow cytometry

TITLE:**Innovative analytical measurements for checking of microbial activity regarding operating conditions****Background/Problem area**

In the most cases waste water from paper industry is treated biological. Next to aerobic treatment plants anaerobic systems take place. The operation of preacidification tanks of anaerobic treatment plants is very simple. Up to now the process control includes only control of pH value and hydraulic amount, but there are more parameters of impact.

Optimal preacidification is the basis for a stable operation of the methane reactor. Short-term consequences of reduced preacidification could be reduced methane production and therefore reduced energy recovery. Long-term consequences, for example inhibition due to accumulation of organic acids, are very cost-intensive because in some cases you have to service the reactor and refill it with anaerobic sludge or you have extra costs if the limit values cannot be hold.

Would it be possible to keep constant and optimal conditions for the influent flow of the anaerobic reactor negative and expensive consequences could be reduced.

At this time there is no process measuring and control technology available. Process control for the preacidification could be control of the amount and composite of organic acids or analysis of microbiological mixture. Available techniques are standardized but need special analytics and are not suitable for online-control.

Objectives/Research results

Objective of the research project is to define a main parameter and therefor to develop the basics for a future online control to ensure efficient operating of the anaerobic reactor.

First step was to check if flow cytometry is able to handle waste water samples of paper industry because of the special sample matrix. Flow cytometry is a new method to analyze the amount of bacteria and therefore to describe the biological condition in water systems. Results show that there is no problem because of the sample matrix and that the method is able to show biomass changes quasi online.

First laboratory tests were started to determine the influence of biomass concentration on anaerobic degradation. The results are not analysed yet.

Data of six paper mills are evaluated with regard to degree of preacidification, hydraulic retention time, pH value and other relevant parameters regarding changing in the last two years. Evaluation is not finished.

Application/Economic benefits

With a new process control system that works online the preacidification of an anaerobic treatment plant can deliver waste water with optimal and constant conditions to the anaerobic reactor. Then the reactor will be able to work with stable performance. Anaerobic techniques will gain in importance and because of the new control system there will be a new market for Consultants and technology supplier.

Paper industry as well as all anaerobic technique using industries for example brewing industry benefit from this new approach for an online control system for the preacidification tank of an anaerobic treatment plant.

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Remarks

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