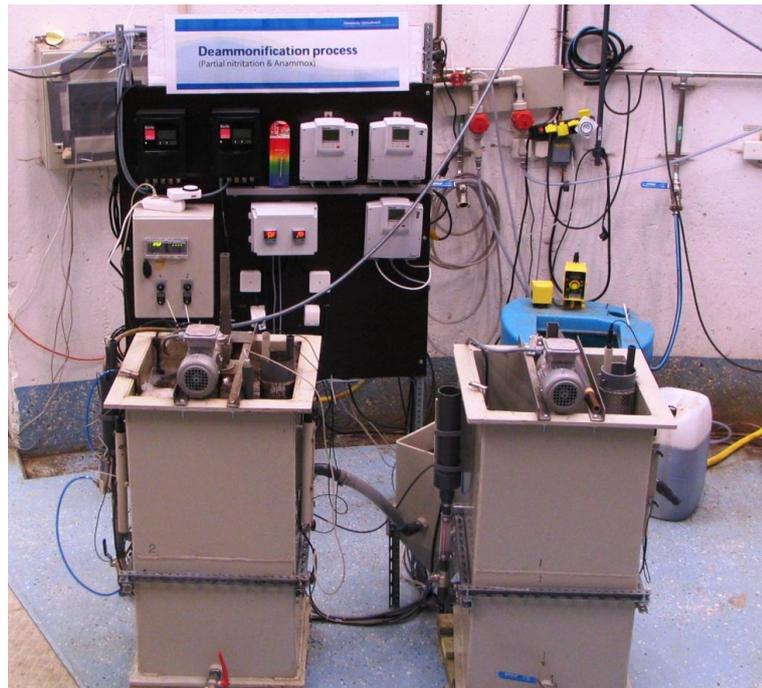


Control and optimization of the deammonification process

Teknik för att styra och optimera deammonifikation



Collaboration partners

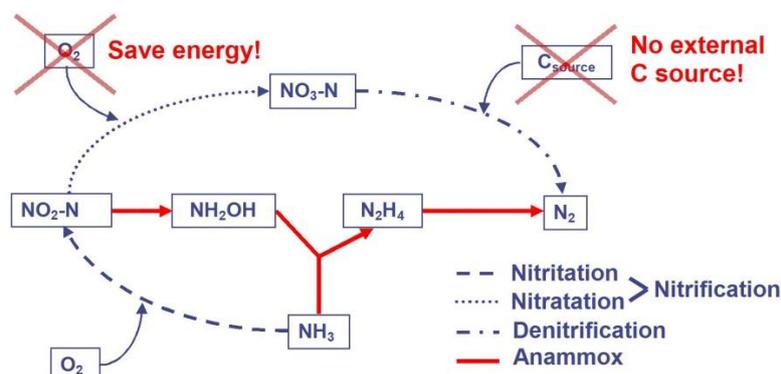
Hammarby Sjöstadsverk, IVL, KTH, Syvab, Cerlic

Summary

Deammonification is based on nitrification (oxidation of about half of influent ammonium nitrogen to nitrite nitrogen without further oxidation of nitrite) and the Anammox process (reaction between formed nitrite and remaining ammonium to nitrogen gas). This technology gives possibility for a cost-effective nitrogen removal from supernatant from dewatering of the digested sludge at the wastewater treatment plants. By separate treatment of supernatant (as ammonium rich stream with concentrations of about 1000 g m^{-3}) influent nitrogen load to the plant can be decreased in 15-20 %. The aim is to develop and test different measurement techniques and operation strategies with further possibility of application in monitoring, control and optimization of the deammonification process. Those methods are:

- Kaldnes biofilm carriers are used for different discontinuous tests for determination of Anammox bacteria, nitrifiers and denitrifiers activity.

- On-line measurements of oxygen concentration, conductivity, pH, redox potential, and temperature are used for process control and monitoring.
- Tests based on measurements of gas volume or a pressure increase caused by nitrogen gas produced in the Anammox process are applied as a simple way to estimate Anammox bacteria activity.
- Different operation strategies like intermittent aeration, tested at the pilot plant, will help to optimize the deammonification process and to obtain the efficient nitrogen removal.



Description

The pilot plant operated at Hammarby Sjöstadsverk consists of two moving-bed biofilm deammonification reactors with a flexible volume of 100-200 l and two sedimentation tanks. The reactors are filled in 40% of the total volume with Kaldnes biofilm-carriers, which has an effective surface area of $500 \text{ m}^2 \text{ m}^{-3}$. The pilot plant is equipped with on-line measurements of oxygen concentration, conductivity, pH, redox potential and temperature.

Goal

To determine the optimal parameters for efficient nitrogen removal and to study different strategies for deammonification process operation.

Expected benefit

Research and development efforts can lead to a more cost-effective and environmentally friendly nitrogen removal technology. This innovative technology has decreased CO_2 and N_2O emissions in comparison with traditional nitrification/denitrification.

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