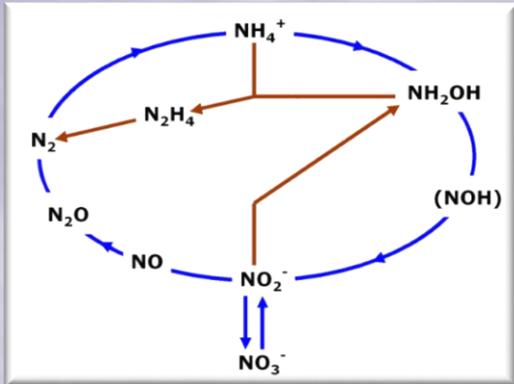


NAS[®]

Anammox in active sludge

Application

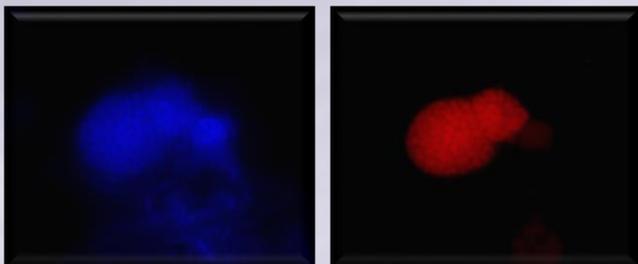
NAS[®] (New Activated Sludge) represents a unique active sludge system in which anammox bacteria constitute a part of the biomass. These micro-organisms ensure a very effective removal of the nitrogen during aerobic purification.



red arrows : anammox shortcut in the nitrogen cycle

An aerobic purification step is often necessary to enable the removal of the remaining COD fraction and nutrients and to facilitate effluent re-use.

The NAS[®] system can be configured with a variety of sludge/water separation systems, e.g. post-settling tanks, flotation or membrane separation. In case an active sludge system or membrane bio reactor (MBR) is configured within a NAS[®] system a number of additional advantages are obtained, e.g. a significant improved effluent water quality and the option to reduce the dimension of the aerobic purification system.



Left (blue) : all micro-organisms
Right (red) : autotrophic denitrification
(by anammox-organisms)

Process

The NAS[®] installation consists of aerobic and anoxic compartments. In the first aerobic tank, a part of the ammonium nitrogen ($\text{NH}_4\text{-N}$) is mainly oxidized to nitrite and partly to nitrate. At the same time COD is converted. In the next anoxic compartment, the nitrite and nitrate are denitrified. Part of the remaining nitrite and $\text{NH}_4\text{-N}$ is converted directly into nitrogen gas by autotrophic organisms, under exclusion of oxygen and without conversion of COD. The remaining nitrogen is oxidized to nitrate in the 2nd aerated compartment. This nitrate is further denitrified during internal circulation.

In a secondary settling tank or membrane installation, the micro organisms are separated from the clean effluent water. In this manner the micro organisms are circulated in the system. The MBR-NAS[®] technology can be applied both for industrial water purification as well as for post purification of the liquid fraction originating from (manure) digestion.

Results

The NAS[®] system offers an overall energy gain of about 40-50%. Moreover the installation can be realized in a smaller dimension and there is no need for fresh (COD) supply in support of the denitrification process. At the same time the amount of sludge produced is lower, which results in better economics for the overall operation.

The NAS[®] system is very robust and can therefore be integrated relatively easy in existing active sludge installations. Depending on the needs, the effluent water can be discharged or reused.

EN-2015