

What is Biological Nitrification?

Biological nitrification is a microbial process by which ammonium (NH_4^+) in an aerobic condition is converted into nitrate (NO_3^-) through a series of intermediate steps.



Where does it occur?

- Wastewater treatment
- Prevents eutrophication
- Aquaculture
- Soil fertility management

•Two-step process:

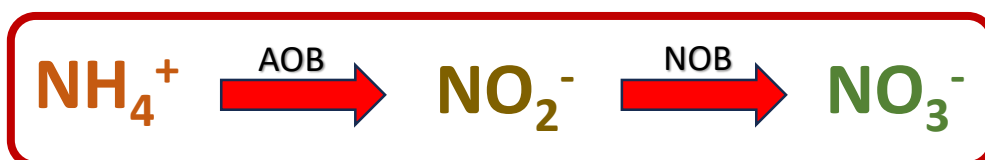
➤ Ammonium oxidation:

Ammonium (NH_4^+) is first converted to nitrite (NO_2^-) by ammonia-oxidizing bacteria (AOB) such as *Nitrosospira* and *Nitrosomonas*.



➤ Nitrite oxidation:

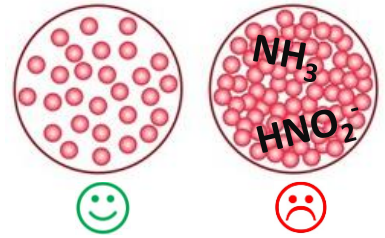
Nitrite is then converted to nitrate (NO_3^-) by nitrite-oxidizing bacteria (NOB) such as *Nitrospira* and *Nitrobacter*.



Key parameters for biological nitrification

➤ Free ammonia (FA) and free nitrous acid (FNA):

Highly inhibits both AOB and NOB within the certain concentration range (10-150 mg FA/L and 0.22-2.8 mg FNA/L) .



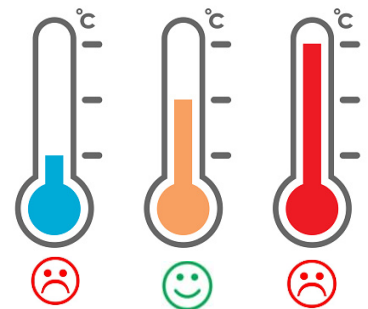
➤ Dissolved oxygen (DO):

Nitrifying bacteria use oxygen as an electron acceptor, therefore adequate DO level is critical. Nitrification rate significantly decreases at levels below 2 mg/L.



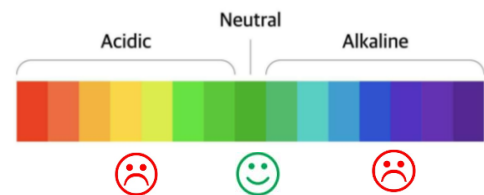
➤ Temperature:

Nitrification rate increases with the increase in temperature, however NOB can be favoured over AOB in lower temperatures.



➤ pH levels:

The best nitrification rate can be achieved when the pH level is in the range of 6.0-8.0.



For further information visit the ARC NiCE hub Website: www.nicehub.org

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