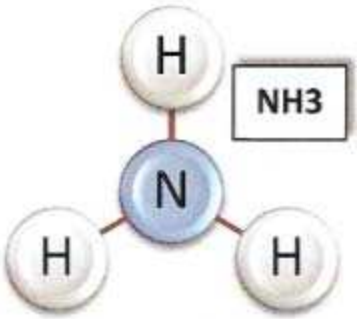
The Nitrogen Cycle - in detail

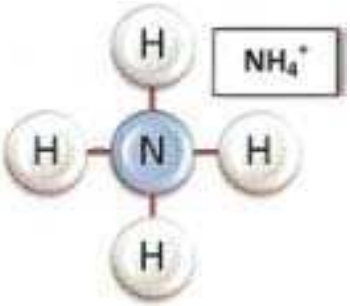
The three elements of an aquaponics system each have their part to play in the nitrogen cycle. This section looks more closely at the chemicals and process created as the water passes through each element of the system.

Fish & the Nitrogen Cycle



Waste excreted from the fish, as well as uneaten food that remain inside the aquaponics tank. If nothing eliminates these waste products, the fish in the aquaponics system will die.

Waste is quickly broken down into either ionized or un-ionized ammonia. The ionized form, ammonium (NH/)' is present if the pH is below 7 and is not toxic to fish. The un-ionized form, ammonia (NH3) is present if the pH is 7 or above and is highly toxic to fish. Any amount of un-ionized Ammonia (NH3) is dangerous, however once the levels reach 2 ppm (parts per million), the fish are in grave danger.



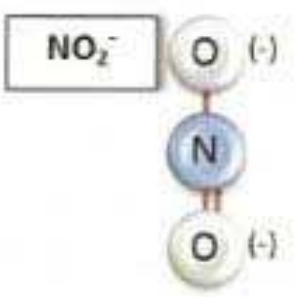
Water tests actually check the ammonia levels by checking for NH/and NH3 and so it is really these two types in combination that affects the quality of the water.

Ammonia usually begins rising by the third day after introducing fish into your system.

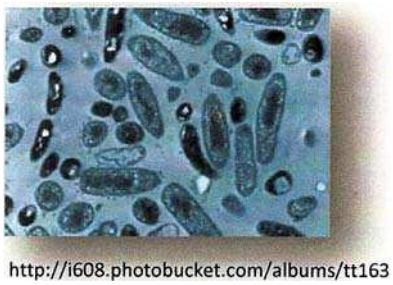
Bacteria & the Nitrogen Cycle

As mentioned in the diagram above, there are two types of bacteria in an aquaponics system. These bacteria live in the growing material that supports the plants. Bacteria require very specific temperatures in order to form and develop to be effective and successful in an aquaponics system.

Nitrosomonas



Nitrosomonas bacteria oxidize the ammonia. The result is that the ammonia is eliminated. However, the by-product of ammonia oxidation is nitrite ($N0_2$-), which is also highly toxic to fish.



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Nitrites levels as low as 1 mg/l can be lethal to some fish.

Nitrite usually begins rising by the end of the first week after introducing fish.

Nitrosomonas prefer an optimum pH of 6.0-9.0.