

Ammonia in the Nitrogen Cycle

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Q. What does toxic ammonia convert into during the nitrogen cycle?

A. First, oxygen-loving bacteria, called *Nitrosomonas*, feed on ammonia and through biological processes they excrete nitrite, a less toxic but still dangerous chemical. Another oxygen-utilizing bacteria, called *Nitrobacter*, feeds on the nitrite, converting it into relatively harmless nitrate. Nitrate can be used by plants in the aquarium, or can be removed with water changes.

Many beginning hobbyists are anxious to add fish immediately after setting up a new aquarium. But the key to successful fish-keeping is patience and an understanding of what it takes to transform a container full of water into a life-supporting ecosystem free of toxic compounds.

Waste and Ammonia

Fish excrete waste and an unestablished (or uncycled) aquarium is not capable of processing these waste materials efficiently, so this creates toxic conditions for the fish. The result is fish loss. Your aquarium water must be free of toxic compounds in order for fish to survive and thrive.

Ammonia, perhaps the most notorious toxin, is introduced into your aquarium through fish waste, respiration, and other biological processes. It is extremely toxic and fish will show signs of stress, such as erratic swimming behavior, when ammonia is present. High levels of ammonia attack the gills first, causing fish to gasp at the surface. Continued exposure affects their fins and skin, and eventually their entire system is under attack.

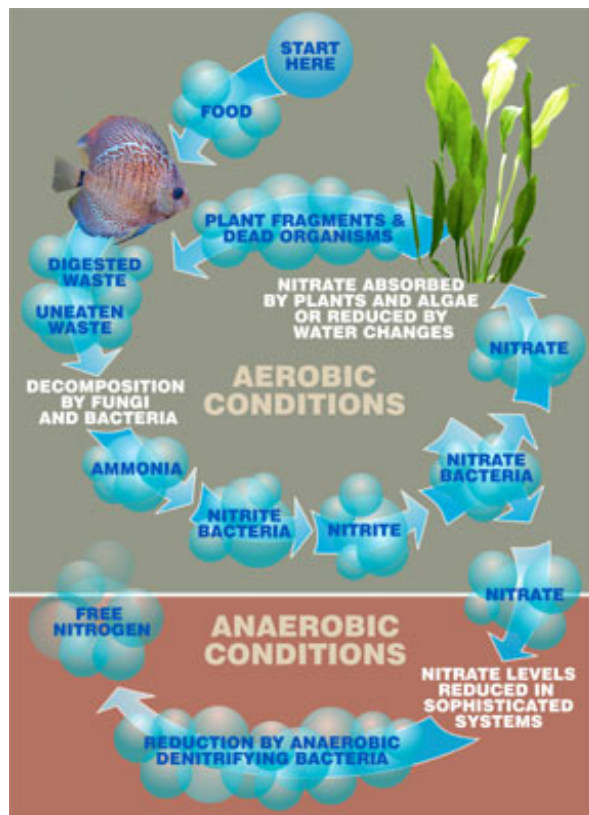
In an established aquarium, ammonia is promptly converted into less toxic substances by beneficial bacteria through a natural process called the nitrogen cycle. New aquariums do not have established colonies of beneficial bacteria to adequately process these toxins.

What is Cycling?

So how does a new aquarium develop these bacterial colonies? Through a process called cycling. "Cycling" refers to the process of establishing and maturing biological filtration. Each new aquarium must go through cycling in order to establish efficient biological filtration capable of breaking down these toxic compounds. A food source for these bacteria, such as ammonia, is required to begin the cycling process. Certain beneficial bacteria use ammonia and oxygen to rapidly colonize aquarium and filter surfaces.

One way to establish beneficial bacteria is to set up the aquarium, fill it with dechlorinated water, turn on your [pumps](#) and [filters](#), and add a small amount of [fish food](#) to the water. As the food breaks down, it supplies the food source bacteria need to multiply and colonize. This method can take several weeks.

Many aquarium keepers speed up the process by adding commercially-available cycling aids. [Cycle](#) and [Stress Zyme](#) are excellent products for this stage. Better yet, use a small amount of gravel from an established aquarium to cycle your new aquarium. This gravel already houses a good number of beneficial bacteria to speed up the cycling process.



Testing During Cycling

During cycling, [test](#) daily for ammonia and nitrite, the most toxic products in the nitrogen cycle. Most basic test kits include tests for ammonia and nitrite. When these two toxins are detectable by testing, you know that the bacterial population is not large enough to safely support fish and other inhabitants. But, as bacteria populations peak, both ammonia and nitrite levels begin to drop to the point where they are undetectable by testing.

Finally it is safe to begin stocking your aquarium. Add fish and aquatic life gradually since your system will once again need time to adjust to the increased ammonia generated by each fish. After cycling is complete, we recommend weekly testing of ammonia and nitrite to monitor water quality.

Essentials: Make it simple

- [Test Kits](#) guide you through aquarium cycling. They cue you when ammonia and nitrite levels have bottomed out, so you can begin to add your livestock.
- [Cycle](#) is a concentrated bacterial additive that speeds up the cycling process in new aquariums.
- A three-stage filter like the [Emperor 280](#) provides an oxygen-rich environment for beneficial bacteria to colonize and multiply.

