pets in the classroom

FISH TANK CYCLING
Freshwater Tropical Fish

When setting up a new aquarium there is a cycling process as your aquarium becomes established. This process is called the nitrogen cycle (nitrification) and is the natural biological process responsible for breaking down waste in the aquarium, making the water safe for the fish. Beneficial nitrifying bacteria live all over the aquarium, in the gravel and on aquarium plants and decorations. As the tank becomes established, the decomposition of fish waste and uneaten food results in the production of ammonia. These nitrifying bacteria convert ammonia (toxic) to convert to nitrite (toxic), then to nitrate (non-toxic).

The cycling process normally takes anywhere from 5 to 6 weeks unless you add a bacterial additive that will help seed your tank with favorable bacteria and speed up the cycle process.

After you set up your aquarium, wait until the tank has remained stable for at least 24–48 hours before adding any fish. This enables the atmospheric gases in the water to dissipate and allows time for any needed temperature adjustments. The water may become cloudy. Wait until this cloudiness dissipates before adding fish.

Nitrogen Cycle - Nitrification

Nitrification is the biological conversion of Ammonia (NH3) to Nitrite (NO2), and Nitrite (NO2) to Nitrate (NO3). In a new set-up, the conditioning period (nitrification) normally takes 5 to 6 weeks. This period can be shortened or lengthened depending on the temperature of the water or if packaged bacterial additives are used. The bacteria that converts ammonia to nitrite usually takes 14 days to reach a sufficient population. The bacteria that converts nitrite to nitrate usually takes 21 days to reach sufficient population with nitrate the end product of the nitrification cycle. In an aquarium system without live plants to utilize the nitrate, the nitrate will continue to increase.

Ammonia (NH3)

Ammonia (NH3) results from decomposition of uneaten decaying food and fish wastes. The fish's gills, during respiration, also release ammonia. Overcrowding will result in high levels of ammonia in the tank. If the ammonia level is too high, the fish will die due to ammonia poisoning. During the conditioning period, ammonia will continue to increase until the nitrifying bacteria develop to sufficient levels to oxidize it and convert it to nitrite.

Nitrite (NO2)

Nitrite (NO2) will continue to increase as a result of nitrification until nitrite oxidizing bacteria develop to sufficient numbers to oxidize nitrite to nitrate. Monitoring nitrite levels is important because it measures the progress of nitrificaion. In new aquariums with a normal biological load, nitrite will rise during the third to sixth week and then drop to a safe level near zero.

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Nitrate (NO3)
Nitrate is relatively non-toxic to fish, although high levels can promote undesirable algae growth. High nitrate levels indicate the buildup of other wastes that cannot be measured directly, and therefore is an indicator of poor water quality. Partial water changes (with substrate vacuuming) of 20% to 25% every four weeks will help keep nitrates under control. Monitoring water quality every 7-12 days by using test kits will keep you aware of your water quality.

Summary

Aquarium cycling is the process of creating a biologically safe environment for fish in a new tank and it involves introducing nitrifying bacteria into the aquarium to regulate the nitrogen cycle. These bacteria curb the effects of ammonia buildup caused by the breaking down of fish waste and uneaten fish food, converting ammonia (toxic) to convert to nitrite (toxic), then to nitrate (non-toxic). Cycling takes time, during which ammonia and nitrite have the potential to easily become stressful and even lethal. This is why so many starting out accidentally kill fish or at least make things more challenging for themselves by causing disease to break out in their brand new tank.

HELPFUL LINKS

How to speed up cycling process:
https://apifishcare.com/product/quick-start

Monitoring water quality:
https://apifishcare.com/product/freshwater-master-test-kit

Cleaning your aquarium fast and easy:
https://www.aqueon.com/products/cleaning-maintenance/siphon-vacuum-gravel-cleaners

Removing unwanted algae:
https://www.aqueon.com/products/water-care/algae-removers