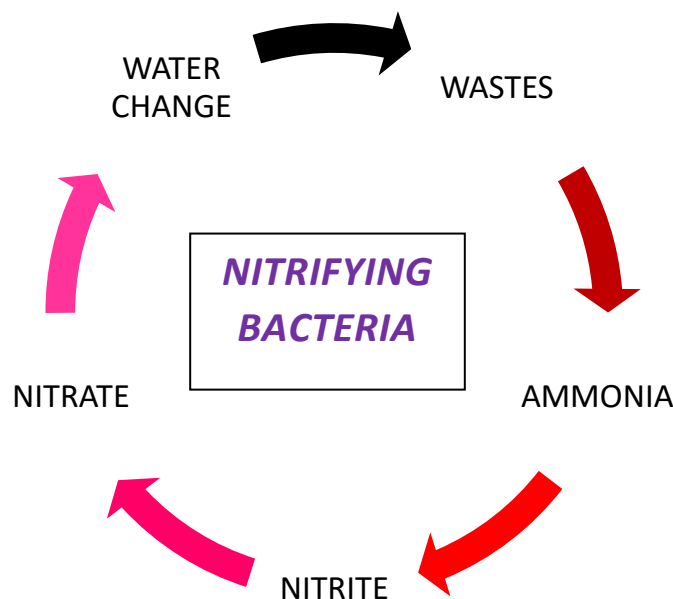


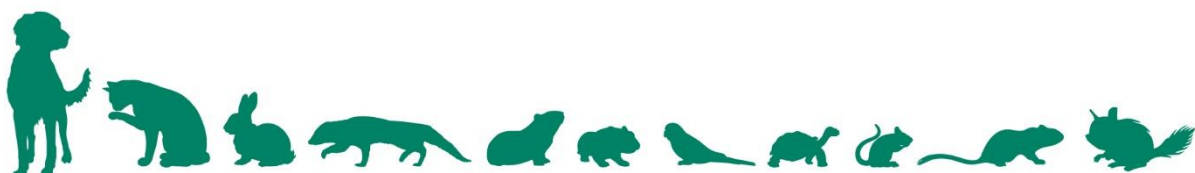
## THE AQUARIUM NITROGEN CYCLE

Aquariums for aquatic turtles, amphibians and fish are a closed system in which debris, such as uneaten food, dead plants and waste material accumulates, leading to the build-up of toxic compounds such as **nitrites** and **ammonia** which can harm your pet. This phenomenon is referred to as the 'Nitrogen Cycle' and there are many videos detailing this cycle online. In order to stop the accumulation of toxins such as ammonia - which can kill aquatic pets - it is important to keep the levels of these harmful by-products as low as possible.

Within the tank there will be a population of 'good' bacteria called **nitrifying bacteria**. These bacteria typically live in the filter or substrate and convert the very toxic ammonia into less toxic nitrites then eventually into nitrates which are not harmful to the animals.



The harmless nitrate can then be removed from the tank by doing *PARTIAL* water changes. If you remove too much (or all) of the water at once when cleaning, you will actually be harming the nitrifying bacterial population which will never reach levels required to keep your pet safe.



**Establishing an aquarium.** Transportation of aquatic species to a new home is very stressful. If you do not take the time to allow your aquarium set up to develop a healthy population of bacteria BEFORE you add your pet, the combined stress of transport and placing them in an unsuitable environment can cause severe illness.

When an aquarium tank is first set up it takes about **8 weeks** for the healthy bacterial population to develop although there are products available which contain these bacteria to speed this process up. Animals should not be added to the tank until it is established - the sudden addition of pets (e.g. large numbers of fish) into a tank which has not been properly established with nitrifying bacteria could lead to death of the animals. Similarly, the sudden addition of new fish to an existing tank can upset this delicate balance.

**Testing for toxins.** Water quality testing kits are available which will allow you to monitor the levels of harmful substances such as ammonia as well as pH which also plays an important role in the health of your pet. We recommend regular testing of the water as any increase in the levels of toxins can lead to severe disease in an aquatic animal. Testing before and after the addition of new animals is also important for monitoring.

**Filtration is also very important.** Having the wrong size or type of filter for your aquarium can be harmful. Too powerful a filter causing water turbulence is very stressful to some species such as small turtles or axolotls who become exhausted and stressed with excessive water movement. In contrast, having too weak a filter causes wastes to build up.

**Feeding and Overfeeding.** Putting too much food into the aquarium causes a spike in ammonia and nitrite. Species who are fed carnivorous diets such as some turtles will suffer from a fouling up of their water more rapidly. It can be hard to get the balance of cleaning vs leaving some healthy bacteria in the tank right. For this reason, it can be useful to set up a plastic feeding tub in which your pet can be trained to eat and once it has had a meal it can be placed back into its regular tank which then stays clean. Such training can take time, so be patient.

**Stocking density.** Having too many animals in the aquarium puts too much pressure on the delicately balanced filtration system. The sudden addition of new animals to the tank can also cause toxins to spike. Add any new additions to the tank gradually, over a few days to weeks.

**Temperature Alterations** can cause stress to the pet and increase break down of plant matter and accumulation of wastes causing spikes in ammonia and nitrites.

**Incorrect pH.** This leads to stress and ill health in aquatic animals.

**Cleaning.** It is never advisable to completely clean and refresh the tank as this will wipe out the healthy bacteria and lead to increased toxin accumulation. If your tank is getting dirty you may need to consider a separate feeding area (turtles), increasing the frequency of partial water changes to 20% weekly, or look carefully at the filtration and stocking density. In many cases a bigger tank is needed.

