



Water Quality and the Nitrogen Cycle

Introduction

One of the most important parts of fish husbandry is maintaining good water quality and the nitrogen cycle within your fish's tank. Poor water quality is one of the largest causes of illness in pet fish. Regular water changes and monitoring of the water quality is required to ensure that your fish is not swimming in water that is full of waste products. Just because the water is clear, does not mean that it is clean and free from wastes and harmful chemicals.

The Nitrogen Cycle

Fish waste products, leftover food and decomposing plant material release ammonia into the water. Ammonia is a toxic chemical. Denitrifying bacteria then convert this into nitrite and then nitrate which are less toxic chemicals. The nitrate is removed from the tank with small, regular water changes or absorbed by plants living in the tank. The denitrifying bacteria live in the filter, substrate and plants and cannot be seen with the naked eye.

Setting up a fish tank

It takes about 6 weeks for the denitrifying bacteria to completely establish within a new tank. The tank should be set up and left with the filter running for about 6 weeks before introducing your fish. Plants should be added slowly during these 6 weeks. Water quality parameters should be tested two to three times a week during this time, to ensure that the nitrogen cycle is established and then maintained.

Weekly water changes

Once your tank is established, between 10% and 20% of the water from the aquarium should be removed and replaced once a week. These small water changes will remove excess levels of ammonia, nitrite and nitrate but not affect the pH of the tank water or the good bacteria.

This water can be removed from the tank with a gravel vacuum/siphon, thereby cleaning the substrate at the same time. It is important to also only clean between 10% and 20% of the substrate each week. Cleaning more than this can result in releasing large amounts of toxic ammonia into the water as well as removing too many of the good, denitrifying bacteria living in the substrate. A different section of the substrate should be cleaned each week.

Leftover food and faeces can also be siphoned from the tank daily, but ensure the substrate is not disturbed during this time.

The pH of any incoming water should be tested, and adjusted to the same pH of the water in the tank before it is added. For this reason it is easiest to fill large buckets of water, test and treat them, and then siphon them into the tank.

Water conditioner

Treat all water before it enters the tank with a water conditioner. This removes any chlorine and other toxic chemicals from the water which could harm your turtle and the denitrifying bacteria. We recommend a product called Prime, made by Seachem.

Filter Cleaning

This should be done regularly enough to ensure that the contents of the filter are minimally dirty. It should be done at a time separate to the weekly water changes. The filter media should be cleaned in a bucket of water from the aquarium, never with tap water, as this will kill the good bacteria living in the filter. Sponges can be squeezed out in this bucket of aquarium water. Filter media does not have to be spotless.

Water Quality Testing

As you cannot see the toxic chemicals building up in the tank water until there are very large amounts present, it is best to test the following factors at least once a week. This should be done prior to any water changes.

Parameter	Range
Potential Hydrogen (pH)	*species dependent*
Ammonia (NH ₃)	0 ppm
Nitrite (NO ₂)	0 – 0.2 ppm
Nitrate (NO ₃ ⁻)	0 – 20 ppm

