Ammonia Poisoning

Ammonia is excreted by fish, mainly through the gills, as the end product of the process of the digestion of protein. Ammonia is very toxic to fish, and in a closed system, such as a typical aquarium, lethal concentrations can easily be reached.

Ammonia exists in two forms in water. In acid water, most of the ammonia is in the bound form NH_4, and is less toxic. In alkaline water, most of the ammonia is free, as NH_3. This "free" ammonia is highly toxic, with levels as low as 0.02 – 0.05ppm (ppm = mg/L = 1mg/1000L), causing death. Ammonia poisoning is one of the biggest killers in a home and business aquarium. It can develop suddenly and wipe out whole tanks of fish over night if not detected early enough or stopped before it occurs (See below for more details).

Causes

The main cause of ammonia poisoning is not being attentive of newly set up tanks. When cycling a new tank you should always check the ammonia (3 times a week) and if you start to see a spike upward in the water then you will need to water change the tank immediately.

The other time ammonia may occur is in established tanks. Adding too many fish at once will cause problems. For example adding 100 x 5cm goldfish to a 200 litre tank all at once will make the fish stress, causing the fish to excrete more waste and raise the ammonia to a deadly level. Adding 50 x 5cm goldfish to a 200 litre tank will slow the stressing down to a controllable level.

The best way to prevent ammonia spikes is to have a good filtration system that has been cycled before adding fish. Having a good filtration system will let the bacteria that you need build up in the water and filters. The more good bacteria you have the better.

If your filter does fail you will have 2 choices:

1) restart the tank from scratch and monitor the ammonia levels every day, or
2) take some well established filter media from a tank that is clear of any disease and use that in the tank.

If bacterial colonies die in the filters there will be nothing in there to consume the toxic ammonia in the water and the water will rapidly become toxic.

When receiving fish into store

When receiving the fish into your shop you may notice the odd bag that is quite 'murky' or cloudy. This may sometimes be the result of an ammonia spike in the bag. The ammonia in the bag will be at a very high level and fortunately the pH will be very low. This will stabilise ammonia from being toxic and save your fish from dying or 'crashing'. If you were to add these fish straight into the tank the ammonia that is already in the gills will become very toxic very quickly. Because the pH in the tank will be higher than it is in the bag, this can cause what we call a 'death spiral' (the ammonia will damage the very fine gill filaments and the fish struggle to breathe).

If you notice this murky water on arrival, you will need to take steps to ensure that your fish don't crash. A good way of stopping this ammonia death spiral from happening is to have a bucket ready that contains water from the tank you will be putting the fish into and an airline running in the bucket to assist with gas exchange. Put some of the water from the bag into the bucket with the water in it, gently place the fish into the bucket and leave for 10 minutes.

This will give the fish enough time to adjust and clear some of the ammonia from their system.

After the 10 minutes is up you should be able to put the fish away without them spinning to their death.

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Symptoms of Ammonia Poisoning

Gross symptoms of acute ammonia poisoning are that the fish will gasp for breath at the top of the water surface. When this happens the fish's gills will turn red in colour, and they will look like they are bleeding from the gills. The fish will become listless and sit at the bottom of the tank motionless. They will have no desire to eat food or even attempt to forage for food. Other symptoms are red streaking on the body and through all of the rays on fins and the eyes of the fish may go cloudy due to ammonia burn.

Chronic poisoning will lead to gill damage which will cause stress and in turn the fish will develop a weakened immune system.

Treatment

The following steps should be taken straight away when ammonia is a problem in your tank.

(1) A 25% to 50% water change will lower the ammonia by ¼ or ½. You may need to do a few water changes over a few days just to reduce the ammonia. There will still be ammonia in the water so be careful (this is the easiest solution).

(2) Reducing feeding will help by lowering the amount of waste being produced by the fish. Stopping feeding all together for the next 1 – 2 days will help dramatically in severe cases.

(3) Increasing the aeration will also help.

(4) Lowering the tanks pH to below 7.0 is affective because the ammonia won't be as toxic as it was when the pH was higher.

(5)There are some ammonia lowering and binding chemicals on the market. These lower the ammonia in the water and are good products.

Prevention

One of the best things to do is not to let your tank get ammonia in the first place. The most important thing to do is to cycle your tank properly. Doing this takes time and patience.

When setting your tank up you should use some hardy strong fish that will survive severe conditions (e.g. comets or mollies). Leave the fish in the tank for two weeks and constantly check your conditions for ammonia and nitrites so to see if the nitrogen cycle is working correctly. If ammonia is rising early on in the process then the filter is working, after this if the ammonia drops with no water change then its still working.