Ammonia NH_3

Ammonia is a toxic compound that is excreted through the fish's gills, a byproduct of the respiratory system, and to a lesser extent formed during the breakdown of fish waste products such as faeces and urine.

A small level of Ammonia will always be present in a pond or aquarium but it must not be allowed to become concentrated as it can be very damaging to fish and other animals. It can burn delicate tissues such as the gills and fins. We call this an Ammonia Spike.

The Ammonia will impart no odour or visual impact on the water clarity. There is only one way to check for Ammonia, with a test kit or electronic probe. Personally I would suggest an inexpensive test kit such as the Tetra Ammonia NH_3 NH_4 Kit

A quick word of caution regarding test kits in general is to avoid the DipStick based tests. Although cheap and simple to use I have not found them to be reliable. This may be due to them getting damp or drying out either way I have little confidence in them. Good test kits will have a test tube and liquid reagent.

The Tetra test kit requires the test tube to be filled with 5ml of water. Then you need to add 14 drops of reagent 1. Shake the test tube. Add 7 drops of reagent 2. Shake the test tube. Then add 7 drops of reagent 3. Shake the test tube. The test tube should be placed indoors and a wait period of about 10 minutes should be observed for the reaction to develop.

You can then refer to the colour card for your results.

If Ammonia is not present in any detectable amount the water will remain yellow in colour. This is exactly what we want to see.

If the water colour turns light green (0.25mg/l) you have a small concentration that could require corrective measures and should definitely be monitored further.

If the colour turns to a darker green (1.5 mg/l) or higher then corrective measures are going to be required as a matter of urgency.

It should be noted that an Ammonia test by itself will not be sufficient to properly diagnose issues. You absolutely must check at least pH as this greatly affects the toxicity of the Ammonia and is even potentially the very reason the Ammonia is being detected. (More on this later)

Corrective \ Preventative Measures.

It is vital that every pond or aquarium is equipped with a suitable filter system. During normal operation bacteria present in the filtration system - known as the biomass - will convert the ammonia into nitrite and ultimately nitrate a less harmful compound. A spike will occur when the filtration system is unable to break down the ammonia more quickly than it is being generated.

Invest in a system that will not just do the job but will be completely and totally on top of the job. Bigger is always better at least when you're talking about filtration systems.

The filter system should be given ample time to mature and develop a healthy biomass. Stocking a system with too many fish too quickly will often cause a spike. Stock fish gradually allowing several weeks for bacteria to develop between each new introduction. Patience when stocking is very important.

Excessive amounts of feeding is also a concern. Fish are cold blooded and have minimal energy requirements. Ornamental fish are often fed far too much food and would suffer no ill effects if the amount was reduced. Over feeding will also create clarity issues and can lead to excessive algae problems.

Most fish anti parasite and bacterial treatments will have a negative effect on the biomass so they should not be used without good reason. Whilst treatments are unlikely if used at sensible levels to completely retard the filtration they can knock back the biomass to a level where a spike develops. Under no circumstances should these treatments be used in a new system or when a system is already struggling with ammonia.

A healthy filter biomass requires a constant flow of oxygen rich water. If the filter operation is interrupted for any length of time it can lead to a dieback of the biomass. Ammonia can spike very rapidly when filter operation is not maintained. Always maintain your pump and also ensure the filter is not obstructed with heavy soiling. Whenever practical, use system water to wash media and it goes without saying to avoid the use of cleaning chemicals.

To help establish and refresh the biomass use a regular dose of filter boosting treatment. A small regular application will be much more effective as opposed to a large occasional dose.

Zeolite, a microporous mineral with chemical absorbing properties, was once a popular choice of filter media. It can be refreshed by soaking it for a day or so in a very strong salt solution. The zeolite can remove small amounts of Ammonia and reduce the harshness of a spike. However it should be considered a preventative measure rather than a corrective measure as it takes a long time for zeolite to take out ammonia.

Small regular water changes are always a good practice and can help to dilute the ammonia. I would suggest at least 10 to 20% weekly. Should a severe spike occur substantial emergency water changes of up to 50% can be used and almost certainly will be required.

There is very little that can be done to help fish who have been through a spike other than providing additional oxygenation and the prevention of further water quality issues.

Extra Notes

If ammonia becomes a recurring problem it is a fairly safe bet that the system is overstocked with fish and the filtration system is not large enough to support a sufficiently large biomass. It is very easy to underestimate the importance of filters.

As mentioned it is vital that pH is tested alongside Ammonia. This is because the pH greatly affects the toxicity of the Ammonia. High pH means the Ammonia will be in the form of NH_3 and will be far more toxic than in a low pH where the Ammonia will be mostly NH_4 a less toxic compound. This in no way is suggesting that you should not be concerned if you have a low pH and high Ammonia. If either forms of Ammonia are present in your system then something is very wrong.

Potentially a low pH can actually cause a spike in Ammonia. Should your pH crash and your water becomes completely devoid of essential carbonate minerals the Bacteria in the filter will not be able to convert the Ammonia into Nitrite and the Ammonia level will shoot up! Always check your pH.

Nitrosomonas is the fancy given to the nitrifying bacterium that oxidises ammonia to nitrite. It will normally develop quickly in a new system.

Check your water parameters on a regular basis.

You may find these YouTube videos helpful.