Water Quality

It is important to monitor the water quality of your aquarium. A test kit makes it easy for you to do this at home, or you can bring a sample of your water to B&B Pet Stop. We'll be happy to test your water and recommend a course of action; we do not charge our customers for this service.

The key values to pay attention to when monitoring your water quality are pH, alkalinity, hardness, ammonia, nitrite, nitrate, and temperature.

CHANGES IN WATER QUALITY should be made slowly as sudden changes in water quality can be harmful or even fatal to your aquarium inhabitants. Products such as Fluval Cycle or API Stress Zyme can help your fish during toxic times as a stopgap.

pH is the chemical term used to describe the measure of **acidity of water**. It is measured on a scale of 1 to 14 - a reading of 7.0 is neutral, lower than 7.0 is acidic, and higher than 7.0 is base. This number reading refers to the concentration of hydrogen ions in the water. A change of one pH unit equals a tenfold difference in this concentration.

The preferred range of pH for most freshwater aquarium animals is between 6.8 and 7.2. This safe range matches the pH found in most freshwater worldwide. If the pH is too low or too high, it can have dramatic effects on the health of your aquarium.

Different types of fish prefer slightly different pH ranges. Goldfish and livebearers like Mollies, Guppies, Swordtails, and Platies prefer a slightly basic pH of 7.2 to 7.6. Most egg layers prefer a slightly acidic pH of 6.6 to 7.0. African Lake Cichlids do well in a slightly alkaline pH of 7.4 to 8.2. The ideal pH level for saltwater fish is 8.1 to 8.4.

pH tends to naturally drop in an established aquarium due to the release of acids in decaying organic matter (uneaten food, dead plant leaves, etc.) and the fish's respiration. This can be offset with regular, partial water changes which removes pollution and replaces minerals that naturally buffer the pH and keep it stable.

Low pH levels can be adjusted up with the use of chemicals designed for this purpose. In some cases, low pH can be raised with the addition of strong aeration such as a large air stone which drives off carbon dioxide (carbonic acid). Also, placing "honeycomb rocks", seashells, and even coral in the tank will help harden the water which will help raise the pH.

High pH levels can be lowered by the use of chemicals designed for this purpose. Also, placing driftwood in the tank will help soften the water which will help lower the pH.

ALKALINITY is the measurement of the water's resistance to change in pH. (Also known as the "buffering capacity" of the water.) The higher the alkalinity - the better the water is buffered. The better the water is buffered - the fewer changes you will see in pH readings. Calcium carbonate (such as crushed coral or oyster shells) can be used to increase alkalinity.

HARDNESS is caused by calcium, magnesium, carbonate and bicarbonate salts in the water. Hardness builds up in established aquariums because these salts do not evaporate out. Water hardness is measured in parts-per-million (ppm) of the calcium carbonate concentration in the water.

Hard water makes the pH more difficult to control. It is also responsible for that nasty white crust that shows up on the sides of the tank.

Most aquarium fish prefer a water hardness of 50 to 150 ppm. Some exceptions are discus, angelfish, and most tetras who prefer soft water at about 10 to 60 ppm.

You can "soften" hard water by using an ion exchange resin in the filter (water softener pillow) or adding driftwood. Conversely, hardness can be increased by adding crushed coral, calcareous rock, or buffer additives like "Proper pH" or "Wonder Shell".

AMMONIA: If the pH of the tank is below 7.0 (acidic), the type of ammonia present is mostly NH_4+ (ammonium) which is not very toxic. When the pH rises above 7.0, the ammonium changes to NH_3 (ammonia) which can become toxic to fish in higher concentrations. With a pH less than 6.5, the nitrifying bacteria that converts ammonia to nitrites may cease to exist in your tank in sufficient numbers to help convert ammonia.

If your tank is brand new or recently re-set up (after a major cleaning), see our handout "Basic Information on the Aquarium Cycle" to learn more about the role of ammonia in your aquarium.

In an established aquarium, any level of ammonia indicates a problem. Find the cause and correct it (see below). Don't expect the chemicals or resins mentioned herein to solve the problem - they are only a "quick fix".

Common causes of ammonia in an established aquarium are:

- **Overfeeding:** "Fuzzy blobs" on the gravel and plants could be uneaten food. Feed sparingly and remove the "blobs" with a net.
- **Dead fish:** Dead fish and plants decay and release ammonia. Remove dead fish and plants with a net as soon as you notice them.
- **Use of antibiotic medication:** Antibiotics don't know the difference between "good" bacteria and "bad" bacteria. The nitrifying bacteria may have been killed or suppressed. Do a partial water change and put fresh carbon in the filter.
- **Detritus:** This disintegrated organic matter settles on the bottom and can "smother" the good bacteria in the gravel bed. Use a gravel washer to remove the detritus. (See handout "Basic Information on Water and Water Changes".)
- **Extremely low Ph:** Low pH suppresses the nitrifying bacteria then they can't do their job of converting ammonia to nitrite. Slowly raise the pH to the ideal range for your aquarium type.
- **Overcrowding:** Too many fish or too large a fish in a tank increases the amount of waste being produced. Either get a larger tank or spread the fish to other tanks. More filtration would also help.
- **Inadequate gravel bed:** If there is not enough gravel or if the pebbles are too large, the nitrifying bacteria does not have enough surface area in which to live. Gravel should be at least 2 inches deep.

NITRITE: Nitrite (NO_2) is converted from ammonia by nitrifying bacteria (nitrosomonas). Nitrite is less toxic than ammonia, but at high levels, it interferes with the fish's ability to acquire oxygen - and could kill them.

A good-sized water change will almost always solve this problem, and products such as Fluval Cycle or API Stress Zyme can help ease this situation by adding additional nitrifying bacteria to your tank. However, if the fish aren't stressed, it is usually best to let the next level of nitrifying bacteria (nitrobacter) metabolize the nitrite naturally.

NITRATE: Nitrate (NO_3) is the end product of the nitrification cycle. Although much less toxic than ammonia or nitrite, it is dangerous in high concentrations.

In the aquarium, ammonia continues to form in small quantities. As it forms, the nitrifying bacteria convert the ammonia to nitrite then the nitrite to nitrate. (When this becomes a continuous process and no ammonia or nitrite is allowed to build up, the aquarium is considered **cycled**.)

In streams, lakes, and oceans the resulting nitrate is utilized by plant life. In a closed system, such as an aquarium, the nitrate will continue to increase and must be removed by partial water changes or by using a special ion exchange resin such as API Nitra-Zorb.

High levels of nitrates can promote rapid algae growth and decrease the fish's immunity to disease!

TEMPERATURE: Tropical fish require warm water held at a constant temperature between 75º to 80ºF (24º to 27ºC).

Water at cooler temperatures can retain higher amounts of oxygen than warm water. Warm water increases metabolic rates of fish thus increasing rates of immune response to disease. This is why raising the temperature helps fish recover from infections.

Freshwater and marine tropical fish aquariums require a heater not only to heat the water but also to keep the water temperature from fluctuating. Fluctuations - of even a few degrees - will stress your fish and may leave them open to infections such as ick.

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