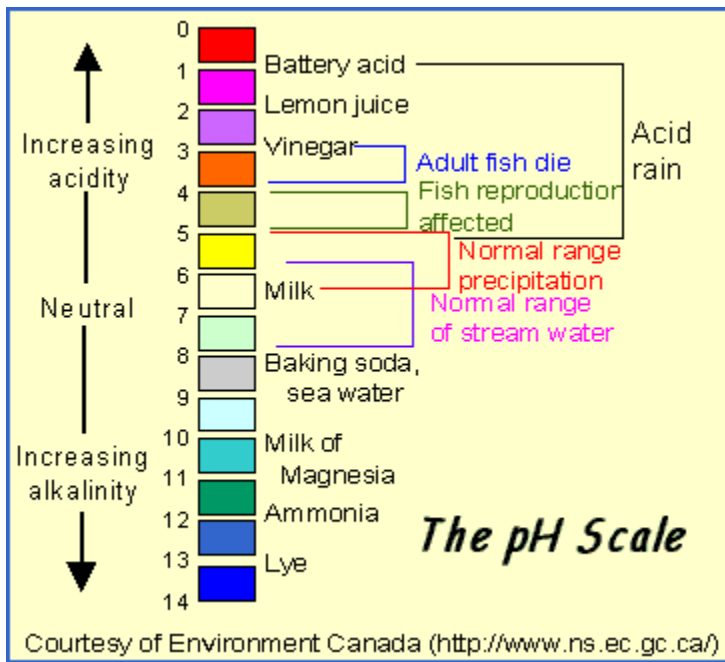


## Preventing a "DEADLY" pH crash?

One of the main goals of a Koi keeper should be to maintain great water quality. The way to make that happen is to understand the makeup or chemistry of your water. The pH of the water is one of the issues we must understand. The pH reading of your pond water fluctuates up and down depending on the time of day you test your water. This is normal. Testing your water in the morning for pH will give you a lower pH reading than testing pond water in the afternoon. The KH or "carbon hardness" of your water is one factor that will determine just how much your pH will fluctuate within 24 hours. Every pond is unique and no two ponds are exactly the same. Readings for your pond could range from 7.6 to 8.4 or 7.1 to 7.5 or even a larger range between the high and low pH may occur. This is the unique daily pH cycle of your pond. What we want to accomplish is to keep that swing from the high pH number to the low pH number as small as possible. The way to accomplish this is to buffer.

You're going to have a natural pH high reading in the late afternoon, this is normal. The very worst thing you could do is panic, because according to what you read your pH must be kept, lets just say below 7.5 and yours is 8.6. Now you want to add a chemical to bring your pH down, which is an acid. WRONG! By adding the acid you just shocked your koi fish by interfering with the natural pH cycle of your pond! Sudden pH changes (especially lowering the pH) will stress your fish which can lower their resistance to bacterial infections. Plus, adding the acid to lower your pH in the afternoon could cause an overnight "pH crash" which could kill your koi. Yes, you could have a pond full of dead fish in the morning!



It is natural for your pond water to have a much lower pH at night and the addition of more acid will cause your nighttime pH to drop even more to possible dangerous levels. Your fish have adapted to the natural slow pH cycle (up and down) of your pond water and it does not stress them. During the day plants and free floating algae in your koi pond produce oxygen and take up carbon dioxide CO<sub>2</sub>. The decrease in CO<sub>2</sub> increases the pH in your pond, caused by photosynthesis (sunlight on plants). At night the plants and algae do the reverse and take up oxygen and produce CO<sub>2</sub> which decreases the pH in your pond. That's why your tests show a low pH and low oxygen level in your pond water early in the morning. Additionally, all the bacteria, your koi, and the sludge on the bottom of your pond all have an effect on the oxygen and CO<sub>2</sub> levels of your koi pond. Sudden substantial fluctuations in pH values will stress koi and possibly kill them. Fish do not tolerate sudden large changes in water quality very well. If they do not die, then the stress they suffer will become a contributing factor to lowered resistance and a possible disease. Testing pH should be done in conjunction with measuring total alkalinity (KH). The total alkalinity will give you an indication as to the buffering capacity of the water against pH variations.

The amount of algae (mostly free floating, single cell algae that makes the pond water green), can have a dramatic effect on pH, pushing the pH to very high levels in the evening after a full days photosynthesis. The opposite effect is observed by a lowering of the pH in the early morning. Not only the Koi but the toxicity of ammonia as well as the bacteria in the filter are affected by pH. Should your water pH fluctuate through a narrow range, your water is well buffered. Should there be a large fluctuations you may need to buffer the water a little.

Koi have adapted to survive in a pH range of 6.5 - 9, providing the fluctuation within this pH range is not large and providing the pH change is not sudden.

### **How can I protect my fish from a deadly pH crash?**

The pH in your Koi pond will have fluctuating problems without a solid foundation of (KH) carbonate hardness. What we don't want is a wide pH swing in a 24 hour period. The way to stop the wide swing is a stable KH. Good koi care means keeping the (KH) at a safe level in your koi pond. A KH reading above 140 is considered good. If you have a bead filter it is recommended to maintain the KH around 200.

A drop in the pH of your koi pond stresses your koi and if low enough can even kill them. The pH is measured on a scale of 1 to 14. A reading of 7 is neutral, below 7 your water is "Acid" above 7 your water is "Alkaline". A good reading for a koi pond is 7.5 or better. Koi and the good bacteria in your filter thrive in slightly alkaline pond water.

The carbonates (KH) in your pond determine how stable your pH is. Your fish and the good and bad bacteria need and use up the carbonates in your pond everyday. Without a good carbonate base in your water, your pH will fall below 7 and your water will go to the "Acid" range. It is not recommended to lower the pH in an **aged** koi pond with a ZERO ammonia reading unless the pH is very high (9 or above). Water changes are good if that is not determined to be a contributor to the high pH.

You can raise your pH in your koi pond very quickly if you see a "pH crash" coming, without hurting your koi however, if you try to lower your pH and it drops even two points within a few hours, your fish can become VERY stressed and could even die.

**Note:** A high pH in a koi pond with any ammonia reading can be a very serious problem, because ammonia is more toxic with a higher pH. The pond owner still would not drop the pH. It is recommended to do massive water changes to bring down the high ammonia reading. And/or add a good ammonia binder like "Amquel or Amquel-Plus" ASAP.

**Good Koi care:** A koi keeper wants a high enough reading of KH in your koi pond to maintain your pH level of above 7 overnight and to prevent large swings from late evening to early morning readings. If your pH is dropping below 7 you must add a buffer like plain old Baking Soda which contains life supporting carbonates to give your pH a good foundation of KH. A good solid foundation of carbonates will keep your fish and your life supporting "good bacteria" healthy.

Joe