AQUARIUM MAINTENANCE GUIDE

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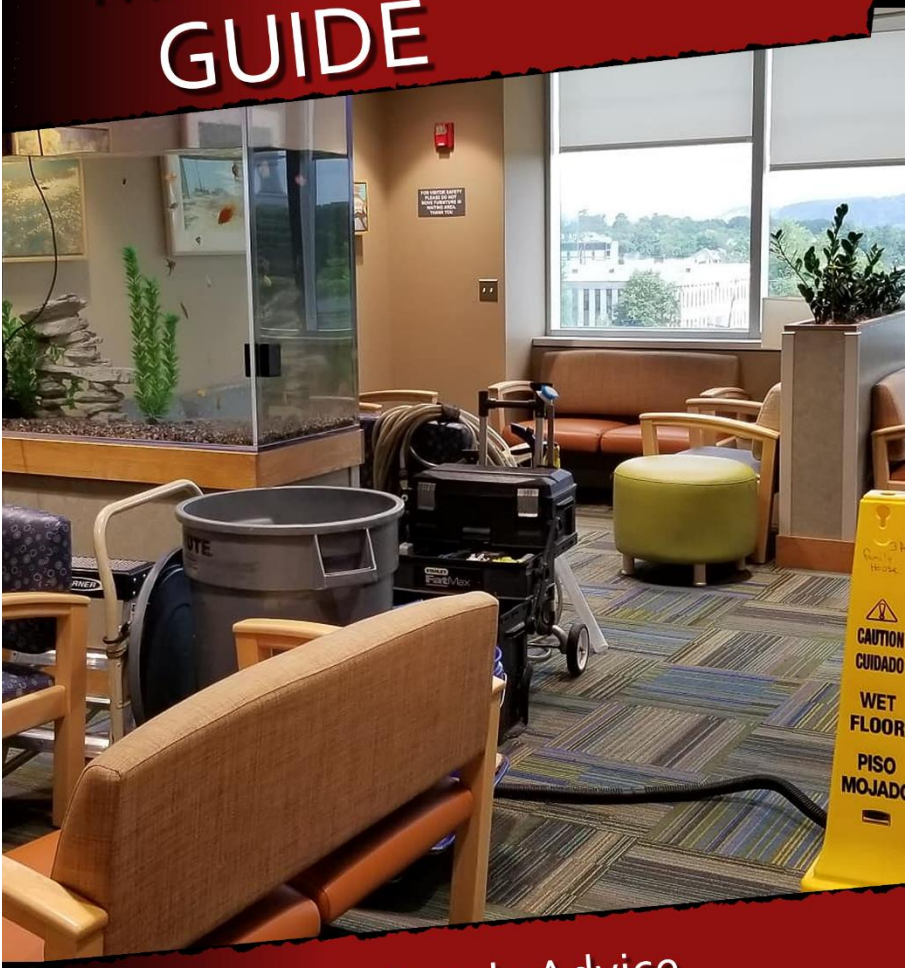

Smart Simple Advice
from an Aquarium Maintenance Company
Freshwater Edition

Larry McGee Aquatic Designs Inc.

Aquarium Maintenance Guide

Smart Simple Advice from an Aquarium Maintenance Company

By Larry McGee

If you know of someone else with an aquarium who can benefit from this book, please feel free to pass it on!

About the Author

Larry McGee is the owner of Aquatic Designs, Inc. and has been doing aquarium maintenance professionally since 1994. He currently maintains over 60 aquariums on a monthly basis in medical offices, restaurants, hotels and a variety of other businesses.

He and his wife opened a retail aquarium store and sold everything from bettas to high end coral reefs. He eventually sold the retail end to concentrate on maintenance full time.

Larry also does commercial aquarium troubleshooting and repair for most all of the big box pet stores in his state.

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Have you been thinking of starting your own side business?

- *Something different that not everyone else is doing?*
- *Something that doesn't cost a lot of money to get started?*
- *Something that doesn't require a large overhead?*
- *Something with flexible hours?*

This course could be what you're looking for!

'How to Start an Aquarium Maintenance Business'

I pack 25 years of aquarium business experience into a step by step course to help you plan and start your own aquarium maintenance business.

In my business, I average over $75 per hour cleaning aquariums and in this course, I will teach you how you can, too!

Even if you have ZERO aquarium experience!

LEARN MORE

1 How Does an Aquarium Work?

An aquarium is not just a tank full of water where fish can swim. It is a living, biological ecosystem. There are several natural cycles taking place inside of the aquarium that help to keep the fish alive. The most important of these cycles is ***biological filtration***.

Properly using biological filtration is the key to keeping a simple, healthy aquarium.

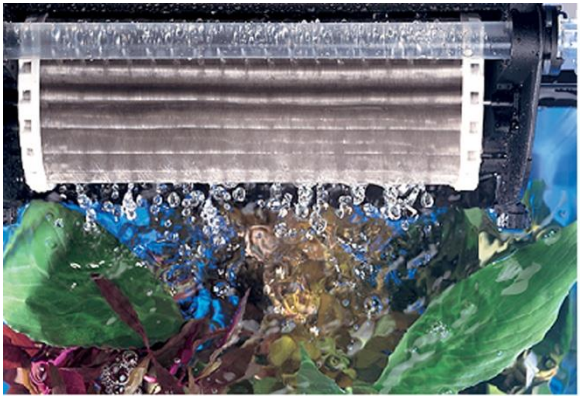
TIP #1
Bacteria are your friends!

Biological Filtration

Fish excrete waste just as all animals do. This waste is ***ammonia*** and it is toxic to fish. If ammonia is not removed from the aquarium water, it will build up to a high level, cause the fish to get sick and die.

How is ammonia removed from the aquarium?
Good bacteria live in the aquarium and use ammonia for their food. They transform ammonia into another waste called ***nitrite***, but nitrite is also toxic to fish. A second type of bacteria begins to live in the aquarium and use nitrite for their food. They change this nitrite into a less toxic waste called ***nitrate***. Fish can tolerate nitrate at fairly high levels, but it should be diluted in the aquarium through partial water changes.

Where do these good bacteria live?
Bacteria live everywhere. They can live in the filter, decorations and gravel. Some filters are designed with a place just for good bacteria to grow, such as plastic balls or rotating wheels.



Marineland Biowheel Filter

TIP #2
Bacteria are the heart of your healthy aquarium. Wherever they are located, they should be respected and kept alive.

Improper cleaning, such as removing and washing the gravel, will kill these bacteria. If you kill bacteria, ammonia and nitrite will to begin to build up, causing the fish to get sick and die.

When first starting an aquarium or after washing the gravel, bacteria require a lot of time to multiply to a high enough level to remove all of the ammonia and nitrite, sometimes as long as ***four to six weeks***. If you accidentally kill these good bacteria, your aquarium could have ammonia and nitrite problems for a while. If you follow this guide, you should have no problem keeping these bacteria alive and healthy.

TIP #3

Give your aquarium time to complete the biological cycle after adding the first fish. Bacteria take time to build up to the required levels, as much as four to six weeks. A new aquarium requires patience, and it will save you a lot of headaches in the future.

BIOLOGICAL FILTRATION

Fish give off waste called ...
Ammonia which is toxic, but is changed by good bacteria to...
Nitrite which is also toxic, but is changed by a second bacteria to...
Nitrate which is less toxic and is diluted by partial water changes.

BASIC AQUARIUM WATER CHEMISTRY

Besides ammonia, nitrite and nitrate, there are other parameters of the water that impact fish health. The most important ones that we will look at are ***pH, temperature and oxygen***.

pH

pH in the aquarium is the measure of the acidity or alkalinity of the water. A neutral pH is 7.0 and can be easily read with a test kit. Most freshwater fish like a neutral pH with an acceptable range of 6.5 to 8.0. More information on testing and adjusting pH can be found in Chapter 5.

Temperature

Fish that are native to warm waters of the world often require the same warm water to survive. These are known as ***tropical fish*** and need a device called a heater added to the aquarium. The average temperature for tropical fish is around 75° F with a safe range of 70° F to 80° F. ***Coldwater fish***, such as goldfish, have a much larger range but will do best in temperatures from 60° F to 75° F . Temperature can be monitored with an aquarium thermometer.

Oxygen

Water contains both oxygen and carbon dioxide. Fish health depends on the amount of oxygen in the water. Oxygen levels are influenced by:

- *The amount and size of fish in the aquarium*
- *How much the filter is turning the water to the surface*
- *The surface area of the water in the aquarium*
- *Water temperature.*

More information on oxygen comes later in Chapter 2.

FACTORS THAT AFFECT THE AQUARIUM

pH
Temperature
Oxygen
Ammonia
Nitrite
Nitrate

2 Properly Starting your Aquarium

Properly starting your aquarium will save a lot of time, expense and dead fish. Most people have no problem preparing the water for new fish, but they tend to ***improperly*** add fish to the aquarium. They usually add ***too many fish, too fast***. This causes ammonia buildup, which stresses fish, causing disease and eventually death.

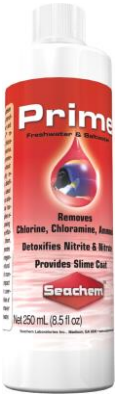
WATER PREPARATION

Assuming the aquarium is set up with all equipment, gravel and decorations in place, go ahead and fill the tank with water. You may use water straight from a faucet. If possible, adjust the temperature so it will be in the mid 70's. If you can't, then the heater or ambient room temperature will eventually get it there.

The three parameters that need to be checked before fish can be added are ***chlorine, pH and temperature***.

Chlorine

If you are on a municipal water system, add a ***chlorine remover*** to the water as you begin to fill. This is a chemical that is readily available at any pet store. This will take the chlorine out of the water as the tank fills up. Chlorine is a gas and is used as a disinfectant in water lines. It must be removed or it will kill the fish. If your water comes from a personal well, it will probably not contain chlorine.



After the aquarium is full, start the filter and all electrical devices. The two parameters we want to check now are the pH and the temperature of the water. See Chapter 5 for proper testing procedures.

TIP #4
Chlorine must be removed from tap water with a chlorine remover or it will kill your fish.

pH

The pH of the water coming from the faucet can vary with the different regions of the country. Some water may be considered ***soft*** where the pH can be easily changed. Others may contain more minerals and be considered ***hard***. This type can be more difficult to change.

Water coming from a faucet can be concentrated with different levels of oxygen, which has an effect on pH. The higher the oxygen level, the higher the pH. If you test the pH of water directly from a faucet or an aquarium that has just been filled, you will not get an accurate reading. Let the aquarium run for an hour or so before testing pH. This allows the oxygen and pH levels to stabilize.

TIP #5
Testing the pH of tap water is useless. Test it in the aquarium an hour after filling and starting the filter.

Regardless of the pH reading, I usually go ahead and add a neutral pH buffer to the water. This way I know that the alkalinity is built up, the pH is stable and where I want it to be.

Water may contain other minerals that can contribute to the hardness or softness of the water. If your well water is extremely hard, then it may be difficult to lower the pH. If this is the case, I would just choose fish that like hard water, such as African cichlids. Trying to constantly lower the pH of extremely hard water is time consuming, expensive and stressful to the fish. More information on testing and adjusting pH can be found in Chapter 5.

Temperature

Use an aquarium thermometer to read the temperature level of the water. It should be placed away from the heater. Some heaters have an adjustment that will set it to a specific temperature. Double check it with a thermometer after the heater is automatically turned off.

Once chlorine has been removed and the pH & temperature are at the desired levels, you may add fish. This can be as little as an hour from filling.

ADDING FISH

Adding new fish to your aquarium is usually the most exciting part of fish keeping, but it can also be the start of many problems. When it is done properly, you should have happy, healthy fish living for many years. Healthy fish are the result of adding the right amount of fish, properly adding them to the aquarium, and controlling ammonia and nitrite.

When setting up a new aquarium, no bacteria are present. After adding the first fish, the ammonia begins to build up. Bacteria enter the water and begin to multiply, transforming ammonia to nitrite, then to nitrate. If you add several fish at first, a lot of ammonia will build up. If too much ammonia builds up, your fish will get stressed, sick, and could die. It is best to add only a few fish at first, keep the ammonia level low and allow the bacteria time to build up. It may take four to six weeks for the ammonia and nitrite levels to fall to "0".

TIP #6
Do not add too many fish to a new aquarium. Only add 2 regular size fish per 10 gallons

How many fish should you add?

Start out with very few, about two regular size fish per ten gallons of water. This does not sound like a lot of fish, but it will save you a lot of headaches in the future. After the ammonia and nitrite levels are "0", then you may add a few more fish.

TIP #7
Never, never add new fish to an aquarium if ammonia or nitrite are present.

Oxygen

Fish require oxygen. Oxygen is taken in and carbon dioxide is given off at the surface of the water. No more fish can live in an aquarium than the amount of oxygen taken in at the water's surface. Allow one inch of fish per 12 in^2 of water surface in the aquarium. For example, a ten gallon aquarium is l0 in wide by 20 in long. It has 200 in^2 of water surface area; therefore, it will hold 16 in of adult fish.

(200 in^2 / 12 in^2 water surface per inch of fish = 16 in of adult fish)

TIP #8
The amount of fish that can live in an aquarium is determined by the surface area of the water.

Beware of tall, skinny aquariums that don't have much surface area. Even though they are deep and can hold a lot of water, they don't have much surface area for oxygen exchange.

TIP #9

An air pump and bubbles do not add oxygen to the water themselves. It just circulates water to the top of the tank where oxygen and carbon dioxide can exchange. They are not required for an aquarium unless they are powering an undergravel filter.

Most of the fish you buy are not fully grown. Allow them room to grow, since they should live for years in your healthy aquarium.

TIP #10

Do not overstock the aquarium. This can lead to many problems such as low oxygen levels and excess ammonia and nitrite.

Acclimating

Acclimating is adjusting the fish to the water conditions in your aquarium. This is accomplished by opening the bag of fish and floating it in the aquarium water. After five minutes, add l/2 cup of water from the aquarium into the bag. Wait ten minutes, and then add another l/2 cup of water. After a total of 30 minutes or more, you are ready to release the fish into the aquarium. If you have sensitive fish, such as discus, then increase the number of times you add water and the time to an hour or more.

The safest way to release the fish is to place the bag over a bucket or sink, cover the drain, make a small hole in the bag, and let the water drain out. Be careful not to let the fish come out of the hole. Then slide the fish into the aquarium. The other method is to pour the fish into a net over a bucket or sink, then release it into the aquarium. Using the first method will eliminate the fish getting their fins caught in a net. You never want to put the water from the fish store into your aquarium. It may contain ammonia or other pollutants that you do not want in your aquarium.

TIP #11

Fish can get used to bad water over time, but when you put a new fish into bad water, it can shock them and kill them. Check your water conditions before purchasing new fish.

Many pet stores have been falsely accused of selling sick fish. The fish were probably healthy when they left the store, but they were put into aquariums that have not had water changes in months, or they were put in with too many other new fish and were victims of high ammonia and nitrite levels.

TIP #12

White, cloudy water after setting up a new tank is normal. Reduce feeding and leave it alone. It will clear up on it's own.

3 Cleaning Your Aquarium

Cleaning your aquarium ensures a healthy home for your fish. It must be done regularly, but most importantly, properly. You want to keep the bacteria alive to keep the fish healthy. Using these few, simple steps will keep you and your fish happy.

TIP #13
You do not have to drain the aquarium or take the fish out. A normal aquarium should only take about 30 minutes per month for proper maintenance.

VACUUMING THE GRAVEL

The first step is to vacuum the fish wastes and uneaten food from the gravel. This is done with the aid of a gravel vacuum cleaner. This is a simple device consisting of a tube with a length of hose attached to it. Purchase one that is rated for the size of your aquarium, then follow these simple steps.

TIP #14
Clean the gravel with the aid of a gravel vacuum cleaner.

Vacuuming Steps

1. Place a bucket on the floor in front of the aquarium.
2. Start a siphon of water through the hose and into the bucket.
3. Place the tube onto the gravel. You will see particles of waste and food float up through the tube and into the bucket.
4. Pick up the tube and move it over. Do not stir the gravel because this only stirs up the wastes into the water.
5. Repeat this until the entire gravel bed has been vacuumed. When you are through, the water level will be lower.

You can leave the fish in the aquarium while you vacuum. The suction is not strong enough to pull out the fish or the gravel. Vacuum under all rocks and other decorations where wastes can build up. This process should take no more than a few minutes, but it rids the aquarium of the wastes that can start decaying and creating more ammonia.

If you get tired of carrying buckets of water to and from the aquarium, you can purchase a vacuum cleaner that attaches to a bathroom or kitchen faucet. This will allow you to siphon water out of the aquarium and directly into the sink. When you are through vacuuming just turn a knob and it fills the aquarium back up with new water. No more buckets or water spills. It cuts down on your time considerably, and is a must for larger aquariums!

WATER CHANGES

TIP #15

Always unplug the heater before doing a water change. If it is out of the water it will overheat and break.

Over time, wastes build up in the water, even though the water is crystal clear. One of the ways to remove and dilute these wastes in an aquarium is through partial water changes. The amount of water that needs to be changed depends on how many and how large the fish are in an aquarium, but a general amount would be 25% to 30% per month. Replacing water that has evaporated does not constitute a water change. The dissolved wastes do not evaporate.

If you have just vacuumed the gravel, the water level has probably been lowered enough. If about 25% to 30% of the water is gone, then add new water to finish filling the aquarium. If you think you need to take more water out, then do so. If you have skipped a month or more, then increase the amount changed.

When adding new water, get it as close to the temperature of the water in the aquarium as possible. If you are not able to get the water close to the aquarium temperature, change a smaller amount of water so it won't shock the fish. If you are on a municipal water system, add a chlorine remover as soon as you start to refill the tank.

CLEANING THE GLASS

TIP #16
To remove algae growing on glass and decorations, use an algae eating fish, such as a plecostomus or Chinese algae eater, or an algae cleaning magnet. This will save time and keep you from getting wet.

After the tank has been set up for a few days, algae will begin to grow on the glass. This is normal and will not harm the fish. Cleaning the glass is easily done with the aid of an algae magnet. This is a device that has one piece that goes inside of the glass while the other piece goes on the outside and are held together by magnetic force. As you move the outside piece, it moves the inside piece and scrubs off the algae. When you are done, the magnet can stay in the aquarium up in a corner, ready for a quick clean when needed.

Versions are made for both glass and acrylic tanks. Be very careful not to get the inside magnet down into the gravel when cleaning an acrylic tank. It can pick up debris and scratch the acrylic.

TIP #17
To remove tough algae from an acrylic aquarium, use the edge of a credit card. This will not scratch the acrylic.

You can clean the areas you can't reach with a magnet, such as the corners and back, with an aquarium cleaning brush.

TIP #18
Do not use soap to clean an aquarium and do not put your hands in your aquarium if you have soap, lotion, or other chemicals on them. These will harm or kill the fish.

CLEANING THE DECORATIONS

Aquarium decorations can be cleaned a couple of different ways. You can use an aquarium brush in the tank if they are lightly dirty or you may take them out and clean them under a faucet with a brush. If they have algae imbedded in them and can't be cleaned with a brush, you can bleach them.

TIP #19
Bleach can be used to clean decorations, but with caution.

Bleach is very effective at removing algae, but it is also very deadly to fish. Caution must be taken when using bleach.

I use bleach a couple of different ways. First, you can fill a sink with warm or hot water and pour in a 10/1 ratio of water to bleach. If it is not strong enough to clean the algae, then add more bleach. Once the algae is gone, drain the sink and fill it up again with clean water. Let the decoration soak for a few minutes then drain again. Repeat this procedure twice. On the last time, add chlorine remover to the sink water. After draining for the last time, allow the decoration to air dry completely before putting it back into the aquarium. When adding it back to the tank, add chlorine remover to the aquarium itself as a safeguard.

The second way is to pour bleach into a spray bottle, bring the decoration outside, and spray bleach directly onto it. After the decoration is clean, rinse it thoroughly with a water hose. Allow it to air dry completely. Use chlorine remover when adding it back to the aquarium.

If the decoration is very porous, such as lava rock or a pipe organ coral, use extra caution when bleaching since it will soak deep into it. Allow to soak in clean water with chlorine remover and air dry longer.

Bleach will ruin clothes or other material if it comes in contact with them. Use caution.

4 Servicing the Filter

Many different types of filters are on the market. The most common filters for freshwater aquariums are the **undergravel filter, external power filter** and the **canister filter**. If you have a different kind of filter than these, then follow the manufacturer's directions on proper care for them.

UNDERGRAVEL FILTER

Many small desktop aquariums have an undergravel filter. This is simply a plastic plate at the bottom of the tank with a clear tube that rises to the top. Gravel is placed over the plate. There is usually an air stone at the bottom of the plastic tube connected to an air pump outside. As the air bubbles rise in the tube, water rises with it. This causes water to go down through the gravel, under the plate, then up the tube. As the water passes through the gravel, bacteria start to live in the gravel where they transform ammonia into nitrite and nitrate. More sophisticated ones will have a powerhead water pump on top of the tube instead of airstones.

Weekly

Air driven

- A steady stream of air bubbles should be rising up through the lift tubes.

Monthly

Both

- Clean gravel with an aquarium vacuum.

Air driven

- Check for and replace clogged airstones in the lift tubes.
- Check air pump and all hose connections.
- A steady stream of air bubbles should be rising through the lift tubes.

Powerhead driven

- Place hand in front of outlet and check for a strong water flow.
- Remove powerhead and clean if water flow is weak.

Every Three to Six Months

- Clean underneath the filter plates.

If your aquarium has more than one filter plate

Vacuum the gravel and move it to one side of the aquarium. Remove one of

the filter plates and clean underneath it, then spread the gravel back. Do not clean all of the plates at once, since you run the risk of harming bacteria.

Space the time out so you clean the entire undergravel filter over a period of one year. For example, if you have two filter plates, clean one plate every six months. If you have four, clean one every three months. Keep a log to help you keep track of what you have cleaned.

If your undergravel filter has only one filter plate
Vacuum the gravel and move it to one side of the aquarium. Refill the aquarium with water. Shake the filter plate and loosen the dirt. Place the vacuum over the exposed filter plate and vacuum the dirt out of it. Remove the lift tube and place the vacuum over the hole. Move the gravel to the other side of the aquarium and repeat the procedure. Check ammonia and nitrite levels for a few days.

Do this once a year.

EXTERNAL POWER FILTER

Most aquariums have filters that hang on the back of the tank. These are called external power filters and are the easiest to service. Follow the manufacturer's directions for cleaning for your specific filter.

Weekly

- Check to see if water is flowing through the filter.
- Check cartridge. If water is flowing over the cartridge, then rinse it out. If this happens sooner than once per month, then you may be overfeeding.

Monthly

- Check water flow. If it is slow, then remove and clean intake tube and impeller.
- Change or clean filter cartridge. You can rinse them out a few times, but replace them every couple of months if they contain carbon. The carbon will get clogged up and will not be effective.

Every Six Months

- Remove and clean the intake tube and impeller. This is the tube that goes down into the aquarium and the small propeller that pumps the water.
- Wipe the inside of the filter to remove built up dirt.

If the filter is equipped with a place for bacteria to live, such as a sponge or rotating wheel, **DO NOT CLEAN THEM.** You can harm the bacteria growing in them. A buildup of brown gunk and slower rotation is normal. Check with the manufacturer's instructions before any type of cleaning.

Change the carbon if it is not contained inside of the filter cartridge.

Carbon

If your filter does not have a place for carbon then consider adding a filter that does. Purchase a small, inexpensive, external power filter to use along with your present filter. Place the suggested amount carbon in a fine, mesh bag, and then place it in the filter. This will help to remove dissolved wastes, colors, & odors and will make the aquarium healthier.

CANISTER FILTER

Canister filters are filters that set on the ground, have built in motors and have tubes that go up into the aquarium. There are many different makes and models, but all run on the same principles. Follow the manufacturer's directions for cleaning for your specific filter.

Weekly

- Check to see if water is flowing through the filter. If not, service the filter.

Monthly

- Check to see if water is flowing through the filter. If not, service the filter.

Every One to Three Months

- Save some of the aquarium water from a water change.
- Service the filter. Disconnect the filter and open it up. Clean the filter sponge and bio-media in the old aquarium water. Chlorine from rinsing them under tap water will kill the good bacteria.

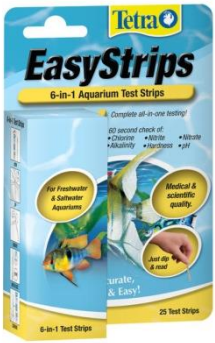
5 Water Testing & Adjusting

It is important that you test the water regularly to be sure that it is safe. You need to purchase test kits that will ***test pH, alkalinity, ammonia, nitrite and nitrate***. Your aquarium should also be equipped with a ***thermometer***.

TIP #20
Water can be deadly, even though it is crystal clear.

TEST KITS

Test kits most commonly come in the form of *test strips* or *liquid drops* & vials. A multi-test strip will have *pH, alkalinity, nitrite* and *nitrate* all on one strip. *Ammonia* has to be purchased on a strip by itself. These are the easiest to use and will give a quick snapshot of the water conditions. Liquid test kits may be a bit more accurate, but are more time consuming to use. I prefer the test strips.



TIP #21
Quickly test the water with a multi-test strip.

Electronic meters are available for pH and other parameters. I haven't found them worth the expense unless you are monitoring a tank full of expensive corals or very sensitive fish and want a constant read out.

TESTING pH & ALKALINITY

pH

pH in the aquarium is the measure of how acidic or alkaline the water is. A neutral pH is 7.0 and can be easily read with a test kit. Most fish like a neutral pH with an acceptable range of 6.5 to 8.0.

Fish are usually not bothered by the pH level unless it leaves this range. The only times you need to be concerned with a specific pH level is when you are trying to breed a particular fish, growing plants, have an algae problem or

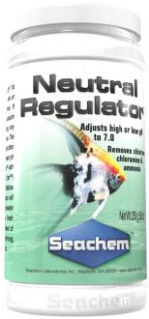
ammonia is present in the water. As the pH rises above 7.0, ammonia becomes more toxic. Check to see if ammonia is present before raising the pH. If it is, then raise the pH if only necessary, and do it very slowly.

Alkalinity
In basic terms, alkalinity is the measure of how easily pH can change. If the alkalinity is low, pH can change quickly, which is a bad thing. A higher alkalinity will stabilize pH, keeping it from changing. Fish do not like a fluctuating pH. It can be a cause of stress and death.

Testing the pH of tap water from a faucet will sometimes give a false reading because the water may be saturated with oxygen or carbon dioxide. Just test the pH level of the aquarium water. Compare the results with the color charts included with the test kit. If they fall outside of the acceptable range, then they need adjusting. Test the pH and alkalinity monthly.

ADJUSTING pH & ALKALINITY

If the pH is staying within the safe range of 6.5 to 8.0, then do not try to adjust it, especially with strict pH up or pH down chemicals. You face the risk of adjusting the pH either too high or too low. Also, fluctuating pH can be stressful on fish if ammonia is present. Using items such as baking soda and vinegar to adjust pH is also risky. Just use a neutral pH buffer made for aquarium use. It is much easier and economical.



TIP #22
Do not continually adjust pH. If it's in the safe range, leave it alone.

As an aquarium ages, the pH will naturally fall. This is due to the buildup of acids from decaying food & fish waste and is slowed with regular, partial water changes. If you have a problem with the pH staying consistently low, use a neutral pH buffer to raise the pH to 7.0. This will also increase the alkalinity to help guard the pH against falling back again. Check nitrate to ensure you are changing enough water to reduce these acids.

TIP #23
Use a pH buffer to adjust and hold the pH at the desired level.

If the pH is staying constantly too high and you are not on well water, check to see if there are any seashells, coral based decorations or coral gravel in the tank. If so, remove them since they will slowly dissolve and raise pH. Some municipal water systems may also have hard water. If so, try a neutral pH buffer. If this does not work, then just purchase fish that like the higher pH. Extremely hard water is too difficult and expensive to fight.

AMMONIA

As stated before, fish excrete ammonia. Uneaten food & dead fish can also decay and create ammonia. The majority of the problems with ammonia will come when you first set up the aquarium, add new fish, overfeed, or misuse medications.

Use a test kit to check for ammonia. When you add new fish to your aquarium, test it weekly until the ammonia level returns to "0". Also, test the ammonia level monthly to identify possible problems, such as overfeeding or overcrowding.

Adjusting ammonia
If you have a high ammonia problem, try one of these methods to reduce the ammonia level. Your local aquarium store should carry these products.

- Reduce or suspend feeding until the ammonia level has dropped.
- Use an ammonia absorber, such as zeolite.
- Use a chemical that detoxifies ammonia or removes it.
- Add concentrated bacteria to the water. These are millions of good bacteria concentrated in a liquid. This will speed up the time it takes for the bacteria to multiply and to reduce the ammonia level.
- Do a partial water change. If you do a water change on a new aquarium, you will remove some of the bacteria that is trying to build up. Use this only as a last resort.

TIP #24
A properly maintained, established aquarium will have no ammonia or nitrite in the water.

NITRITE

Use a test kit to check for nitrite. Test for nitrite weekly after adding new fish. A few days or weeks after the ammonia level drops to "0", the nitrite level will drop to "0" . When this happens, then you can add more fish. **Never add more fish if the nitrite level is not "0"**. Also, test for nitrite monthly to identify problems, such as overfeeding or overcrowding.

If you have a high nitrite level, you can use one of these methods.

- Reduce or suspend feeding until the nitrite level has dropped.
- Add concentrated bacteria to help speed up the multiplication time.
- Use a chemical that detoxifies nitrite.
- Do a partial water change to help dilute the concentration of nitrite. If you do a water change on a new aquarium, you will remove some of the bacteria that is trying to build up. Use this only as a last resort.

NITRATE

Use a test kit to check for nitrate and test monthly before doing a water change. If the nitrate level is well within the safe range, then do a normal 25% to 30% water change. If the level is getting close to the unsafe range, then increase the level to 50%. If the level is extremely high, you may do a water change up to 75%. (When doing a large water change be sure to get the temperature as close as possible and use a chlorine remover as soon as you start to refill the tank.)

Very High Nitrate

TIP #25

The nitrate level is a good indicator of:

If enough water is being changed
If you are overfeeding

Identify why the level is in the unsafe range. It can be from overfeeding (#1 problem), overcrowding or lack of water changes.

TEMPERATURE

Develop a habit of checking the thermometer every time you look at the aquarium. The temperature should be around 75* for tropical fish. Goldfish and other coldwater fish can stand colder temperatures.

TIP #26

Do not keep tropical fish in an aquarium without a proper heater.

Do not keep tropical fish in an aquarium that does not have a heater and do not purchase the cheapest heater possible. Spend a little extra money and get a high quality heater. This is the piece of equipment that will go out most often. It will either stop working or it will stick “on”. If it does stay on, the high temperature can kill the fish.

Small aquarium kits without heaters may have too much temperature fluctuation for tropical fish. Either keep coldwater fish, such as goldfish or bettas, or purchase a heater just made for a small aquarium.

6 Algae Control

Anytime you put water and light together, you will get algae growth. Algae is part of a healthy aquarium, but is not always pleasant to look at. Algae does not harm the fish and is used by some fish as food. Below are some methods to help control different types of algae.

TIP #27
Algae does not hurt the fish.

TYPES OF ALGAE

Brown

Brown algae are microscopic diatoms that feed off of silicate that is found in tap water. This type of algae is more prevalent after setting up a new aquarium or a large water change. It will show up on the glass and eventually spread to everything in the tank. It will slow down in a few weeks as the silicate is used up.

It can't be controlled by chemicals, but it can be controlled by using Chinese algae eaters. Plecostomus algae eaters don't really like it. Simply clean it off with an algae magnet or brush and lightly stir the gravel to turn it under.

TIP #28
Use algae eating fish to help control brown and green algae. Snails are better suited as decorations or food.

Green

After setting up a new aquarium, the algae will first turn brown, then green. This is normal. Green algae is fed from nutrients in the water and light. It is difficult to entirely eliminate green algae, but it can be controlled by the following:

- Proper fish feeding.
- Proper maintenance procedures.
- Chinese Algae Eaters and Plecostomus Algae Eaters.
- Turn lights off at night.
- Leave lights on for no more than 12 hrs per day.
- Move aquarium away from bright windows.
- Algae inhibiting chemicals if the aquarium does not have live plants or invertebrates (shrimp, snails, etc).

Some of the algae inhibitors work better than others and some will kill the fish if overdosed.

Clean the algae from the glass with an aquarium magnet or brush. Decorations may have to be removed and cleaned.

TIP #29
Do not leave the lights on for more than 12 hrs per day. This helps to control algae and allows fish a time of rest since they don't have eyelids.

Black and Red

Black and red algae usually indicate a buildup of nutrients in the water due to overfeeding, overcrowding or under filtration. These nutrients can include nitrates or phosphates. You can check these with a test kit and make changes to remove them. Phosphate can also be introduced into the aquarium from tap water and some pH buffers.

Black and red algae can be in the form of little tufts on the glass or decorations, or a "slime" that covers everything. They can be controlled by the following.

- Increase water changes.
- Reduce feeding.
- Reduce population.
- Increase filtration and water flow.
- Use a chemical or filter media to remove phosphate.

Green Floating

This is when algae is suspended in the water and it looks like pea soup. The algae can be introduced through new fish, plants or carried in through the air. It can be very difficult to control. Refer to ***Green*** under the ***Cloudy Water*** section.

TIP #30

Live plants can be difficult to keep and most require intense light for photosynthesis. Because of their strict requirements, they are not always a good choice in nutrient / algae control.

7 Problem Solving

Occasionally you will run into a problem that can't be explained from water testing. Below are some common problems and fixes.

CLOUDY WATER

Cloudy water in an aquarium can be caused by four things: ***Multiplying bacteria, suspended particles, chemical imbalance or floating algae***. It will usually be either ***white, brown or green***.

White

After adding the first fish to your new aquarium, the water may become cloudy. This may be the good bacteria entering the water and multiplying. It will take a few weeks for it to settle down into the gravel & filter and for your water to clear up. Do not try to remove the cloudiness through water changes. You will remove bacteria that are trying to multiply and may cause ammonia and nitrite to build up. It is a natural biological cycle that has to occur. Just be patient and let it clear on its own. I do recommend cutting feeding to about one half of the normal amount during this time.

If the tank has been established for a while and a white cloudiness forms, first use a clarifier to see if it is suspended particles. If it does not clear up, then either the good bacteria has been damaged, you are overfeeding or another bacteria has entered the water. If the tank does not clear up after cutting feeding for a few days, then use an ultraviolet sterilizer to clear the bacteria bloom up.

If none of these methods help, then there may be problems with the alkalinity level, or excess phosphate is in the water. Test the water for those levels and correct if necessary.

Brown

Cloudiness maybe caused by suspended particles of dirt or food floating in the water. **Clarifiers** are available to help clear up this type of cloudy water. They are chemicals that help to clump together small particles into bigger particles that are more easily removed by the filter or by vacuuming.

A brown / yellow color may also be a buildup of dissolved fish waste in the water. A water change is recommended along with adding or replacing carbon. Carbon will absorb these colors.

Natural driftwood can sometimes release tannins in the water causing a brown color. Carbon will help to remove them. If it becomes a consistent problem, then remove the driftwood.

If the water does not clear up after using these products, then the cloudiness may be the bacteria spoken of in the last paragraph. Your aquarium could have an ammonia or nitrite problem.

Green

TIP #31
Green, floating algae is difficult to get rid of. Knock it out quick with a UV sterilizer.

If the water is tinted green, then the cloudiness may be floating algae growing in the water. Floating algae can be caused by several things, one of which is from excessive or unsuitable light. If your aquarium is setting by a window or the light stays on for more than 12 hours a day, then it is getting too much light. Move the aquarium away from the window and reduce the light to less than 12 hours a day. Floating and regular algae problems may also be caused by weak light bulbs. Light bulbs weaken & shift spectrum as they are used over time and should be replaced every year or two.

TIP #32
Old light bulbs or bulbs not meant for aquarium use can be the source of algae blooms.

Another cause of green cloudy water is from ammonia and nitrite problems. The bacteria have not built up to a high enough level to rid the aquarium of all ammonia & nitrite and the algae is using ammonia and nitrite for food. Bacteria must be given time to build up to their optimum level. While the bacteria are multiplying, use a clarifier to clear the algae from the water. Keep using this until the bacteria have finished multiplying, ammonia and nitrite are gone, and algae stops growing in the water. This could take several weeks, so please be patient. Excessive waste build up can also cause ammonia, nitrite, and floating algae problems.

Floating algae, and regular algae, will also thrive in a low pH level. If the pH is low (around 6.0 or below) and floating algae are present, raise the pH back to

neutral using the techniques discussed earlier. Again, use a clarifier to help remove the algae while the aquarium adjusts back to normal.

Changing the water in the aquarium will not get rid of floating algae. It will come back in a few days and feed on the phosphate that comes in with new water.

A quick, guaranteed fix is to use an Ultraviolet Sterilizer. This is a device that forces the aquarium water past a UV bulb which kills the algae. They are highly effective and will clear the water within a couple of days.

Floating algae does not harm the fish.

ODORS

If you notice an odor coming from the aquarium, check the following things.

- Dead fish
- Uneaten food at the bottom of the aquarium
- Overcrowding
- Filter unplugged or not working
- Wet food outside of the aquarium

Check the ammonia level. If it is high then follow the steps given in Chapter 5.

TIP #33
A properly maintained aquarium does not smell bad.

8 Feeding

Overfeeding

Do not ***overfeed*** the aquarium. Notice it says ***aquarium*** and not ***fish***. Fish will eat until they are full, leaving the uneaten food to decay and create ammonia. A fish's stomach can be the size of their eye. Feed only the amount that the fish will eat in a few minutes once or twice per day. If the food falls to the bottom and remains uneaten, then you are feeding too much.

TIP #34
Do not overfeed the aquarium. Feed only what the fish will consume within a few minutes once or twice a day.

If you think you are overfeeding, then you probably are. If you think you are not overfeeding, you still probably are. Overfeeding is the root cause of the majority of all problems in an aquarium. Controlling feeding will eliminate most of the algae blooms, ammonia spikes and disease outbreaks that occur.

TIP #35
Overfeeding is the root cause of the majority of all problems in an aquarium.

Vacation Feeding

If you are planning on leaving town for a couple of days, do not worry about feeding your fish. Fish can go several weeks without eating and will be fine if they are well fed up to that point. They face more harm with a stranger incorrectly feeding them while you are gone.

If you plan to be gone for several days up to a couple of weeks, feeding blocks are available that slowly dissolve and release food. These work well for smaller aquariums and fish.

TIP #36
Don't let someone unfamiliar with aquariums feed your fish while you are out of town. I have sold many replacement fish to people who have overfed and killed fish while fish-sitting.

Automatic Feeders

If you are planning on leaving for a few weeks, or have an erratic work schedule, you might consider investing in an automatic fish feeder. These are devices that will dispense food at the times you program. There are different models for different types of food and can last up to a month or more.

TIP #37

Automatic fish feeders are handy devices for people who are gone for long periods of time or need consistency in feeding. Choose one that feeds your type of food.

Food Types

There are many, many different types of food available and the choices can be overwhelming. Most common aquarium fish do fine with a basic ***flake food***. Larger fish will usually need ***pellet food***.

Specialty fish can be either herbivores or carnivores. Try to match up the type of fish with the type of food for their species. It will contain certain nutrients beneficial to that type of fish.

Frozen foods are also available. These will be actual insects or other natural foods frozen into flat packs or cubes. Fish usually love them but they can be messy and time consuming to use. You can use them as an occasional treat.

Some fish prefer or require ***live food***. This can be anything from shrimp to smaller fish such as guppies, rosy reds or goldfish. Live food usually creates more waste in the aquarium and more maintenance.

9 Disease and Medications

CAUSES OF DISEASE

The majority of fish stress & disease is caused by poor water quality, such as high ammonia & nitrite levels, unsafe pH levels, dirty filters and not enough partial water changes. Diseases can also be brought in by new fish to the aquarium.

TIP #38
Healthy fish usually do not become sick, but stressed fish do.

When your fish becomes sick, treat the problem, not the symptoms. A fish becomes sick for a reason. Something has stressed the fish to allow it to become susceptible to disease. First, find the problem stressing the fish, then treat the fish for the disease. Always test all of the water conditions first: pH, ammonia, nitrite, nitrate and temperature. Usually, these will tell you if something is wrong with the water. If one of them is beyond a safe range, then correct it and treat the fish for the disease.

TIP #39
When your fish becomes sick, treat the problem, not the symptoms

If all conditions are fine, then check to see if you have performed all maintenance tasks recently. The fish that are in the aquarium can get used to bad water quality over time, but new fish introduced into the bad water will sometimes get stressed and become sick. If you believe that this is the problem, then a large partial water change is needed.

After you have found the reason for the disease, then medicate the fish if needed. When using a medication, read the package first. Several medications are so strong that they will harm the good bacteria in the aquarium. These will have warnings printed on the labels:

- **Will interrupt nitrification**
- **Will harm the biological filter**
- **Use only in a hospital or quarantine tank**
- **Use in a bare tank**

If a medication is used for treating bacterial diseases, it can also harm the good bacteria in your aquarium. Use caution using these in your main aquarium. They could lead to ammonia and nitrite problems, and more sick fish.

DISEASE IDENTIFICATION

Fish disease can be caused by:

- **Parasites**
- **Bacteria**
- **Fungus**
- **Water Quality Issues**

Parasites

Ich - The most common disease among fish is called Ich. It is a parasite that looks like little grains of sugar or salt on the fins and body. It is easily treatable, but ***must*** be treated or it can spread and kill all of the fish in the tank. It is usually brought on by the stress of moving to a new tank or water quality.

Internal Parasites – Common symptoms for internal parasites are the fish are thin, weak, listless; they swim aimlessly or dart wildly, have spasms or have mucus on the gills.

External Parasites – Symptoms for external parasites include the fins are closed and held close to body; fish scrape against objects; red spots on fins; gills hang partially open or pump quickly; tiny lumps moving slowly on skin or fins; small, black specks on skin or threadlike worms hang from body.

These can all be treated with a parasite medication.

TIP #40
Always look at all the fish in a fish tank at the pet store before purchasing one. If one fish has it, they may all have it.

Bacteria

Bacterial diseases are usually caused from water quality issues. Symptoms can include:

- Tail, fin or mouth rot – flesh eaten away with redness.
- Open sores on the body.
- Red streaks on fins or body with no sign of skin or scale damage.
- Clamped fins held close to the body.
- Bloated with the scales standing out.
- Eyes cloudy or enlarged.
- Swim bladder disease – fish swims on their side or upside down.

These can be treated with a medication for bacterial diseases.

Fungus

Fungal diseases are sometimes the result of a previous wound, such as a parasite or scrape. The fungus will setup in the wound and grow. These are identified by white, cottony growths on the body.

This can be treated with a fungus medication.

TIP #41

Remove all loose carbon and replacable filter pads containing carbon from the filter before using a medication. Carbon will soak up the medicine causing it not to work. Leave out for at least 7 days.

Water Quality

Bad water quality can lead to other type of diseases such as parasites or bacteria. It can also cause other erratic behaviors. For example, if the water temperature gets too low, African cichlids will start swimming upside down. Always test all parameters your water if your fish start behaving differently.

Water quality can cause other conditions, too. Extremely low pH will cause the slime coating on a fish to peel off.

TIP #42

If you can't easily identify why a fish is behaving differently or dies without explanation, then do a large partial water change to remove anything that may be poisoning the water.

QUARANTINE AQUARIUM

A quarantine aquarium is a tank set up just for watching for disease in new fish and medicating sick fish. It can be just a bare tank with a simple sponge filter and a heater.

If your new fish were to get sick from all of the traveling they have done in the past few weeks, using a quarantine aquarium will keep the fish in the main aquarium from getting sick. Also, some medications can harm the bacteria in the main aquarium. This will lead to ammonia and nitrite problems and cause more sick fish. If they are healthy after a few days, you can add them to the main aquarium.

TIP #43

A basic 10 gallon tank with a simple sponge filter and a heater, set up as a quarantine tank can cost less than a tank full of dead fish.

10 Chemicals and Filter Media

Below is a list of chemicals and filter media pertaining to freshwater aquariums. There are many different company names, brand names, product names and variations, but most fall into these basic items.

Aquarium Salt
This is *non-iodized* salt that can be used in the aquarium. Some fish, such as livebearers and goldfish, benefit from salt added to the water. You may use most any type of salt, such as rock salt, as long as it is doesn't contain iodine.

Carbon
Carbon is a black granule that contains many microscopic cracks. They absorb dissolved organic waste, colors and odors. It is sometimes contained inside of filter pads or in its own separate container in the filter. The cracks will fill up and needs to be replaced every couple of months.

Zeolite
Zeolite is a micro-porous granule that is used to remove ammonia from the aquarium water. It should only be used in an emergency situation. Constant high ammonia levels are from overfeeding or overcrowding and should be fixed.

Phosphate Remover
This can be either granular or a liquid. They work by absorbing or binding phosphate so it can't be used by algae for food.

Chlorine Remover / Water Conditioner
This is a chemical that removes chlorine from municipal water sources. Some may also have additional chemicals to restore the slime coat.

Ammonia / Chloramine Remover or Detoxifier
This is a chemical that removes or detoxifies ammonia in an emergency situation. The aquarium may still test for ammonia after using one of these, but it has been detoxified. Chloramine is a combination of ammonia and chlorine and can be harder to remove. Some also detoxify nitrite and nitrate.

Bacterial Additives
These are chemicals that contain the good bacteria used in biological filtration. They will help speed up cycling a new aquarium and if the good bacteria has been damaged.

pH Buffer
This is a chemical that will adjust the pH to the desired level and boost alkalinity so the pH won't change as easily. Some are phosphate based and work really well at stabilizing pH, but they can boost phosphate levels and cause algae problems. If an algae problem occurs after use, switch to a different kind.

Algaecide
This is a chemical that help to control green algae growth. Some work really well and others will kill fish if overdosed.

Water Clarifier
This is a chemical that clumps small, floating particles in the water together so they can be more easily removed by the filter or vacuuming.

Resources

Websites

This is the website for my aquarium maintenance business.

www.aq-designs.com

This is the website where I blog about the aquarium maintenance business.

www.aquariummaintenancebusiness.com

This is where my aquarium maintenance business course is located.

https://how-to-start-a-low-overhead-high-profit-low-st.teachable.com

Thank You So Much!

I hope you have learned some tips that will save you time and money in your aquarium hobby.

If you know of someone else with an aquarium who can benefit from this book, please feel free to pass it on.

Thanks again, and happy fishkeeping!

Larry McGee