

# **The Fantastic Aquarium**

Being mostly involved with Primary and Secondary education students I have become passionate about how the aquarium can be used for educational purposes as well as enjoyment. This information will show you that setting up an aquarium is not the scary task I once thought it was, and will demonstrate how it can be utilised in the classroom. It is not a complete and comprehensive listing of aquariums, equipment, fish plants, etc – I would need to write a book for that. ☺

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## **Before you start**

A fish tank sounds awesome, would look so cool in the lab and provide you with the gentle sounds of falling water, very good for Feng Shui, right?!!! Yes and possibly NO. Ask yourself the following questions:

- How much time do you **REALISTICALLY** have to spend maintaining your fish and tank?
- Are you really that keen on fish/frogs? (I'm assuming yes because you're reading this)
- How much do you know about caring for fish?
- What sort of fish do you want – cold water, tropical, marine?
- How much space do you have for a tank?
- What is your budget and what are its limitations?

These are all important considerations to take into account before you start on your aquatic journey. (Also, I actually had a lecturer turn off the filter on one of my tanks because it was deemed “too noisy” during an exam – I was not told until late and the filter had not been turned back on!)

## **Your Aquarium – the basics for beginners**

Note – this will be based on freshwater aquariums

Good things to remember when choosing what to get:

- the internet is a quick source of information, but not all information may be accurate, it may just be someone's experience or opinion
- your local library has a lot of information on aquariums and fish and is cheaper than buying a bunch of reference books straight off
- Look up an aquarium forum on the internet. You can get some great information, opinions and advice. Keep in mind that there are some great ones with really good moderators keeping things in check but there are also some not so good ones. You want to look for one that is very active and is interested in helping beginners by encouraging questions, as well as the advanced hobbyist.
- get a good relationship going with your local Aquarium shop or keep looking until you find a store you like and staff you can talk to

When looking for a good aquarium shop, keep in mind that the person you deal with should be genuinely interested in fish and providing you with the correct equipment and advice for your needs rather than selling you the most expensive items in the shop. You should be able to ring them with any questions you have regarding your fish and equipment.

## **The Basics**

### **Tank**

- Glass vs acrylic
- Shape – some fish need a deeper aquarium. A longer aquarium has more surface area = greater O<sub>2</sub> exchange
- Size – buy the largest you can afford and have room for. Weight considerations

- Filter – under gravel filter is probably the cheapest option. See Equipment attachment for more information
- Air Pump - used to drive both under gravel filters and sponge filters. Different types, prices and output volumes.
- Gravel (substrate) - natural colour is better than fluorescent!!! Sand will not work with an under gravel filter as it falls through.
- Decorations - rocks & driftwood help to add to the natural look rather than a sunken ship.
- Light - many different types. Fluorescent is a cheap option and you can even buy a “daylight” tube from Bunnings cheaper than at an aquarium store.

### Other Requirements

- Water conditioner – helps to stabilise/buffer the water to prevent sudden swings in pH
- Water ager / dechlorinator –removes the chlorine from the tap water. Chlorine in tap water kills your fish!
- Water Test Kit –allows you to monitor your water parameters. Get an all in one kit rather than buying a few individual tests at a time.
- Food – various types, brands and prices. Some fish have special requirements. Some live or frozen foods may be required to trigger spawning
- Automatic Feeder – Makes life easier if you are only part time or for over the holidays
- Gravel cleaner (vacuum) – works like a siphon to clean the gravel.

*The ins and outs of syphons – when you need to use your syphon to vacuum your gravel or do a water change, you need to involve the physics principal of negative pressure. The cheapest and easiest way to provide this is using your mouth. Be prepared to get some fishy water in it!*

### Plants

The plants I have had the most luck with are:

Java Fern – low maintenance plant. Fish can swim through and around it. Can be grown in the gravel or attached to driftwood.

Java Moss, also known as Breeding Moss – great for new fry (baby fish) to hide in and as it provides a large surface area for microscopic organisms to grow on, will help feed the small fry

Duckweed, Lemna minor – gold fish generally love it as a food source. It also provides shelter and protection for a wide variety of animals and fish. In addition, some fish, such as bettas and gourami, use it when building their bubble nests. You do need to thin out as it can get out of control

Amazon Frogbit, Limnobium laevigatum – similar to Duckweed, but easier to clean out. Note: this plant has been declared a noxious weed in QLD and it is illegal to buy, sell or trade there.

Both Duckweed and Frogbit are very good at removing nitrates from the water to keep it healthy for your fish. You will need to have a plan in place to dispose of excess as it can grow out of control and will need regular culling. I feed my excess to my chickens (great if you have them at a school), or you can compost them. Do not allow any aquatic plants you have to go down the drain and potentially into waterways.

Elodea densa – great coldwater plant but I have had varying degrees of success with it. It is a great holiday food for goldfish as they love snacking on it. It can also be used for biology pracs.

Cabomba and Bacopa – nice plants, again I have had varying degrees of success in keeping these, but they do add a lovely variety to your tank.

Anubia – a lovely low-light plant that will grow on rocks and driftwood. This plant is very low maintenance but can be more expensive, especially if you are trying to buy it already established on driftwood. A cheaper option is to buy from someone on a forum and tie it to the rock or driftwood yourself.

## Setting Up

Wait – Don't add fish straight away!!!

Allow plenty of time – it takes longer than you think

Cycle your tank – Nitrogen Cycle

Choose your fish – cold water, tropical or marine. Live bearer, egg layer, mouth brooder, egg scatterer

Feeding – a great time to check on the health of your fish. Don't over feed!

Water testing – can be daily the first week, weekly, then monthly or if you feel this is a problem

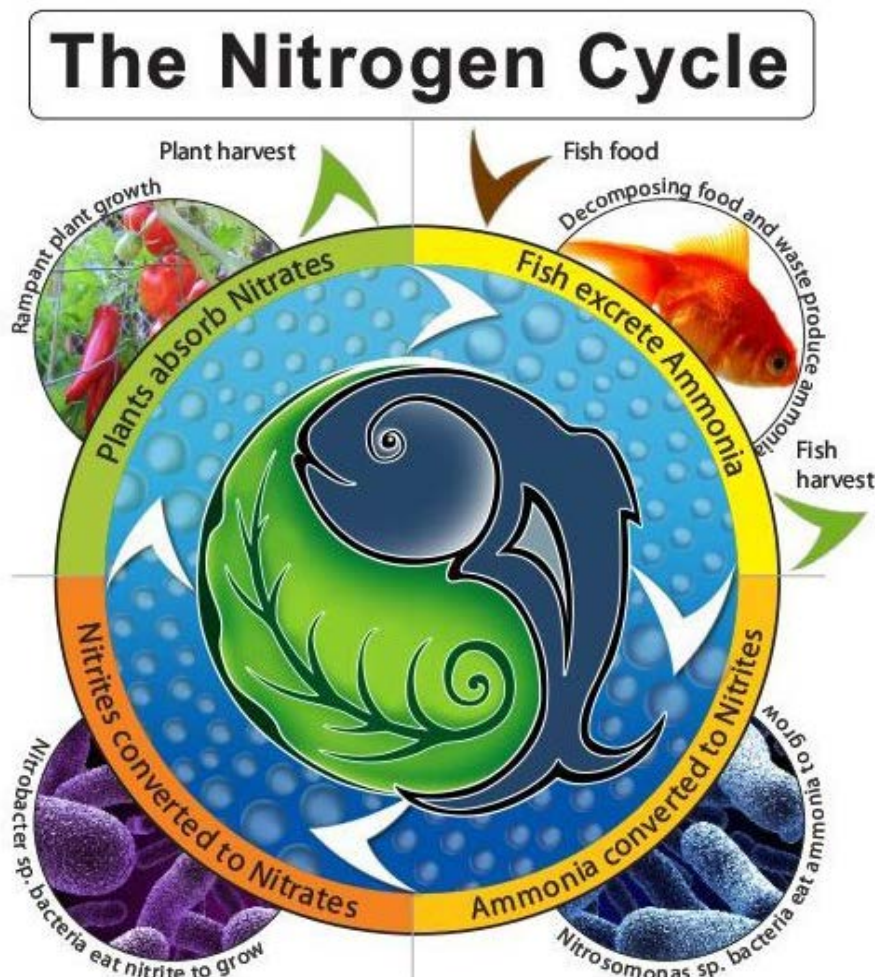
Cleaning and maintenance – generally depends on the size of the tank, the type of fish and how much you feed them. Some people recommend weekly water changes. I generally would do monthly (or 3 monthly, dependant on water parameters and time available). Water changes happen naturally as you vacuum the gravel.



Always follow your Aquarium Shops' recommendations for maintenance and cleaning when you are first setting up your tank. This way you know you are doing the right thing by your fish and you also can go back to the shop if you have having any problems.

## Cycling Your Tank

This fits in with why we need to do water testing. A fish's natural environment generally consists of a large body of water and ways of cleaning this water. It may be by the movement of waves and currents or the flow of a river to change the water in the fish's location. It may be due to dense growth of plant life to take up excess nutrients in the water and help purify it for the plants. Whatever the case, there will DEFINITELY be bacteria! For our purposes we are talking about the beneficial bacteria that breaks down wastes into a form that plants can utilise. See the following diagram :



<http://www.backyardaquaponics.com/information/the-nitrogen-cycle/>

When you set up your fish tank for the first time there will be little, if any, beneficial bacteria in it. Without this bacteria, ammonia levels will build up in the water very quickly. Ammonia is toxic to fish and depending on the levels and the fish species, can kill your fish in 12 - 24 hours.

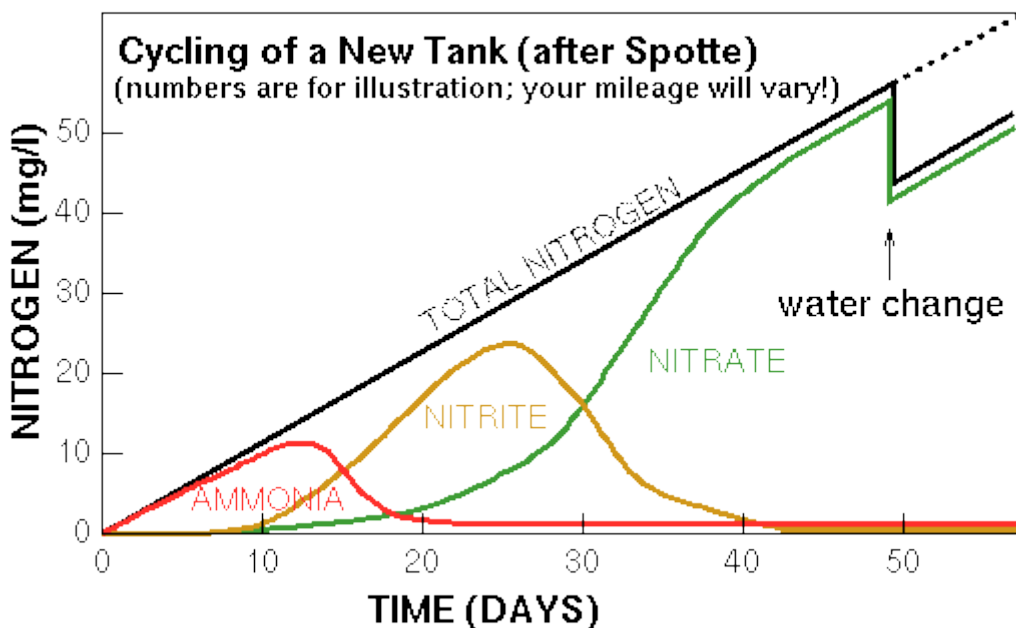
The cycle starts with ammonia being converted to nitrites, which are then converted to nitrates that can be utilised by plants as a source of fertilizer to help growth. This is why garden fertilizers talk about the levels of N, P & K – nitrogen, phosphorus and potassium.

This cycle is a bit of a balancing act at times. If you only have a few fish, you will not be producing enough waste and may need to add fertilizers for your plants. On the plus side, you will also cut down on your maintenance and cleaning. If you have too many fish, the bacteria cannot keep up with waste output and your ammonia levels will rise.

You also need to keep in mind that your tank is a closed system – this means that there is no rain or river continually refreshing the water supply. You will need to do this manually with water changes!

To start your cycle going you can do a couple of things.

- Set up your tank and only introduce 1 or 2 small fish to start getting your bacterial population increasing. You need the fish to produce waste, which feeds and helps to multiply existing bacteria so they can multiply. This will not work very well if you have bought everything brand new and have no plants or driftwood (with their hitch-hiking bacterial groupies) and only plastic plants and ceramic ornaments – you can do it but it would take months. If you add too many fish too fast you will have a sudden ammonia spike and kill your fish. This is why it is important to be patient. This can take 4-8 weeks
- Fishless cycle – this is exactly as it sounds. You do not put in any fish until the tank is “cycled” - instead use something like a prawn. You chuck it into the tank and as it rots down the bacteria will go into a feeding frenzy and start to multiply. You pull the prawn when you are starting to get nitrate readings. This can take 2-6 weeks
- Seeding – this involves using gravel or filtration media that has been seeded with bacteria. Basically it already has a good growth of bacteria. This can give your tank a really good boost and allow you to add fish (again, not too many)
- Bacterial Supplement – generally this is a liquid that contains beneficial bacteria in suspension. You can add this directly to your tank water.



<http://www.aquariacentral.com/forums/showthread.php?178508-Fishless-Ammonia-Cycle-how-long-did-it-take-your-tank-to-cycle>

## **Illness & Disease**

Because there are so many diseases and illnesses (and I am not an expert) I will leave this to others more capable than me to cover. I will let you know some signs to look out for. As said previously, feeding time is a great time to be on the look out for any trouble. Make sure to watch your fish regularly, though, to check for any aggression or bullying, as this can lead to injuries that can get infected and lead to the death of a fish.

This is just a small list. Get to know your fish and as you learn their personalities and habits, you will be able to more easily tell if something is “not right” and then be able to get further advice.

- Belly up, not moving – this is the biggest indication there is something wrong with your fish
- Fish not eating, hiding, dull colouring – could be a case of bullying or possibly the start of some disease. Watch the fish at other times to check for bullying and also to check if there are any other symptoms. Note, new fish will generally hide until they become accustomed to the tank.
- Fish bloated, possibly with scales standing out – probably dropsy, can be fatal
- Small white spots on the fish – probably Ick / White Spot. Very contagious but can be treated easily
- Long stringy poo, fish not eating – probably worms. Easy to treat but can become fatal when the fish becomes weakened.
- Sores or lesions on the body or fins of the fish – could be a fungal infection or injuries sustained from fighting.

These are just a few of the more common ailments. The following links can provide you with more information.

<http://www.plantedtank.net/articles/Common-Freshwater-Fish-Diseases/13/>

<http://www.aquaticcommunity.com/disease/common.php>

<http://www.petmd.com/fish/conditions#.UorUlvO4aUk>

If there is a problem, check your water parameters first. This can give you a good idea if something is out of the ordinary and causing other issues. It also helps when you call your LFS to be able to give them this information. Make sure you have not been over-feeding your fish. Not only does this pollute the water, but some fish can literally eat themselves to death.

## **Quarantine**

A quarantine tank is a separate set up to isolate new fish while you check for and, if needed, treat for any diseases before adding them to your community or breeding tank. Some people do, some don't. You can take your chances, but be willing to accept the consequences.

## **Euthanasia**

Hopefully, any illness you find can be treated before you have to consider this. Sometime this is not the case and you will have to euthanise a fish. All animals deserve respect and consideration and should be euthanised as humanely as possible. I have been advised that placing the fish in a small container of water in the freezer is the most delicate way to go. There are other methods as well.

## Using your aquarium as a teaching tool

Your aquarium can be your best friend in the classroom! There are so many ways you can use your aquarium and I will try to cover as many as I can think of. You will no doubt come up with or already have some ideas of your own.

## Literacy

Excerpt from *The Old Man and the Sea*, Ernest Hemingway

<http://www.sparknotes.com/lit/oldman/quotes.html>

*“Just then the stern line came taut under his foot, where he had kept the loop of the line, and he dropped his oars and felt the weight of the small tuna’s shivering pull as he held the line firm and commenced to haul it in. The shivering increased as he pulled in and he could see the blue back of the fish in the water and the gold of his sides before he swung him over the side and into the boat. He lay in the stern in the sun, compact and bullet shaped, his big, unintelligent eyes staring as he thumped his life out against the planking of the boat with the quick shivering strokes of his neat, fast-moving tail. The old man hit him on the head for kindness and kicked him, his body still shuddering, under the shade of the stern.”*

How does the author describe the tuna and does this help you visualise it?

Use a paragraph to describe one of the fish. Note the way it moves in the water, its shape and colouring and how it interacts with its surroundings (character/personality).

Write your own short story about a day in the life of one of our fish in the aquarium.

## Art

Draw an anatomically correct picture of your fish. Pay attention to detail. Are you going to draw it to scale or will you magnify your drawing to allow more detail?

## Microscopy

Examine the 2 types of aquatic snails under the microscope. Note any differences/similarities between the two species and between individuals of the same species. Draw an enlarged drawing of each and label the different features.

Examine the fish fry images from the digital microscope. What differences can you see in the growth from day to day? Observe the beating heart in the video. Examine the eggs. Which are viable? Note any signs you used to determine the difference between the different eggs.

## Biology

This is following on and meshing with our Art and Microscopy. After drawing and examining different species, discuss what function they serve as part of an ecosystem. What adaptations do they have that particularly suits their environment and how? Find the description of the tuna in *The Old Man and the Sea* excerpt above – how does this help?.



Life cycles – detail the life cycle and breeding and rearing habits of your chosen aquatic inhabitant, include pictures.

Draw a food chain representative of your chosen aquatic inhabitant. Now incorporate this into a food web to include ALL living inhabitants in the tank (bacteria as well).

Natural selection – explain how natural selection works. What features might help a particular fish to survive if there are changes due to weather, pollution, etc?

Diversity – show examples, with explanations, of the types of diversity in the lab tank. Eg, bottom feeders, mid-level and surface feeders, floating plants, mosses...

Genetics – you have a group of blue and red guppies. What do you think the offspring colour will be? Set up an experiment to prove your theory and record all the results.

<http://www.tropicalfishkeeping.com/livebearers/table-guppy-color-genetics-53447/>

## Maths

Measure the aquarium and give the following details – volume capacity, potential weight of tank when full, surface area of water when filled to different depths. Discuss the impact of water volume and changes in water chemistry. Discuss the impact of surface area and O<sub>2</sub> exchange.

3 ft tank = 92cmL x 46cmW x 52cmH = 220064cm<sup>3</sup> = 220Ltrs = 220Kg water volume, not including the weight of the glass tank.

<http://www.calculator.net/volume-calculator.html>

Gravel/sand substrate. 3ft tank @ 4cm depth = approx. 23 Kg, @ 8cm depth = approx. 48Kg

<http://www.aqua-calc.com/calculate/gravel-rectangular-solid>

Next, calculate the size water pump you would need for each of the different size tanks. Note: this can vary depending on the height of the pump in relation to the tank.

<http://www.monsterfishkeepers.com/forums/showthread.php?47105-How-to-size-a-pump-to-your-tank>

<http://www.drsofostersmith.com/pic/article.cfm?aid=280>

## Physics

You can discuss reflection and refraction here and go into discussion on the biology of sight (kingfisher catching a fish) and also how polarising lenses work when you are at the beach or out on a boat.

[http://www.youtube.com/watch?v=i5heupU7UPw&list=PLBCggXBVHyF2x-GXcuOyyQB2f\\_1MOnYXv](http://www.youtube.com/watch?v=i5heupU7UPw&list=PLBCggXBVHyF2x-GXcuOyyQB2f_1MOnYXv) (48.10 min mark)

The lab has a 2ft tank with a 100watt heater set to 26 °C – how long does will it take to heat the tank? (set up the data logger to track progress) Is there anything we can do to change the time taken? Now we need to heat the 18in tank. How long will this take? Draw graphs to show the results.

## Chemistry

What is the impact on the water chemistry, of adding more fish to an 18in tank as compared to a 4ft tank? (refer to Nitrogen Cycle picture) What can be done to combat this? (chemical, mechanical, biological)

Our tap water is at pH 7.6 in the new labs – how can we alter this to allow is to keep Pygmy Corydoras, with a pH requirement of 6.4-7.4? Set up the data logger to track the change in pH with the addition of a chemical product to reduce pH. Continue data collection to see if the pH remains stable.

Now, set up the data logger to track the change in pH with the addition of driftwood and peatmoss, natural pH reducers. Continue data collection to see if the pH remains stable.

How do chemical removal products work in the aquarium? (absorption/adsorption) Do they really remove harmful chemicals or just change them to a non-harmful state? Are there natural alternatives that could be used?

## **Geology**

You have a selection of rock samples you would like to put into your aquarium – how will they affect the water in the tank? Using the classification table, do the tests to classify your specimen and decide where it is ok to use.

[http://www.cichlid-forum.com/articles/rock\\_metals.php](http://www.cichlid-forum.com/articles/rock_metals.php)

<http://www.ratemyfishtank.com/articles/101>

Different fish come from different environments – how has their environment been impacted by surrounding rock? Look up Rift Lake Cichlids

<http://www.docbrown.info/page21/GeoChangesANS03.htm>

<http://geology.com/articles/east-africa-rift.shtml>

<http://www.mchportal.com/aquatic-life-mainmenu-114/aquatic-life-freshwater-mainmenu-142/tropical-ecology-biotopes-mainmenu-151/101-african-biotopes-chemistry-of-african-rift-lakes-water-parameters-in-natural-habitats.html>

## **Environment**

I was going to say “Natural Environment”, but so much of our environment is not natural anymore.

Crown of Thorns starfish is again on the rise and doing damage to our reef system – how is it being combatted

<http://www.australiangeographic.com.au/journal/new-hope-to-stop-crown-of-thorns.htm>

With the deterioration of some of our reef systems, are man-made reefs helping or hindering?

<http://www.theatlantic.com/infocus/2011/04/artificial-reefs-around-the-world/100042/>

What was the impact of the Exxon Valdez oil spill in terms of the damage to the environment, and also any new policies to avoid this happening again?

Wild caught or captive bred? How sustainable is it to continue collecting fish from the wild? What are some of the issues?

<http://injaf.org/articles-guides/wild-caught-or-captive-bred/>  
[http://www.forthefishes.org/Aquarium\\_Trade\\_Impacts.html](http://www.forthefishes.org/Aquarium_Trade_Impacts.html)

<http://www.defenders.org/magazine/fall-2013/collecting-gone-wild>

Take an excursion to Hazelwood Pondage and do some fishing. What fish did you catch and are they native – considering the pondage is man made. Discuss the ethics of releasing aquarium fish and critters into the wild rather than rehoming or euthanizing them.

<http://www.asfb.org.au/committees/alien-fishes-committee/escr200105.htm>

<http://www.qldaf.com/forums/general-aquarium-discussion-19/wild-cichlids-hazelwood-pondage-45169/>

Research examples of damage done to the environment due to release of non-native aquatic species. Discuss deliberate introduction – Gambusia species.

<http://www.nativefish.asn.au/exotics.html>

[http://www.feral.org.au/wp-content/uploads/2012/02/TILFS4\\_web.pdf](http://www.feral.org.au/wp-content/uploads/2012/02/TILFS4_web.pdf)

<http://www.dpi.nsw.gov.au/fisheries/pests-diseases/freshwater-pests/species/carp/general-information>



### **Ethics – thoughts to discuss with students**

How do we keep them? Are we providing adequate space and appropriate conditions? Do we keep up with maintenance?

Why do we keep them?

Where do we source them from? Sustainable populations. Domestically bred vs wild caught (plant collection too)

Respect for them as living creatures

Legalities – collecting yourself. Do you need a wildlife permit to keep them? Some species available have come from illegal imports, do you know where yours came from if you are buying privately?

Euthanasia of sick fish

Disposal of unwanted fish or fish too large for the tank - baby croc's

<http://aquariadise.com/goldfish-bowl-banned/>

### **Finally**

If I have forgotten anything in my excitement to share the joys of the Fantastic Aquarium I have included some useful websites for information.

<http://www.aquariumlife.com.au/forum.php>

<http://firstaquarium.tripod.com/>

<http://www.aquariumworld.com.au/>

<http://fins.actwin.com/index.php>

<http://www.fishindex.com>

<http://www.fishlore.com/FirstTankSetup.htm>

<http://www.aqadvisor.com/>

I have also set up a website and a Facebook page for sharing information. I would encourage you to jump in and ask questions or share experiences so we can all help each other.

<http://aquariumeducation.weebly.com/>

<https://www.facebook.com/groups/1437278023152260/> Under the name Aquariums in Education

Enjoy your aquarium, it can sometimes seem like the one peaceful area of your work life and can be a source of great excitement when you come into work one morning to find new babies.

All the fishy best,

Ellen Clarke

Laboratory Manager

# Aquarium Equipment

Equipment	Use	Pros & Cons
Tank	Holds fish, plants and substrate. A must if you want to keep aquatic creatures. Generally made of glass or perspex	O2 exchange dependant on surface area. Cost depending on size, type and material. Glass heavier and broken more easily, Perspex scratches more easily.
Gravel	Substrate to decorate aquarium. Holds plants in place. Aids beneficial bacteria	Comes in many colours and sizes. Does not really hold nutrients for plant growth. Can be ingested by some aquatic inhabitants
Sand	Substrate to decorate aquarium. Holds plants in place. Aids beneficial bacteria	Looks very nice and natural. Some fish do better with sand. Can alter pH levels. Can be a pain to clean. Doesn't hold nutrients
DIY Soil with gravel or sand topping	Substrate to decorate aquarium. Holds plants in place. Aids beneficial bacteria	Provides nutrients to plants and composition can be altered for different plant types. Can cause problems with too much nutrient. Can be messy when rescaping or replanting
Soil Replacement Substrate	Substrate to decorate aquarium. Holds plants in place. Aids beneficial bacteria	Very easy to use. Looks good. Great for plant growth. Is very expensive compared to the above alternatives
Under Gravel Filter - UG	Filtration system that sits under gravel in tank. Works by water flow cycling through gravel. Air driven	Cheap. When used correctly works very well. Some people consider it tacky. Has visible pipes in tank
Corner Filter	Filtration system in plastic unit with different types of filtration. Air driven	Cheap. When used correctly works very well. Some people consider it tacky. Is visible in tank unless hidden
Sponge Filter	Works as biological filtration. Air driven	Can be cheap. Great in smaller tanks or breeding tanks. Does no mechanical filtration so extra cleaning necessary
Internal Filter	Motor driven filtration unit. Sits in the tank and filters the water through it. Biological and mechanical	Cheaper alternative. Good for smaller tanks or those not needing high filtration. Can be an eyesore
Hang On Filter - HOB	Filtration unit hangs on the side of the tank and circulates the water to filter it. Motor driven	Great combination of all 3 types of filtration. Can use as hydroponic/natural filtration unit as well. May not have a place to attach to tank or room to fit it
Trickle Filter	Part of an all-in-one tank, works as an overhead filtration system. Motor driven	Can be very good and use all 3 types of filtration. Not always good on larger tanks. Can be a problem when cleaning
External / Canister Filter	Filtration system in a canister comprising of mechanical, biological and can have chemical filtration	Excellent filtration and provides good water flow in tank. Easy to clean and maintain without getting into the tank. Can be very expensive. Not easy to fix if there is a problem.
Sump	An external tank divided into compartments. Water flows through various filtration media	Provides extra water volume to the tank system. Can hide heaters, etc. May not have room for it. Can be a pain to set up

Equipment	Use	Pros & Cons
Air Pump	Used to provide oxygen to water and to aid the working of some filtration units	Relatively cheap. Various outlet options. Not always needed. Can be noisy
Water pump	Used to move water around the tank, push water through canister filters or external sump filters or trickle filters	Various pump capacity options and flow rates. Various prices. Can provide a range of alternatives for water movement (waterfall) Can be limited due to distance to/from tank. Can be noisy (water flow)
Internal Heater	Used to heat tank water. Sits directly in tank or in sump. Has thermostat to regulate heat	A must if you have tropical species. Can be cheap or expensive. Thermostat can freeze and stay on, cooking fish
Under Substrate Heater	Used to heat tank water. Sits on bottom of tank, under substrate	Debate about the uses of this one. Good for plants as the heated soil encourages growth.
External In Line Heater	This heating unit connects to a canister filter and the water flows through it, heating it before it goes into the tank.	Means no heating unit in view, more focus on the aquarium. Expensive. Needs canister filter
Florescent Lighting – T8 & T5	Standard lighting used for Aquariums	Good standard lighting. Comes in various sizes and shapes. Contains mercury so disposal may be a problem. Recommended to be changed every 12 months
Metal Halide Lighting	High intensity lighting	Great lighting for planted tank or saltwater tanks. Expensive. Gets very hot. Can be bulky and heavy
LED Lighting	Light Emitting Diode lighting option	Comes in various shapes and sizes. Can get different colours. Lasts 7-10 years. High cost initially. Not always easily available and may not fit into existing light fittings
UV Sterilizer	Using UV light, the water passes through this unit and bacteria/algae is killed.	Greatly reduces, if not completely removes all algae problems. Can help reduce disease problems. Will kill off beneficial bacteria as well, but with careful placement, this can be minimal.
Test Kits - Chemical	Water test kits to check various parameters for a healthy tank	A must for any sort of tank. Can get basic kit for minimal checks or go extreme with multiple tests. Can get very expensive. Can be time consuming and messy.
Electronic pH Meter	Electronic means for testing water parameters	Quick/instantaneous. Can get meters that test pH, temp, EC & TDS and can connect to your computer or phone. Needs batteries or power source. Expensive
Automatic Water Top-up	Use of a float valve to automatically top up the water in the aquarium when it gets down to a certain level	Very good for open top tanks where evaporation can be an issue. Can help with automatic water changes. Requires water supply nearby. Can be fiddly to set up. Involves drilling a hole in the tank.