Aqaurium Making and Maintenance

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An aquarium is a miniature form of an ecosystem which adds to the beauty of our home. This natural "living jewels" makes our living room more attractive and reduce the tensions experienced by the family members or the visitors. The major advantage of aquarium keeping is the low expenditure incurred when compared to other pets.

History of keeping aquarium fishes as pets

The idea of aquarium fish keeping is as old as recorded in history. The Sumerians, Assarians and Egyptians have all kept fish in ponds. By the end of the 17th century gold fish was introduced in several countries and became popular in England and Scotland. The opening of the fish house in London Regent Park during the spring of 1853 is the world's first aquarium.

Fabrication of aquarium tank and accessories

Considering the safety and reliability of aquarium tank you should remember the following factors.

1. Aesthetic beauty
2. Size and shape of the tank
3. The volume of water

Table 1: Size of the tank and required thickness of the glass

Tank size in feet	Thickness in mm
LxBxH	
2x1x2	4
3x1x2	6
4x1x2	8
3x2x2	10
4x2x2	10
5x2x2	12
6x2x2	12
7x2x2	12

Additional care- There is no additional cross belt in the upper portion of the tank up to a size of 3x1x2. The tanks above 3x1x2 size and up to 4x2x2' size requires additional cross belt on the upper side. Above 4x2x2' size needs beading and cross link with a size of two inch. Recently, imported modular tanks of various sizes are available in the market.

Fabrication of the tank

Fabrication of aquarium tank is an art which we can learn within two to three days of practical experience. The good quality glass, gum, glass cutter and silicone sealant can be purchased from glass merchants. When taking measurement for cutting the glass or giving order you should take care about the side glass (width wise glass). Regarding the width; deduct two times thickness of selected glass from the width of base glass.

Place the base glass on a leveled floor after pasting sealant near to the edges for fixing the other side glass. Then paste sealant along two sides of lengthy glass and fix above the base glass. Later paste sealant on one edge of side glasses and fix it in the corner of lengthy glass. Finally attach the lengthy glass to the previous one. After finishing the mould, firmly tie a sting covering four sides of the tank for avoid sliding the glass while pasting sealant in the corners.

Height of the tank- The aquarium tank should always be kept at height of 2.5 feet for viewing from standing and sitting positions in a living room.

Hood and lighting- The tank is covered with beautiful roofs made up of plywood or any other wood. The roof is provided with feeding facility and the facility to attach suitable lighting. The tank must be placed not far away from the window,(but not close to the window) which helps to allow some natural light into the aquarium and to promote the growth of plants inside the tank. Keeping the tank near to the window invite excess algal growth, which will destroy the beauty of the tank. For easy operation and safety providing electrical plug points near to the tank is ideal.

Accessories for tank setting

Items	Units
1. Aquarium tank	1
2. Aquarium hood	1
3. Aerator	1
4. Air tube	2 meter
5. Air regulator	2
6. Air stone	2
7. T-joint and I-joint	2
8. Florescent light with fittings	2.
9. Thermocool sheet (suitable size)	1
10. River sand (3 to 4mm) enough quantity	
11. Rocks and drift woodenough quantity	
12. Aquarium plant"	
13. Thermo meter	1

14.	Heater with thermostat	1
15.	Power filter	1
16.	Hand net	1
17.	Filter bed	1
18.	Magnetic cleaner	1

Advance preparation for tank setting- Necessary drift wood, river sand and rocks should be thoroughly washed under running water till water turns clear. Some quantity of gravel and river sand(raw) mixed with vermicompost is better for growth of the plants. This mixture should be spread just below the washed river sand. Landscaping is to be decided well in advance,we can use silicone sealant for making desired shape in wood or in rock.

Setting of aquarium- Place the aquarium tank on an even surface(use water level hose or spirit level gadget) preferably on one inch thickness Thermocol sheet. After placing tank carefully insert under water gravel filter plate into the tank along with air lift pump. Then spread one to two cm manured mixture above the filter, above the mixture spread through washed river sand slopping towards front side. Modulated rocks and drift woods are firmly fixed in the land scape position. Air stones can be placed behind rocks for good visual effect. Decorate with aquarium plants depending upon your imagination. Fast growing plant and tall plants like vallisneria, cobomba, sagittaria are ideal for background planting. Bushy plants should be used to fill the corners and plants like ludwigia,amazon sword, small mint, water fern can be used in front portion.

While planting the long rooted species, assure that the roots are not damaged. Bushy plants should be tied with a stone to fix them in position. Before planting, the plants must be thoroughly washed in running water to remove any unwanted snail ,eggs and larvae attached with this plants. Dip the washed plants in 0.1% $KMno_4$ (Potassium permanganate)solution one to five minute and again wash in running water. Once the planting is over, the aquarium tank is filled with water without tilting the plants and other settings. Then cover the tank with the lighted hood.

Tank conditioning- Air pump and other electrical fittings (power head, filter, heater etc) are switched on and allow to run continuously for three to five days. During this time water will be cleared and the plants roots will take their position. Flow rate should be adjusted to 18 to 20 times per day for proper functioning of biofilter and the consequent removal of ammonia with the help of nitrifies.

Introducing the fishes- When purchasing fishes it is essential to make sure that they come from reliable source and are free from disease. Keep the bags containing fishes in the aquarium tank for an hour to acclimatize. After half an hour gradually acclimatize the fish by adding tank water into the fish bag for better survival of fish in the tanks. Stocking density can be adjusted as) 75 cm^2 space for a 2.5 cm fish. As a thump rule-Total surface area (Length x Breadth) of the tank divided by (3x2+6x+3)/2, where 'x' is size of the fish.

Water quality parameters

The key to a successful, healthy aquarium is in maintaining good water quality for the creatures in your care. Most fish health problems are caused by poor water quality and many factors can cause this including type and frequency of the maintenance you carry out, inadequate filtration, stocking levels, overfeeding, and so on. The most important water quality parameters for a tropical community aquarium, or goldfish aquarium are as follows:

Ammonia - excreted by fish into the water; ammonia is poisonous and must be removed. If the filter is working properly, there should be no ammonia in the water. It is recommended to test for ammonia every week.

Nitrite - bacteria in the filter turn ammonia into nitrite, which is also poisonous. If the filter is working properly, this is also removed, and there should be no nitrite in the water. It is recommended to test for nitrite every week.

Nitrate - bacteria in the filter turn nitrite into nitrate, which is harmless to most fish. It is however an algae nutrient, and should be controlled if it gets very high. It is worth testing the nitrate level if you have a problem with algae in the aquarium or pond. Very low nitrate levels are only important for sensitive freshwater fish and marine aquariums.

pH - a measure of the water's acidity. Fish do not respond well to rapidly changing pH levels, and therefore a stable value is important. Pond fish, goldfish, and hardy tropical fish require a stable pH between 6.5 – 8.5. Sensitive tropical fish and marine fish have more particular pH requirements.

Oxygen - like all animals, fish require a plentiful supply of oxygen. Because water contains much less oxygen that air, it is important to provide some form of aeration in an aquarium.. Extra aeration can also be provided with aerators, air-pumps,.

Ideal water quality conditions are as follows

	Freshwater	Marine
Ammonia	0	0
Nitrite	0	0
Nitrate	0	0
pH	6.8 - 7.2	8.1 - 8.4
Carbonate Hardness	40 - 60	120 - 180
General Hardness	60 - 150	N / A
Phosphate	<0.5	<0.5
Calcium	N / A	N / A
Salinity	N / A	1.002 - 1.024 (30 - 35g/l)

Aquarium foods

Properly feeding your fish helps them to stay healthy and is helpful in maintaining your aquarium. It is important to know the types of foods your fish need and how much food they need, which differs from species to species. In most cases, fish only need to be fed once a day, and you only need to feed a small amount. Small, regular feedings provide fish with the nutrients they need and keep your tank cleaner than large or more frequent feedings. Over feeding can also contribute to algae growth, which can be unsightly, remove vital oxygen from the water, and increase your tank maintenance routine.

There are a number of food options available for your aquarium fish, and a combination of foods is necessary to provide your fish with the nutrients they need. All of these foods fall into two broad categorizations of fish food: live and processed.

(a) live feeds - Tubifex worms, Blood worms, earth worm, Daphnia, Copepods, Rotifer, Artemia and infusoria.

(b) Processed feeds: Pellet and flakes.

Filters

Selecting the correct filtration system for aquarium is an important factor that will impact not only the type and quantity of fish that you wish to keep, but also the amount of maintenance that the system will require. The filtration system is responsible for keeping the water clear and free of particulate matter and toxic compounds that are dangerous to the inhabitants.

There are three types of filtration that are necessary for the health of any aquarium:

- Mechanical : Mechanical filtration is the process in which particulate matter is removed from the water.
- Chemical : Chemical filtration removes toxic or unwanted chemicals as the water passes through a chemical media or resin.
- Biological: n biological filtration, different types of bacteria convert the toxic chemical byproducts produced by the aquarium inhabitants into less toxic nutrients. This breakdown process by the bacteria is called the Nitrogen Cycle.

Types of Fileters:

-a) Biofilter (b) Foam filter (c) Powerfilter

Biofilter :-harmful substance like ammonia and nitrites are gradually accumulated in the tank due to bio degradation of food remains and fecal matters. The accumulated ammonia and nitrates can be removed by the action of nitrifying bacteria attached to the biofilter. The other parts of filter mechanically prevent the turbidity of the aquarium water.

Parts of Biofilter:- Oyster shell or zeolite, charcoal, blue metal, river sand and water lifting system.

Function of bacteria:- The bacteria synthesize ammonia into nitrate leaving H+ ions into the water. This H+ ions reduced the PH of water (lethargic condition of the fish).The oyster shell present in the biofilter neutralize the H + ion. Charcoal act as a deodorant in the water

The steps involved in aerobic nitrification can be summarized as follows

$NH3^{+} + 1.5\ O_2 \rightarrow NO_2^{-} + H_2O + 2H^{+}$

$G = -65$ Kcal $mol^{-1}N$

$NO_2^{-} + 0.5O_2 \rightarrow NO_3^{-}$

$G = -18$ Kcal $mol^{-1}N$

The overall reaction is $NH_4^{+} + 2O_2 \rightarrow NO_3^{-} + 2H + H_2O$

This $2H^{+}$ions react with OH group of calcium hydroxide and neutralize the PH of the water.

Use of scavanchers as tank cleaners:-Scavanchers are creatures which takes undesirable matter out off aquarium water. Snails, Armored catfishes, Shrimps and Mussel are the common scavanchers used in the aquarium.

General disease and treatment:-

Disease	Symptom	Treatment
Constipation	Feces of the fish are long and stringy and remain attached to the fish went.	Keep the fish on fast
Branchitis (Inflammation of the gills)	The gill become inflamed and swollen	Potassium Permanganate 3 ppt for 10 minutes or 1ppm salt solution
Fin rot and tail rot	Fins and tails become frayed	3ppm oxytetracyclin for half to one hour
hite spot	Irritating tendency	4 to 5 drops of formalin in 10ml of water or Methylene Blue 2mg per 10 liter water, Keep the fish for one weak

Regular maintenance

1. The fishes are fed one or two times a day ad-libitum
2. At the time of feeding air pumps and power filters switched off
3. Daily switch off aerator, heater, power filter etc. for half an hour to avoid overheating.
4. Monitor the tank regularly during winter season especially the heater.
5. Do not spray insecticide near the tank
6. Assure sufficient light
7. Check air connectivity to the tank
8. Remove dead animals from the tank immediately
9. Use magnetic cleaner
10. Use chlorine free water always.