# Chapter – 1 AQUARIUM FISH KEEPING – INTODUCTION

## DESIGN AND CONSTRUCTION OF AQUARIA

### Tank Shape

- Mostly rectangular due to large surface area for exchange of gases.
- Rectangular shape allows more swimming area.
- Tall/other shape tanks cannot support large fish population (less surface area and need strong aeration).

### Tank Size

- Size varies depending on location, type of fish etc.

### Types of Aquarium Tanks

1. All glass tank
    - ✓ Widely available, low cost.
    - ✓ Made of glass sheets cemented together using silicon rubber mixture
    - ✓ Disadvantage - Frequent leakage is a problem.

2. Framed glass tank
    - ✓ Have frames made of metal (non-rusting) on all sides of glass tank.
    - ✓ Rarely used due to hindrance in view.

3 Plexiglass tank
    - ✓ Polymethyl methacrylate – transparent thermoplastic (acrylic glass).
    - ✓ Light, attractive, available in various size, lesser leakage problems.
    - ✓ Disadvantage - High cost, vulnerability to scratches, turn yellow with age which reduces transparency

### Cutting of Glass

- 5 panes required.
- Front and back long sides; 2 end sides; base
- Glass cutter with diamond edge used.
- Safety of eyes, hands & other body parts should be considered.
- Sharp edges must be evened by filing with wet fine grain sand paper

### Preparation Of Glass Tank

- 2 methods to assemble glass aquarium

Method 1

- First glass panes are assembled with adhesive tape & then glue line of silicon applied using silicon gun.
- This method prepares stronger tanks as silicon has a grip on larger surface area.
- Newly constructed tanks are exposed to air for a week
- Then tank is filled and checked for leakage overnight

Method 2

- Glue line of silicon run at the edges of panel & then clipped together (old/traditional method).

**Strengthening and Supporting of Tank**

- Long support long side of the tank
- Cross braces reinforce the strength of the tank
- Cross braces should be twice as wide as long braces.
- Reinforcing the corners by laying a triangle of glass or acrylic in each corner add to the strength

**Moulded Tanks**

- They have superior strength, fine finish and durable performance

**THE COVER (HOOD)**

- Reduce evaporation, prevents fish from jumping out, provides solid place to fit lighting
- Glass/plastic

**FITTING OF TANK INTO ROOM SETTINGS**

- Choose correct location
    - Maximum visibility
    - Accessibility for maintenance and management
    - Away from direct sunlight. Sunlight encourages growth of algae and can affect the temperature
- Display stand
    - Should support the weight of the aquarium
    - Aesthetic appeal
    - Place a thermocol base before placing the tank on the top of the stand, which will act as a shock absorber

**AQUARIUM FLOOR SETTINGS (BEDDING)**

Laying of bed contributes the natural surrounding for fish and aesthetically improves the aquascape.

- Particle size: 3mm – 6mm

- Smaller particles (fine sand) may clog the filter.
- Larger particles accumulate uneaten wastes and debris
- Limestone should not be used as it increases alkalinity

**Materials for Bedding**

- Sand: coarse/fine grain.
- Loam: mixture of sand silt & clay.
- Gravel: mixture of coarse sand & small stones.
- Pebbles: smooth pieces of rocks.
- Granite: granular crystalline rock of quartz, mica etc.
- Marble chips: different colours.

**Hiding Place**

- Mainly required for shelter seeking / timid fishes
- Earthen vessels, PVC pipes, caves, castles etc.

**Advantages of Floor Setting**

- Serves natural environment & medium for rooting plants.
- Surface area for beneficial bacteria.

**FILLING THE TANK**

- Should be done carefully
- Clean the tank & materials.
- Should not disturb the floor
- Water filling may be done with a siphoning hose running first into small vessel or plate

**FILTERS**

Device capable of handling fish wastes & particles in aquarium.

- Check pollution
- Circulate clean oxygenated water
- Remove excessive nutrients from water
- Filtration improves health of the living organisms in aquarium
- 2 type : external & internal

EXTERNAL FILTER

- Push/pull water through series of filter media.
- More effective & easier to use than internal filter.

INTERNAL FILTER

- ❑ Sponge/foam/undergravel filters.
- ❑ Attached inside via suction cup.

OTHER CLASSIFICATION

- Biological, chemical, mechanical filters

**Biological Filters (Undergravel Filter)**

- It has a slit plate in plastic placed beneath the gravel
- 1 or 2 uplift pipes are fixed at the corners
- Flow of water is maintained by airlifting or by powerhead
- Powerheads pump water from the upright tubes into the tank creating suction that pulls water through gravel bed and up the tube.
- Gravel offers large surface area for bacterial colonization
- Mulm (organic debris that builds up in and on aquarium surface) serves as a medium for biological filtration.

- Harmful N-compounds produced by animals get converted into harmless N-compounds by nitrifying bacteria
- Ammonia gets converted to nitrites (eg: Nitromonas)
- Nitrites get converted to nitrates (eg: Nitrobacter)
- Very high levels of nitrates are also harmful for fishes, hence periodic removal of nitrates is also essential
- AGING / CYCLING: it is the critical time given to an aquarium for building up biological filter bacteria.
- Suitable materials (gravel, sand, plant leaves etc) should be provided for bacteria to colonize
- Right type of bacteria can be purchased from aquarium shop too.

**Mechanical filters**

- ➢ Mechanical filtration is a process in which particulate matter is removed from water
- ➢ Aquarium water is forced through a media that is designed to catch and hold these tiny particles
- ➢ Synthetic sponge/foams, ceramic & sintered glass, silicon products etc.
- ➢ Good mechanical filter maintains high water clarity, screens free-swimming parasites, accumulate dirt and debris from aquarium
- ➢ Clogging may occur, hence, regular cleaning required.

**Chemical filters**

- ✓ Chemical filtration refers to the process of removing dissolved compounds, toxins, colours etc. by chemical means
- ✓ Ammonia absorber (zeolite) binds to free ammonium ions
- ✓ Ion exchange resins reduce hardness by removing salts & maintain pH.
- ✓ Peat : reduces pH and hardness of water
- ✓ Nitrate absorber bind to nitrates making them less toxic
- ✓ Activated carbon/charcoal: can remove upto 50% of its own weight of toxins, gasses, organic compounds, colour etc.

PROTEIN SKIMMER

- o It is a chemical filtration method
- o It takes out dissolved biological wastes before it can decompose.
- o Injection of air bubble into aquarium water creates froth-like foam when proteins collect around the air bubbles.
- o This froth rises to the top of the filter unit called reservoir
- o From here organic waste is removed daily using skimmer or cup
- o 2 air pumps are used
- o One is used to air lift water for skimming
- o Other pump along with air stone or bubbler is used to create foam

**Common Forms of Commercial Filters**

1. Sponge/foam Filter
2. Diatom Filter
3. Canister Filter
4. UV Sterilizer
5. Ozonizer

**Sponge/Foam Filter**

- ➢ It is a modification of under-gravel biological filter
- ➢ Gravel bed replaced by sponge/foam.
- ➢ Water is filtered before being air lifted to fill aquarium.
- ➢ Large surface area for beneficial bacteria to grow.
- ➢ Performs biological & mechanical filtering systems.
- ➢ Simple and inexpensive

**Diatom Filter**

- Special type of biological filter that has cartridge filled with diatoms.
- Filtration is perfect that even a single bacterium is removed
- Cleaning is necessary as there are chances of frequent clogging
- Diatomaceous earth is naturally occurring, soft, siliceous sedimentary rock.

**Canister Filter**

- External filter
- Water circulates in the filter with the help of pumps.
- Sealed, fully loaded system
- Rely mostly on biological filtration method, hence does not require much cleaning.
- Provides high volumes of filter material without reducing internal space of the aquarium
- Great volumes of water can be filtered

**UV-Sterilizer**

- Water passed through a UV-light chamber.
- However, all pathogenic bacteria are not killed, hence risk of infection remains

**Ozonizer**

- Speed up nitrate breakdown.
- Antiseptic.
- Excess amount may destroy useful bacteria.

**AQUARIUM ACCESSORIES**

1. Aerators
2. Decorative
3. Lighting
4. Heating
5. Feeding Trays

**Aerators**

- ✓ Aerators is an air-pumping device which is electrically operated
- ✓ It is made up of vibratory air pump

WORKING: When current passes, a shaft bearing magnet vibrates. Shaft is attached to diaphragm which also vibrates like a piston producing a forceful stream of air

ADVANTAGE : cheap, handy, long lasting, require very little maintenance

DISADVANTAGE: produce unpleasant humming sound, does not generate fresh air and pumps only surrounding air into the tube.

**Decorative**

Decor is an ornamental object or accessory unit used in an aquarium. These objects impart aesthetic sense to the viewer and provide welfare to the fish

Types – background, substrate, interior decor

1. Background decore: external/internal; water proof coloured paper pasted in the background
2. Substrate decor: material used in the top of the bed (slate, sandstone, granite etc)
3. Interior decore: is placed projecting from the bottom anywhere in the aquarium

   Gravel; Rocke; Granite; Wood; Gems; Live Rocks etc

**Lighting**

Lighting is essential due to following reasons:

- ✓ Ensures photosynthesis in plants
- ✓ Ensures normal photoperiodic daily rhythms
- ✓ Ensures retention of normal colour and patterns on fish body and plants
- ✓ Enables viewers to get aesthetic sense
- ❖ Direct sunlight should be avoided as it enables the growth of algae on glass surface

FLOURESCENT TUBES: most preferred

Advantages: consume less power, produce less heat, provide even distribution of light

Disadvantage: their intensity gets reduced with time which affects the plants. Hence they have to be replaced periodically

For normal aquaria, 25W fluorescent white tube is suitable. Such tubes emit infrared light which helps plants to take $CO_2$ and UV light which promotes chlorophyll production

MERCURY VAPOUR LAMPS

They work well for tanks with depth greater than 50cm

They are not frequently used and need special fixtures

OTHER OPTIONS : T2, T5 and LED lamps

- ➢ Light source should be placed above water surface leaving gap of 4-6 inches
- ➢ Spot lights can also be used to focus on specific areas of aquarium
- ➢ Proper timing is to be fixed for switching on and off the fights
- ➢ Avoid changing lighting pattern as it may become a stress to certain fishes

**Heating**

- ❑ Heating is required to keep water in aquarium at desired warmness especially for tropical fishes maintained in temperate regions
- ❑ Types – heater, thermostat or both
- ❑ Types – external or internal
- ❑ Immersion heater: inexpensive and most popular
- ❑ Usually 2-3W per 5 litre water is suggested
- ❑ Provide mesh around the internal heater to protect the fishes
- ❑ Thermostat helps to maintain a constant temperature, but they are expensive
- ❑ A thermometer is essential to monitor the aquarium temperature regularly

**Feeding trays**

Feeding trays ensure economical and healthy delivery of feed to the fish in a homely environment

1. FEEDING RING

- ✓ Light weight ring made up of plastic which floats on the surface of water
- ✓ Used to feed fish with floating food
- ✓ It prevents the spread of

feed on pollution in water

2. WORM FEEDER

- ✓ Plastic basket with holes and slits
- ✓ It can be attached to glass sides using suckers
- ✓ Tubifix worms or Chironomus larvae can be filled in them

3. ELECTRIC or ELECTRONIC FEEDER

- ✓ They are designed to feed fishes at regular intervals
- ✓ It prevents overeating by fish and releases right quantity of feed
- ✓ It is usually mounted on the top of the aquarium

**FISH NET**

- Aquarium nets are used for safe and gentle capturing of aquarium fish and to scoop out debris and uneaten food
- 100% nylon mesh is used with stainless handle