# LITTLE RIVER CHAPTER – TU

## TROUT IN THE CLASSROOM MANUAL

**Little River Chapter of Trout Unlimited**
**12-2017**

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# Equipment List

Except for the chiller, all the standard TIC equipment is listed below. The brands listed are those that have, for the most part, been installed with the tank.

- 60 gallon aquarium and stand
- Aqua Euro USA ¼ HP Max chiller with flexible tubing, tubing insulation and outflow diffuser
- Mag Drive 700 Water Pump
- ½" female adapter
- AquaClear 110 Power Filter with Foam, Charcoal and Biomax filter inserts
- Whisper 20 Air Pump with check valve, 12" airstone and flexible air tubing
- Thermometer
- Water Test Kit
- 1 each of Ammonia Detoxifier, NiteOut, Special Blend, Water Conditioner
- Siphon and tubing
- Breeding basket and net
- GFI power strip
- Water hose
- Portable air supply
- 2 each 5-gallon buckets

### Other Equipment that may be needed but not supplied

- Long-handled scrub brush to loosen grime and growth in the tank

### Equipment Replaced Each Egg Season or Yearly

- Charcoal for the filter – replaced each season
- Sponge and Biomax filter inserts – replaced as needed
- Airstone – replaced as needed
- Chemical for the water quality test kit – replaced as needed
- MICROBE-LIFT SPECIAL BLEND – replaced each season
- NOVAQUA PLUS-WATER CONDITIONER – replaced as needed or each season
- AMQUEL-AMMONIA DETOXIFIER – replaced as needed or each season
- MICROBE-LIFT NITE-OUT II – replaced as needed or each season

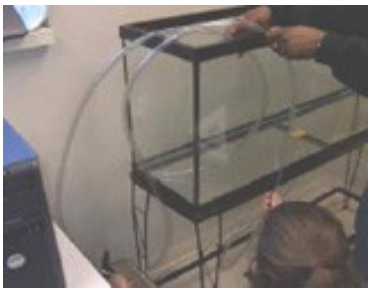
# TANK AND CHILLER SETUP

1. Place the tank in a location away from heat, excessive light, and activity. **The bottom insulation for the tank should be placed under the tank before filling with water.** The tank should be not be placed next to a window. If there is no other location, make sure that the window shade is down to prevent algae buildup and to protect the eggs and alevins from light. Do not put the tank next to an active radiator. Because a filled tank will be top heavy, place it away from areas where students might accidentally bump into it. Clean out any dirt inside the tank with alcohol and a paper towel. **Do not use soap or any cleaning chemicals – the residue from these compounds can persist in the aquarium and harm the trout.**

In order to drain condensation into a bucket and not on the floor, the bottom insulation should have a channel routered around the board about 1 inch from the edge. Cut a hole and insert a tube held with silicon sealer on one side. The tube can be horizontal or vertical and on either side depending on where the tank is located.

2. Locate the electrical outlet but DO NOT plug in the GFI power strip. This should be close enough to the tank that all electric devices can reach. Ideally, this should be right behind or underneath the tank.

3. Place the chiller to the side of or below the tank on a stable surface with the front facing out. Ensure that there are at least 4 inches on every side for airflow. Open the plastic bag with chiller parts and remove two water nozzles. Screw these in place on the chiller, tighten them by hand. They may be carefully tightened further with pliers, but be mindful of the limitations of the plastic.



4. Measure a length of tubing for the chiller **input nozzle** that will reach from the chiller to the bottom **and far end of the tank without stress or kinks**. Be generous with length because tubing can always be made shorter but not longer. Cut this length of tubing, slide a clamp onto the tubing and then slide that end over the chiller input nozzle.

5. Measure a second length of tubing for the chiller **output nozzle** that will reach from the **output nozzle to the near side of the tank**. Cut this length of tubing, slide a clamp onto the tubing and then slide that end over the chiller output nozzle.

6. Remove the pump from its box and locate the plastic adapter nozzle for the pump. Screw this nozzle in place, and slide the other end of the **input chiller tube** over the nozzle on the pump. This connection does not need a clamp. Install the pump filter if one is not attached. **Gently place the pump at the bottom of the far side of the tank**, place the pump power cord near the power strip.

7. Unpack and assemble the filter according to the included instructions. If it is a hanging filter, place it on the back side of the tank. Make sure to use both filter intake tubes. Cover the intake for the filter with some sort of mesh or net, that will keep the fry from getting sucked into the filter (plastic net bags or plastic flexible screen are popular materials for this). Secure the mesh with an aquarium-safe method, such as a rubber band.

8. Unpack the airstone, air pump, airstone tube, t-connector and check valve. Cut two pieces of tubing approximately 3 inches. Insert the two 3 inch pieces onto the air outlets of the air pump and attach them to the cross portion of the t-connector. Cut another piece of tubing approximately 6 inches and attach this to the single outlet of the t-connector. To the other end of the 6 inch piece, attach the check valve. With the remaining tubing, attach one end to the airstone, and the other to the check valve. Place the air pump near the tank, preferably above the tank. **Place the airstone in the tank, away from the filter intake tube and the egg basket location**. The air pump should be plugged into a separate outlet from the GFI. This allows the air to continue should the GFI be triggered by a problem.

9. Fill the tank with tap water using any clean container or tubing. The water level should be no more than 2 inches from the top of the tank, but should not be so close that it might spill. Use a cup to fill the filter chamber with water until it overflows back into the tank.

10. Plug all electric cords into the GFI, with the exception of the air pump which should be plugged into a separate socket (see #8 above). Once everything is plugged in, double check all connections and ensure that everything is ready for operation. Have some paper towels on hand in the event of a leak.

11. Plug in the GFI and check for any leaks on the chiller. The air stone should be creating a large volume of small bubbles. **DO NOT TURN THE CHILLER ON**. The pump needs to run for 24 hours prior to the chiller being turned on. The filter should become much quieter after all the air is pushed out of the system.

12. Allow any chlorine in the tap water to dissipate for the next 48 hours. Then follow the bottle directions to add MICROBE-LIFT SPECIAL BLEND to the tank at that time.

# INSULATING THE TROUT TANK

Insulating the classroom trout tank is absolutely CRUCIAL. It keeps the water at a more constant temperature which saves wear and tear on the chiller, prevents excessive evaporation and protects the eggs and alevin from too much light.

Use foam board found at home improvement stores, as shown in the pictures below. Cut a small section to be used as a door where the egg basket will be hung. This egg basket section should be away from the air stone and filter discharges.

Because it is important to see the trout as they develop, it is acceptable to leave the front insulation off of the tank, as long as all the other sides (and bottom and top) are covered. **However, only do this AFTER the fry have absorbed their yolk sacs, have started feeding and have been released from the egg basket. It is only then that they can handle the light for long periods of time.**

Below is an image of a well-insulated tank with a special viewing window so that students can see the developing trout.

# PREPARING FOR EGG DELIVERY AND TIMELINE

## 30 Days Before Eggs are Received

Set up the bio-system in the tank:

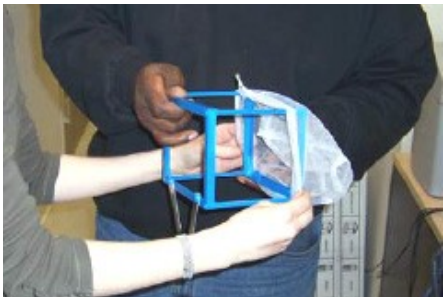
- Chiller **IS NOT ON**.

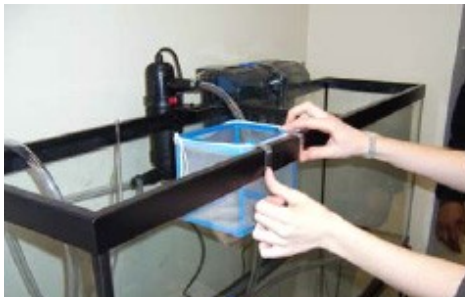
- Start nutrient cycle by adding MICROBE-LIFT SPECIAL BLEND and following recommended dosage and schedule on the bottle.

## 24 - 48 Hours Before Eggs Arrive

1. Start the chiller and set the temperature to 52 – 55 degrees.

2. Assemble the hatching basket by placing the mesh inside the plastic frame. This prevents the alevin and fry from getting stuck between the net and the frame. Hang the basket on the tank wall by bending the metal clips.





### Getting Eggs

Transport the eggs received from the hatchery in a cooler padded with crumpled paper or foam to minimize the jostling and banging around, which can hurt the eggs. If eggs cannot be delivered to the tank the same day, store them in a cooler or refrigerator and keep them wet by placing a wet paper towel on top.

### Placing Eggs in the Water

Check to see if the temperature of the eggs and tank water are roughly the same. If not, warm or cool the eggs slowly to that temperature within 3 – 5 degrees.

Once the egg and tank temperatures are close, gently pour the eggs into the hatching basket.

### Egg Maintenance

Eyed eggs are identifiable by their characteristic dark spots – each trout's two eyes. White eggs are dead eggs. If possible, gently remove them from the egg mass.

Movement during delivery of the eggs can weaken the outer layer of the shell and cause weak spots or broken areas. These spots are vulnerable to fungal infection. A white to tan colored fungus can grow among the eggs. The fungus should be monitored to ensure that it does not bind up viable eggs or alevin. If the fungus does affect the eggs, then it should be removed carefully, otherwise do NOT try to remove it. Uniform cloudiness of the egg can be okay, it might be just the trout development.

## Hatching

Most trout will hatch within 2 -3 days of the first egg hatching. Some eggs will not hatch properly and some alevin may not come all the way out of the egg.

The leftover shells float to the top of the basket and enzymes will break down these shells and create foam, this is normal. **The foam should be removed carefully so the alevin and remaining viable eggs are not harmed.**

When eggs hatch, alevins will lie on their side, with the egg sack still attached, feeding from it. Soon they will "right" themselves, but remain low in the basket. As the egg sac is consumed, they begin to rise.

Any leftover eggs must be removed as these likely will not hatch.

## Alevin (sac-fry) – 1 to 3 weeks

Length of time at this stage depends on the water temperature; warmer water causes the fry to develop faster. Some alevins don't survive, and this is perfectly normal.

## Swim-up Stage – one week or less

As the yolk sac disappears, some trout will start swimming around looking for food. When you see the first trout swim up in the hatching basket, VERY light feeding of the **Starter** food should begin

If not already done, now is the time to add a mesh or fiberglass window screen around the filter intake to make sure that the fry don't get sucked into the filter when they are released from the egg basket.

Once all fry are swimming up and have been eating, unhook the basket and drop it to the bottom of the tank. The basket needs to be weighted with a weight such as a clean stone so the basket stays in place. Strong, adventurous fish will swim out and the timid, weaker fry will hide for a few more days until they are stronger.

Some fry don't survive or learn to feed properly and will die. This is perfectly normal.

This is the time that you can remove the darkening cover from your tank. At this point, UV light will not hurt the fish.

## Fry stage 6 to 8 weeks

To ensure all of the fish are eating, feeding should be done on two separate sides of the tank. In general, feed tiny pinches 2 to 3 times per day. Any leftover food that collects in one area MUST be removed 5 to 10 minutes later. No left over food should remain in the tank. Use the siphon with the attached tubing with screen attached should be used to vacuum up extra food and waste. Continued leftovers mean that you are overfeeding and can cause problems with ammonia levels.

Some fry never learn to feed and will die. Non-feeding fish are called "pinheads" – big heads, little bodies. These trout should be removed, as they will not develop.

### Parr stage – the rest of the time

As the fish grow, the food sizes should be blended between starter, #1, and/or #2, depending on the fish size. This allows for all the fish to have the proper sized food available. There should not be any food remaining in the tank after 5 minutes. Clean up left over food 15 minutes after feeding,

Always keep track of your water chemistry. If any levels seem high, do big water changes of 50% or more. Be careful to watch the temperature during water changes and don't let the tank temperature fluctuate more than 5 degrees or so. In an emergency, clean water is more important than temperature stability though.

Cannibalism can occur; the big fish do eat the little fish. If cannibalism is becoming an issue, then feed more often. If you are feeding more often, be sure to clean more often and monitor the water chemistry more often. They may result in more water changes.

# Trout Feeding

Feeding trout can be a difficult job when first starting out. It's hard to know how much is too much, and how much is not enough. Furthermore, it's dangerous for the fish to both underfeed and overfeed. Underfeeding starves them and overfeeding can lead to serious ammonia problems. At the end of the feeding, the small fry should have full bellies, and in general the trout should look strong and healthy.

Trout food comes in three difference sizes **Starter**, **#1,** and **#2**. Start feeding with the bag marked Starter. As the fish grow, use a combination of food sizes so that fishes of various sizes have feeding opportunities. The food is perishable, so keep the bags sealed and in a cool, dark place, a refrigerator if possible.

## First Feeding (Starter)

Hatchlings do not require feeding for 7 to 14 days after hatching. They will feed from their yolk sac as they stay at the bottom of the hatching basket. When the first hatchlings begin to rise off the bottom of the basket, start providing a **small** amount of food. Much of this first food will go uneaten, but by providing it to the developing fish, it will be there when they are hungry. This is important as food must be available to fry when they first want to eat.

NOTE – there will be a small mortality rate as the fish start to feed, some hatchlings just never begin eating and pass away.

## Quantity: Basic rule – only provide enough food for the fish to consume in about 2 minutes.

When born, your hatchlings are very small. Assuming **200 baby fish,** feed them approximately the following amount of food each day--interpolate as needed:

- First feedings, fish still in hatch box: feed very little food.

- Fish just out of hatch box: 0.34 grams (0.01 oz) of food.
  No more than one tenth (0.1) of a teaspoon

- Fish = approx. 1": 1.36 grams (0.05 oz) of food. (Switch to Starter and #1).
  No more than one half (0.5) of level teaspoon

- Fish = approx. 1 1/2": 3.4 grams (0.12 oz) of food (Switch to all 3 sizes).
  No more than one level teaspoon

- Fish = approx. 2 1/4": 10.9 grams (0.38 oz) of food (Fish ready for release).
  No more than three (3) teaspoons

Many teachers prefer to feed their trout very small amounts of food a few times a day. You can easily divide the daily amount over two or three feedings.

Trout can survive over a weekend without any food, but during vacations, it is best for someone to check on the tank and provide a small amount of food on a regular basis.

It is also important to <u>clean up any leftover food</u> after every feeding. If you see leftover food after about ten minutes or so, use a net or vacuum to take it out of the tank. Replace any water lost in the cleaning process.

# Trout Care

## Daily Checklist

1. Keep an eye on tank temperatures. An increase in temperature might indicate a chiller problem or a change in the tank insulation.

2. Feed trout only as much food as they can eat in a few minutes. Remove extra food using the siphon provided. You may feed more than once a day.

3. Check the tank for any dead fish or debris. Remove dead fish as soon as possible.

4. Ensure that water is flowing from the chiller, and the filter and the bubbler are still working.

5. Check ammonia, nitrite, nitrate and pH levels with the testing kit (often, if not daily).

## Weekly Checklist

1. Change water about once a week starting once the fish have been released to the tank and the ammonia levels begin to rise. If the ammonia levels are not high, and there are no physical problems with the water (such as cloudiness), water changes are not necessary. Small changes (around 10%) are better for routine maintenance, such as removing left-over food. If you're having water chemistry problems such as elevated ammonia, nitrite or nitrate, a larger water change (around 50% or more) should be done. In either case, be careful of large temperature swings. Make sure the water being put in is cool and chlorine-free (treated with NOVAQUA PLUS-WATER CONDITIONER).

2. Add the bacterial boost mix MICROBE-LIFT SPECIAL BLEND based on the recommended doses on the bottle.

3. Clean off (rinse) the meshes or sponges that cover intakes as they can get clogged with waste or debris.

## Monthly Checklist

Vacuum or otherwise clean the chiller's air filter. This may require removing the face of the chiller, but this step is VITAL to protecting the inner workings of your chiller and prolonging its life. Dust can seriously clog the fan, radiator, and other parts. Check the chiller manual provided for filter locations and removal. See the Cleaning Filter Section in the chiller manual provided with each system.

The removal of dead and visibly sick fish is important. Many fish start to get lethargic, or have problems swimming. Some never learn to eat. Eventually they simply float around the tank. These fish are sick and will never get better. One dead fish body, if left too long, can spread the disease to the other fish causing damage to the whole population.

Use the pH and ammonia test kits to check the water conditions regularly, at least once a week, but more often is better. Tests should indicate a neutral or near-neutral pH (in the high 6's or near 7) or slightly alkaline (in the high 7's or low 8's). Water that is acid (below 7) or VERY alkaline (above 8.5) can cause problems with fish health. Above all, the trout need a stable tank pH. Large changes in the pH can stress the fish.

Ammonia levels are best as close to zero as possible, though a small amount of ammonia is inevitable. Ammonia and nitrite levels should remain consistently low (preferably under 2 ppm, and definitely under 4 ppm for ammonia, and not too much higher for nitrite.). Ammonia and nitrite will change to nitrate over time. This simply means that the bacteria are doing their job

If you are not sure about your levels, watch the fish. Are they happy? Do they swim around, look for food, or hold a constant place in the tank? When fed, do they respond enthusiastically? Some trout are adventurers and others are homebodies, but as long as there are some of each and they are spread throughout the water column (some at the top and some at the bottom), this is good. Eventually you will know what sorts of water chemistry your trout can handle – it is never the same for any two tanks.

If fish behave strangely or start dying in large numbers, poor water quality is often the root of the problem. This is where a large water change would be called for.

# TROUT RELEASE AND TRANSPORTATION

### Materials

1. Sturdy cooler or bucket with a loose-fitting lid.
2. Ice made with decholorinated water, or ice in a Ziploc bag or 2-liter bottle.
3. Battery powered airstone.

Using one of the buckets, put approximately 2 inches of ice in the bottom then place a large white trash bag in the bucket (covering the ice). It helps to find the fish in the bucket if the trash bag is white.

Start draining the tank as you would for a normal water change except drain some of the water into the trash bag in the bucket. Fill to approximately 3/4's. Place the portable aerator on the side of the bucket with the hose and airstone in the water. As the water recedes, use the net provided with the tank setup to scoop the fish out of the tank into the bucket.

Once all the fish have been removed from the tank, twist tie the trash bag loosely around the tube for the aerator to keep the water and fish from sloshing out while being moved. NOTE- you are pumping air into the bag, and the excess air needs to be released (reason for the loose twist tie). Once at the release site, the water and fish should be acclimated to the stream (due to difference in water temps) prior to being released.

To release the fish, a volunteer will scoop out a fish, or several, into a cup for each student who will then release them into the stream.

# END OF YEAR CLEAN-UP

At the end of the TIC season, it is important to clean the aquarium set-up in order to ensure a successful next season. If you take some time to make sure everything is clean, the equipment will have a much longer life. Here are a few pointers for cleaning the various components of the chilled aquarium set-up:

### Aquarium Tank

**1.** Turn off and unplug all electrical equipment. Start removing the water by siphoning.

**2.** Lift the filter from the tank and pour the remaining water in the filter into the tank. Set the filter aside. **See below for filter cleaning instructions**.

3. Disconnect tubing from the pump and drain the remaining water from the tubing into a bucket. Remove tubing from the chiller. **See below for chiller cleaning instructions.**

4. Use rubbing alcohol (91% isopropyl) to wipe down the interior and exterior of the tank. A soft sponge (dedicated to this use only) can be used to scrub hard to remove scale and algae growth. The alcohol is easier to use in the classroom and even removes some of the scale.

5. The 1:10 bleach solution can be used for cleaning out the tubing. Clean tubes using long brushes that can be purchased at any pet shop or soak them in a bucket of the chlorine solution.

6. Rinse anything cleaned with the bleach solution thoroughly with fresh tap water. Let everything air-dry completely, preferably in bright sunlight.

## Aquarium Chiller

1. Rinse pre-filter sponge on pump thoroughly with water, let air-dry.

2. Tip chiller and drain. Using pump or faucet hose, flush chiller with clean tap water in each outlet to ensure any dirt is washed out of the chiller. Then tip the chiller (but don't turn it upside down) further to ensure it is fully drained. **NOTE:** <u>This is a **necessary** step in the cleaning process. If this is not done, you're going to get a discharge of bacterial sludge into the tank when it's set up next season.</u>

3. Remove dust and lint from all vents on the chiller and clean the front and side vent inside screens using a small vacuum cleaner, dusting cloth, soft bristle plastic dust brush or wash with water. **NOTE:** <u>If this is not done, the chiller will not get enough air exchange, will not be able to cool efficiently, and could even damage the chiller.</u>

4. ***If there has been a problem in the tank***, install 2 short lengths of tubing on the chiller and fill with the chlorine solution until it is visible in the 2 lengths of tubing. Let stand for 30 minutes then flush with clean water then tip further to ensure it is fully drained.

## Filter

1. Take apart the filter and scrub out the plastic parts with the 1:10 bleach solution.

2. Thoroughly rinse out all filter sponges. ***If there has been a problem in the tank***, the sponges can be cleaned with the bleach solution, rinsed then dried thoroughly. Or, new sponges can be purchased.

3. Dispose of the charcoal and purchase new charcoal for the new season.

4. The bacterial growth media (such as ceramic pieces) can be re-used after it has been thoroughly rinsed.

5. Thoroughly air-dry the entire filter apparatus.

# CRISIS NOTES – READ BEFORE TROUT TRAGEDY OCCURS

1. Treat all of the water with water conditioners, such as NOVAQUA PLUS-WATER CONDITIONER when adding new water.

2. If you come in and all fish are lethargic – **WATER CHANGE**.

3. If you come in and all fish are unmoving at the bottom of the tank – **WATER CHANGE**.

4. If you come in and fish don't respond to food – **WATER CHANGE.**

5. During the first few weeks, initial ammonia spikes from overfeeding are likely. Water changes and some water conditioners are the only solution.

6. It is also good to "boost" your tank with MICROBE-LIFT SPECIAL BLEND as often as once a week, or per the instructions on the bottle.

7. If you change your filter media, only change one section at a time allowing the bacteria from the remaining section to colonize the new media. The ceramic media should not be changed.

# All About Ammonia and Trout

Excess ammonia causes many problems in fish. One significant effect is damage to the gills. Although the most obvious consequence of this is impaired respiration (breathing), this isn't the only problem. Gills are also important for acid-base balance (keeping the pH of the fish's blood correct to allow for normal processes to occur) and ion exchange (keeping the correct amount of importation ions such as sodium and chloride in the blood). Thus, damage to the gills prevents a number of important processes from occurring. This leads to extra stress on the fish as well as an increased potential for infection by bacteria and other invaders.

Ammonia also causes damage to skin, fins and the intestine. More chronic ammonia exposure can cause kidney damage, decreased growth and overall immune suppression. Ammonia also affects the nervous system, resulting in erratic swimming behavior.

What to watch for:

- gasping / impaired respiration
- abnormal swimming / whirling
- bloody areas on the body
- increased mucus production
- bloody areas in the intestine
- acute death

What causes excess ammonia:

- overfeeding
- excess leftover food in tank
- decaying food or fish matter trapped in the filter
- die-off of healthy bacteria colony due to something like chlorine
- a tank that was not properly cycled yet and lacks the healthy bacteria needed for the nitrogen cycle

How to decrease ammonia levels in a tank:

- 20% water change 2 to 3 times a week or a larger water change of 50% or more once a week (siphon from the bottom of the tank)
- make sure you are not overfeeding
- clean decaying food or fish matter trapped in the filter
- use a detoxifier such as AMQUEL-AMMONIA DETOXIFIER

**See more on ammonia in Appendix B - Ammonia Test.**

# The Nitrogen Cycle

Every new aquarium setup goes through a process of establishing beneficial bacterial colonies. This process is generally known as the nitrogen break-in cycle. As you know, your aquarium is a closed environment so all of the waste excreted from your fish and uneaten food accumulates in your aquarium. The nitrogen cycle converts these wastes to safer by-products.

### Stage 1

The cycle begins when fish are added to the aquarium. All uneaten, decayed food and waste generated by the fish breaks down to form ionized or unionized ammonia. The ionized form, Ammonium ($NH_4$), is present if the pH is below 7, and is not toxic to fish. The unionized form, Ammonia ($NH_3$), is present if the pH is 7 or above, and is highly toxic to fish. These ammonia levels will increase for about 2 weeks until the second stage of the cycle begins.

### Stage 2

During the second stage of the nitrogen cycle, aerobic bacteria called nitrosomonas, grow to sufficient quantities in the filter to convert the ammonia to toxic nitrite. (Nitrite destroys the mehoglobin in the fish's blood and eventually prevents the blood from carrying oxygen). As this happens, the ammonia levels will quickly begin to drop as the nitrite levels slowly increase. The nitrite levels will continue to increase for about 2 weeks until aerobic bacteria called nitrobacters grow to sufficient quantities in the filter to convert the nitrite to less toxic nitrates. If the current water quality testing indicates high nitrites, the nitrobacters are still establishing themselves in your filter media and hydrosponge.

### Stage 3

The conversion of nitrites to nitrates is Stage 3 of the nitrogen cycle. Again, as the nitrite levels quickly decrease due to the work of nitrobacters, the nitrate levels will slowly increase. Once your tank has reached this point (about 5 to 6 weeks total), it is said to have "cycled". All you need to do now is to perform the regular partial water changes in order to keep a moderately low nitrate level. If this practice is followed routinely, there should be no problems maintaining the biological filter.

### Stage 4

The normal Stage 4 would be a transformation of nitrate to nitrogen gas. This cannot occur in an aerobic system such as our aquariums. So the removal of nitrate in the TIC tanks needs to be done through water changes.

### What not to do during the nitrogen cycle

Don't change the filter media, the beneficial bacterial are growing here. Don't disturb them until they have become well established. Don't overfeed the fish.

Remember that anything going into the tank will produce waste one way or another.

**See more on nitrite and nitrate in Appendix C- Nitrite Test and Appendix D – Nitrate Test**.

# APPENDIX A - Trouble Shooting

**What if I come into school and many trout have died? What to do?**

1. Contact your coordinator.
2. Remove healthy fish first and put healthy fish in a reserve water bucket (with treated water), no matter its temperature and use a battery-operated aerator or the tank's airstone in the bucket.
3. You may also add one, small clean ice pack to the bucket.
4. Remove as much water from the tank as possible (80%).
5. Leave pump and filter intake covered.
6. Clean tank with clean scrub sponge, removing as much crud as possible and suck up gunk with siphon.
7. Refill tank with water and treat with water conditioners.
8. Cool water with ice or freeze packs.
9. Rinse the filter sponge with non-chlorinated treated water.
10. Replace at least one charcoal bag in the filter. Rinse the new charcoal bag prior to putting it in the filter.
11. Replace fish in tank.
12. The next day, add more Stress Zyme and/or Stress Coat.

# APPENDINX B - AMMONIA TEST

## Why Test for Ammonia?

Fish continually release ammonia (NH3) directly into the aquarium through their gills, urine, and solid waste. Uneaten food and other decaying organic matter also add ammonia to the water. A natural mechanism exists that controls ammonia in the aquarium – the biological filter. It is made up of nitrifying bacteria. However, as with any natural process, imbalances can occur. Testing for the presence of toxic ammonia is essential. Ammonia in the aquarium may damage gill membranes, and prevent fish from carrying on normal respiration. High levels of ammonia quickly lead to fish death. Even trace amounts stress fish, suppressing their immune system and thereby increasing the likelihood of disease outbreaks and subsequent fish loss.

## Testing Tips

This salicylate-based ammonia test kit reads the total ammonia level in parts per million (ppm) which are equivalent to milligrams per liter (mq/L) from 0 ppm to 8.0 ppm (mq/L). The Freshwater Ammonia Test Color Chart is the appropriate chart to use for testing freshwater aquariums to which salt has been added.

## Directions for Testing Ammonia Levels

Read thoroughly before testing. Do not allow test solutions to get into aquarium.

1. Fill a clean test tube with 5 ml of water to be tested (to the line on the tube).

2. Add 8 drops from Ammonia Test Solution Bottle # I, holding the dropper bottle upside down in a completely vertical position to assure uniformity of 7 drops added to the water sample.

3. Add 8 drops from Ammonia Test Solution Bottle #2, holding the dropper bottle upside down in a completely vertical position to assure uniformity of drops added to the water sample.

4. Cap the test tube and shake vigorously for 5 seconds. **Do not hold finger over the open end of the tube, as this may affect the test results.**

5. Wait 5 minutes for the color to develop.

6. Read the test results by matching the test solution against the Ammonia Color Chart. The tube should be viewed against the white area beside the color chart. Color comparisons are best made in a well-lit area. The closest match indicates the ppm (mq/L) of ammonia in the water sample.

7. Rinse the test tube with clean water after each use.

## What the Test Results Mean

In a new aquarium, the ammonia level may surge to 4 ppm (mq/L) or more, and then fall rapidly as the biological filter becomes established. The ammonia will be converted to nitrite (also toxic), then to nitrate. This process may take several weeks. Use MICROBE-LIFT SPECIAL BLEND to speed up the development of the biological filter. In an established aquarium, the ammonia level should always remain at 2 ppm (mq/L); any level above 2 can begin to harm fish. The presence of ammonia indicates possible over-feeding, too many fish, or inadequate biological filtration. The ammonia level is not an indication of the nitrite level: nitrite is another toxic waste material which must be tested separately.

## Frequency of Testing

Regular testing is necessary to make sure the ammonia level is safe. Aquarium water should be tested for ammonia once a week after the trout eggs have been placed in the egg basket.

## Detoxifying Ammonia

To detoxify ammonia, use AMQUEL-AMMONIA DETOXIFIER to instantly lock up ammonia. AMQUEL-AMMONIA DETOXIFIER does not remove ammonia. it simply converts toxic ammonia to a nontoxic form. Ammonia test kits will still test positive for ammonia, even though treating with AMQUEL-AMMONIA DETOXIFIER has made it non-toxic. The biological filter will then consume the non-toxic ammonia, converting it to nitrite and then to nitrate.

## Water Changes

Changing 25% of the aquarium water will reduce the ammonia level. In an emergency, a daily water change may be required over several days. Be sure to use a water conditioner like NOVAQUA PLUS-WATER CONDITIONER, when adding tap water back into the aquarium.

# APPENDIX C - NITRITE TEST

## Why Test For Nitrite?

Nitrite (N02-) is produced in the aquarium by the biological filter. Beneficial bacteria in the biological filter convert toxic ammonia into nitrite (also toxic). The biological filter then converts nitrite into nitrate (N03-)· Testing for the presence of toxic nitrite is essential, so that once detected, steps can be taken to remove it. Otherwise, nitrite in the aquarium will prevent fish from carrying on normal respiration. High levels of nitrite quickly lead to fish death. Even trace amounts of nitrite stress fish, suppressing their immune system and, thereby, increase the likelihood of disease and subsequent fish loss.

## Testing Tips

This test kit reads total nitrite (N02-) level in parts per million (ppm) which are equivalent to milligrams per Liter (mq/L) from 0 ppm to 5.0 ppm, in either fresh or saltwater aquariums.

## Directions for Testing Nitrite

Read thoroughly before testing. Do not allow test solution to get into aquarium**.**

1. Fill a clean test tube with 5 ml of water to be tested (to the line on the tube).

2. Add 5 drops of Nitrite Test Solution, holding dropper bottle upside down in a completely vertical position to assure uniformity of drops added to the water sample.

3. Cap the test tube and shake the tube for 5 seconds. **Do not hold finger over the open end of the tube, as this may affect test results.**

4. Wait 5 minutes for the color to develop

5. Read the test results by matching the color of the solution against those on the Nitrite Color Chart. The tube should be viewed against the white area beside the color chart. Color comparisons are best made in a well-lit area. The closest match indicates the ppm (mg/L) of nitrite in the water sample.

6. Rinse the test tube with clean water after each use.

## What The Test Results Mean

In new aquariums the nitrite level will gradually climb to 5 ppm (mq/L) or more, As the biological filter becomes established (in 4 to 6 weeks), nitrite levels will drop to 0 ppm (mq/L). In an established aquarium, the nitrite level should always remain at 0 ppm (mq/L); any level above 0 can begin to harm fish. The presence of 5 nitrite indicates possible over-feeding, too many fish, or 6 inadequate biological filtration. The nitrite level is not an indication of the ammonia level; ammonia is another toxic waste material which must be tested separately.

## Frequency of Testing

Regular testing for nitrite is an essential part of routine aquarium maintenance. Aquarium water should be tested for nitrite once a week after the trout eggs have been placed in the egg basket to make sure the nitrite does not reach an undesirable level.

### Reducing Nitrite in the Aquarium

Use MICROBE-LIFT NITE-OUT II to remove nitrite from the aquarium. MICROBE-LIFT NITE-OUT II is a rechargeable filtration material that removes nitrite from freshwater. Making partial water changes can also help reduce the nitrite level, especially if the initial nitrite level is very high.

# APPENDIX D - NITRATE TEST

## Why Test For Nitrate?

Nitrate (NOF) is produced in the aquarium by the biological filter. Beneficial bacteria in the biological filter convert toxic ammonia and nitrite into nitrate. A high nitrate level indicates a build-up of fish waste and organic compounds, resulting in poor water quality and contributing to the likelihood of fish disease. Excessive nitrate also provides a nitrogen source that can stimulate algal blooms. Maintaining a low nitrate level improves the health of fish and invertebrates.

## Testing Tips

This test kit reads total nitrate (N03-) level in parts per million (ppm) which are equivalent to milligrams per liter (mq/L) from 0 ppm to 160 ppm, in freshwater aquariums. The Freshwater Nitrate Test Color Chart is the appropriate chart to use for testing freshwater aquariums to which salt has been added. This test kit measures nitrate as nitrate ion or "total nitrate.

## Directions for Testing Nitrate

Read thoroughly before testing. Do not allow test solutions to get into aquarium.

1. Fill a clean test tube with 5 ml of water to be tested (to the line on the tube).

2. Add 10 drops from Nitrate Test Solution Bottle # 1, holding dropper bottle upside down in a completely vertical position to assure uniformity of drops added to the water sample.

3. Cap the test tube and invert tube several times to mix solution. **Do not hold finger over the open end of the tube, as this may affect test results.**

4. Vigorously shake the Nitrate Test Solution Bottle # 2 for at least 30 seconds. This step is extremely important to insure accuracy of test results.

5. Now add 10 drops from Nitrate Test Solution Bottle #2, holding dropper bottle upside down in a completely vertical position to assure uniformity of drops to the water sample.

6. Cap the test tube and shake vigorously for one minute. This step is extremely important to insure accuracy of test results.

7. Wait 5 minutes for the color to develop.

8. Read the test results by matching the color of the solution against those on the Nitrate Test Color Chart. The tube should be viewed against the white area beside the color chart. Color comparisons are best made in a well-lit area. The closest match indicates the ppm (mg/L) of nitrate in the water sample.

9. Rinse the test tube with clean water after each use.

## What The Test Results Mean

In new aquariums the nitrate level will gradually climb as the biological filter becomes established. A nitrate level of 40 ppm (mq/L) or less is recommended for freshwater aquariums.

## Frequency of Testing

Regular testing for nitrate is an essential part of routine aquarium maintenance. Aquarium water should be tested for nitrate once a week to make sure the nitrate does not reach an undesirable level.

## Reducing Nitrate in Freshwater Aquariums

Changing 25% of the aquarium water will reduce the nitrate level. Small changes (around 10%) are better for routine maintenance, such as removing left-over food, but if you're having elevated nitrate, a larger water change (around 50% or more) should be done. In either case, be careful of large temperature swings. Make sure the water being put in is cool and chlorine-free (treated with NOVAQUA PLUS-WATER CONDITIONER).

# APPENDIX E – pH TEST

## Why Test pH?

pH is the measure of acidity of water. A pH reading of 7.0 is neutral. A pH higher than 7.0 is alkaline, and a pH lower than 7.0 is acidic. Maintaining the aquarium at the proper pH ensures optimal water quality.

## Testing Tips

This test kit measures pH from 6.0 to 7.6. Certain freshwater fish thrive at a pH above 7.5. When keeping fish in a pH range of 7.4 to 8.8, use the API HIGH RANGE pH TEST KIT.

The minimum pH reading for this kit is 6.0 and the maximum is 7.6. Under extreme water conditions readings below the minimum will read 6.0 and above the maximum will read 7.6. pH adjustments outside the range of this kit will not show any changes until the pH of the aquarium water is within the range of this kit.

## Directions for Testing pH

Read thoroughly before testing. Do not allow test solution to get into aquarium.

1. Fill a clean test tube with 5 ml of water to be tested (to the line on the tube).

2. Add three drops of test Solution, holding dropper bottle upside down in a completely vertical position to assure uniformity of drops.

3. Cap the test tube and invert tube several times to mix solution. **Do not hold finger over open end of tube, as this may affect the test results.**

4. Determine the pH reading by matching the color of the solution against those on the pH Color Chart. The tube should be viewed against the white area beside the color chart. Color comparisons are best made in a well- lit area. The closest match indicates the pH of the water sample.

5. Rinse the test tube with clean water after each use.

### Recommended pH Levels

A pH of 7.0 is ideal when keeping a community aquarium containing a variety of fish. To raise or lower the pH of a freshwater aquarium, changing 25% of the aquarium water will change the pH level. Small changes (around 10%) are better for routine maintenance, such as removing left-over food, but if you're having water chemistry problems such as elevated ammonia, nitrite or nitrate, a larger water change (around 50% or more) should be done. In either case, be careful of large temperature swings. Make sure the water being put in is cool and chlorine-free (treated with NOVAQUA PLUS-WATER CONDITIONER).

### Frequency of Testing

The pH should be tested weekly, since natural materials in the aquarium (such as fish waste and uneaten food) can cause pH changes.