`

Chapter 4 Pre-Cycling the Tank Prior to Egg Delivery

*Chuck Dinkel update as of November 2024, of **HOW TO RAISE TROUT IN MARYLAND CLASSROOMS**, produced by Trout Unlimited Mid-Atlantic Council, Chuck Dinkel editor*

PRE-CYCLING INTRODUCTION

Pre-cycling is a process designed to put your tank through the nitrogen cycle ***before*** the arrival of your eggs. When this works, it establishes a colony of good bacteria in your filter that can (a) convert ammonia (from fish waste and decomposing excess food) to nitrite and (b) convert nitrite to the less harmful nitrate.

INSTRUCTIONS FOR TEACHERS WHO PLAN TO PRE-CYCLE

An important note about pre-cycling, and biology in general. We have done our best to provide a standard protocol for pre-cycling below, however, each tank set up is ultimately unique. There are many variables we cannot control such as your classroom temperature, water quality, sources of bacteria, etc. For the protocol below to be successful, water quality monitoring is critical and you may (likely will) need to adjust the protocol based on those readings. In other words, this is an active, living protocol. **Robert Cramer – Member of the TIC/SIC Science Advisory Panel**

A. STARTING THE PRE-CYCLING PROCESS

One month prior to the expected delivery day for the eggs you should prepare and set-up the tank as described in Chapter 3 of the TIC Manual. Don't forget to treat the tank water with the appropriate amount of dechlorinating water conditioner. **If possible, fill the tank with "warm" tap water.**

It is difficult to establish these beneficial bacterial cultures in tank water as cold as your tank will be in a few weeks. The pre-cycling procedure is used to establish the cultures when the water is at **room temperature** which allows bacteria to reproduce more quickly. **DO NOT RUN YOUR CHILLER DURING THIS PROCESS. (Do run the chiller before starting to pre-cycle to determine if it is actually working properly. Make sure the coil begins to get cold and there is a 14-17 difference between room temp and temp coming out of the chiller. This should not take longer than 15 minutes). RUN THE FILTER AND AERATOR. If you can raise the water temperature of the tank to 75 degrees during pre-cycling the process will take less time. This can be accomplished with an inexpensive aquarium heater.**

Note: When you lower the temperature (Step B below), growth of the bacteria will slow.

Day 1:

- Test the water chemistry of your tank (pH, ammonia, nitrites, nitrates and KH) and record the values. It is **unlikely** that you will have any readings for ammonia, nitrite, and nitrate at this point but it is nonetheless important to check. High readings could indicate a problem with your water source that needs to be addressed before moving forward. Record water temperature.
- Following water testing add the appropriate amount of Dr. Tim's Ammonium Chloride Solution to the tank based on tank volume. Add 4 drops of ammonium chloride for each gallon of water in a tank. A 50-gallon tank will require 200 drops. 1 teaspoon (tsp.) = 100 drops = 5 ml. Add 2 tsp or 10 ml of ammonium chloride. This amount will raise the ammonia level of the tank to approximately 2 pmm.
- After 10 minutes measure and record the ammonia level in the tank to make sure the right amount was added. **The goal is to achieve an ammonia level of approximately 3-4 ppm.**

`

- **Add 25 ml of NiteOut II bacteria solution to the tank every other day.**
- Your initial KH reading should be 150 ppm. Add baking soda if the reading is more than 20 ppm below this figure. A KH reading between 100-150 ppm should be maintained during the time eggs and fish are in the tank. (One tsp/55 gallons of water will raise the KH 17.9 ppm. With no fish in the tank you can add all of the baking soda at one time. It is possible that adding several teaspoons of baking soda at one time will temporarily increase the pH reading. It should decrease back to your initial reading over time.

Day 2:

- Measure water temperature, ammonia, nitrite, nitrate, and pH readings (and KH if you have been adding baking soda) Record readings.

Day 3:

- **If** ammonia and nitrite readings are below 3 ppm, add half the amount of ammonium chloride solution as that on Day 1. (5 ml for a 50 gallon tank) If readings are above 3 ppm, do nothing unless the ammonia reading is above 5 ppm. If it is, do a partial water change. Do not allow ammonia or nitrite level to exceed 5 ppm. **Add 25 ml of NiteOut II bacteria solution.** . Record readings

Day 4 & 5:

- Measure water temperature, ammonia, nitrite, nitrate, and pH readings (and KH if you have been adding baking soda) **On Day 5 Add 25 ml of NiteOut II bacteria solution.** Record readings

Day 6:

- Follow Day 3 procedures. Record readings.

Days 7 & 8: NOTE: This process could take more than 8 days.

- Measure water temperature, ammonia, nitrite, nitrate, and pH readings (and KH if you have been adding baking soda) **On Day 7 Add 25 ml of NiteOut II bacteria solution.** Record readings

Days 9 --------

- Follow Day 3 procedures. Record readings.

When is cycle completed?

a. On the first measurement day that **BOTH** ammonia and nitrite are below 0.5 ppm, and nitrates are above 10 ppm your tank is close to being cycled.
b. Remove the heater and maintain the water temperature at ambient room temperature.
c. Proceed to "Until Fish Arrive" (below).

Until Fish Arrive:

You need to feed the bacteria you've now established in your tank. Add a small pinch of fish food every other day and once a week measure and record pH, KH, ammonia, nitrite, and nitrate. When you add fish food and the ammonia and nitrite stay below ~1 ppm, you know you have a cycled fish tank ready for fish! Along with the ammonium chloride, you may have been provided with pellets of fish food. If you crush 1 to 2 of these pellets in a mortar and pestle that should provide the pinch of food. Lacking a mortar and pestle you can use the back of a metal spoon and crush the pellets against the side of a small bowl.

Note: A pre-cycled tank should not require the addition of Special Blend Bacteria.
Additional Notes:

- IMPORTANT - Do not let the ammonia OR nitrite concentration get above 5 ppm.

`

- If either ammonia or nitrite concentration gets above 5 ppm, do water changes to lower the concentration.
- Do not let the pH drop below 7.0. If it does, do a partial water change to bring the pH back up. A pH value that is declining is often an indication of a KH level that is too low. Add baking soda if needed.

B. FIVE DAYS BEFORE EGG DELIVERY

1. Turn on the chiller, setting the temperature to 58 degrees.
2. Test the water for pH, ammonia, nitrite, nitrate, carbonate hardness (KH) and general hardness (GH). The pH of the tank should be stable within a range of 7.0 - 7.6 for optimum reproduction of the bacteria. If the pH of your tap water falls outside this range your fish will still do well as long as you keep the pH stable. Fluctuations in pH level can cause fish mortality.
3. Make sure the KH (carbonate hardness) of your tank's water is 150 or more. Refer to Chapter 7 for guidance regarding KH and to Appendix F for instructions for using baking soda to correct low KH readings.

C. ONE DAY BEFORE EGG DELIVERY

1. Using the digital thermometer, check to see that the water temperature is at the desired level; 58 degrees F.
2. Check the breeder basket. Make sure that water flowing from the filter and bubbles flowing from the aerator will not disturb the resting eggs. If necessary, redirect flows or reposition the tray.

D. EGG DELIVERY PROTOCOL

1. Be sure the filter is operating at its highest flow rate.
2. The tempered eggs will arrive in a jar of hatchery water at a temperature approximately the same as your tank (58 deg). The egg delivery volunteers have been instructed to allow the water in the egg jars to rise slightly during transport. Follow instructions in Chapter 4 of the TIC Manual if the eggs arrive in water that is 5 deg lower or 3 deg higher than the tank water.
3. Add NiteOut II to the tank after the eggs are in the tray. See appendix F for directions for adding bacterial solutions to the tank. Double the amount of Nite Out II added to the tank at this time (50ml) to adjust for the lowered tank temperature. If the tank has pre-cycled you should not have to add Special Blend bacteria to the tank.
4. NOTE: Depending on the date in December on which the eggs arrive you may be provided additional guidance regarding the tank temperature. The goal is to have the eggs hatch **before** students begin their Christmas break.

The BIG Question: How long does it typically take for a tank to pre-cycle?
"It varies tank to tank. This is the "issue" with aquaria in general. It is biology, not physics or chemistry. In other words, we can have standard operating protocols as *guides* in biology, but there are too many variables for those protocols to work exactly the same every time. Cookbook recipes do not work in biology. Teachers need to be vigilant, think about the biology underlying the data they are generating, and adjust from there. In general, using ammonia, a tank should cycle in a week to 10 days at a room temperature of 70 degrees. But the water chemistry readings are the key and if they do not match what is expected, one must adjust." (Robert Cramer – Member of the TIC/SIC Science Advisory Panel. In the protocol there are suggestions for what to do when the unexpected happens)