## Chapter 4 Pre-cycling the Tank and Preparing for the Eggs

**Pre-cycling introduction**

We highly recommend that teachers “pre-cycle” their tanks. Pre-cycling is a process designed to put your tank through the nitrogen cycle (see page 32) *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.

Pre-cycling has worked extremely well for many teachers who tried it. For reasons we can’t fully explain, however, some teachers who pre-cycled found that they still had high nitrogen levels close to the date when eggs were going to be delivered[[1]](#footnote-1). As a result of these mixed outcomes, not all regional coordinators are committed to pre-cycling in all cases. If you’re trying to make a decision about pre-cycling, check with your regional coordinator.

**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, not a “dump and walk away” protocol.

1. **START THE PRE-CYCLE PROCESS ON THE FIRST MONDAY OF DECEMBER.**
* Your tank water should be at room temperature when you pre-cycle. “Room temperature” is not 65 or 67 degrees, even though that’s what many of our rooms are these days. Pre-cycling would proceed much better if the tank water was 75 degrees. At this warmer temperature, optimal growth of the bacteria that drive the nitrogen cycle occurs. The colder the water, the more limited growth of the beneficial nitrogen-cycling bacteria. That’s why we strongly recommend using an aquarium heater to maintain your tank at that temperature. We have included one (cost $25) in the ThatPetPlace kits in Appendix A. One on-line article on “How to choose the right aquarium heater” recommends that, if you have a 55-gallon tank, you get at least a 300-watt heater if you’ll need to raise water temperature ten degrees (or two 150-watt heaters) and a 400-watt heater (or two 200-watt heaters) if you need to raise temperature more than ten degrees. Google [the article](https://www.fishlaboratory.com/fish/aquarium-heater/) if your tank is significantly smaller or larger than 55 gallons.
* Run your filter 24-7 during this time.
* DO NOT run the chiller.

**Day 1:**

* Test the water chemistry of your tank—pH, ammonia, nitrite, nitrate—and record the values you get. 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.)
* For proper pre-cycling, the pH of the tank needs to stay above 7.0. The pH will potentially drop when the bacteria convert ammonia to nitrite. A pH below 7.0 is a primary cause of pre-cycling failure.
* Following water testing, add the appropriate amount of Ammonium Chloride Solution to the tank based on your tank volume. Using Dr. Tim’s Ammonium Chloride Solution, you would add 4 drops per gallon of water (read the bottle for instructions). For a 55-gallon tank, adding *two teaspoons* of Dr. Tim’s Ammonium Chloride Solution should introduce approximately the right amount of ammonium chloride. But this is critically important to test and adjust if needed. Add the Dr. Tim’s and measure ammonia levels. You need to get above 1 ppm but below 5 ppm to start the cycling process. If you are below, add more Dr. Tim’s and adjust accordingly. If you go over, remove water from the tank and add fresh water.
* Take 5-in-1 test strip readings and an ammonia measurement **after** adding the ammonium chloride solution. Make sure you get a pH reading between 7.0 and 8.5 and an ammonia reading above 1 ppm but DO NOT allow ammonia to exceed 5 ppm; this will kill the bacteria before they have a chance to grow.
* Add the appropriate amount of Nite-Out II bacteria solution per the instructions on the bottle for your tank size.

**Day 2:**

* Measure and record 5-in-1 test strip and ammonia readings.
* If pH drops below 7.0, perform a 25% water change with treated water to bring pH back above 7.0. If KH is below 150 ppm, add baking soda to raise it. (See Appendix E of this Manual.)

**Day 3:**

* Measure and record 5-in-1 test strip and ammonia readings.
* **If** ammonia **and** nitrite readings are *below* 3 ppm, add more Dr. Tim’s Ammonium Chloride Solution (same as Day 1). If readings are *above* 3 ppm, do nothing.
* If pH drops below 7.0, perform a 25% water change with fresh water to bring pH back above 7.0. If KH is below 150 ppm, add baking soda to raise it.

**Day 4 & 5:**

* Measure and record 5-in-1 test strip and ammonia readings.

**Day 6:**

* Measure and record 5-in-1 test strip and ammonia readings.
* **If** ammonia and nitrite readings are *below* 3 ppm, add more Dr. Tim’s Ammonium Chloride Solution (same as Day 1). If readings are *above* 3 ppm, do nothing.
* If pH drops below 7.0, perform a 25% water change with fresh water to bring pH back above 7.0.

**Days 7 & 8:**

* Measure and record 5-in-1 test strip and ammonia readings. Many tanks are cycled at this point if conditions have been optimal. After you have observed spikes in both ammonia and nitrite levels and nitrate showing up, your tank is close to being cycled!
	1. If your tank is cycled, **BOTH** ammonia and nitrite will be *below* 0.5 ppm and some nitrate will be around.
	2. However, if at this point you still have high ammonia or nitrite levels:
		1. Add a 2nd dose of Nite-Out II per instructions on the bottle.
		2. Double check pH and water temperature. Make sure pH is above 7.0 and that water temperature is above 70 degrees Fahrenheit.
* Proceed to “Until Eggs Arrive” (below).

**Until Eggs 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 5-in-1 test strip and ammonia readings.
* \*Alternative to fish food, you may feed the bacteria by adding more Dr. Tim’s following the schedule you used for cycling. A well cycled tank will consume the ammonium added rapidly.

**When you’re adding fish food and the ammonia and nitrite stay below ~1 ppm, you know you have a cycled fish tank ready for fish!**

**Additional Notes:**

* IMPORTANT - **Never let ammonia OR nitrite get above 5 ppm.[[2]](#footnote-2)**
* If either ammonia or nitrite concentration gets above 5 ppm, immediately do water changes to lower the concentration. Add fresh Nite-Out II after the water change to re-kick-start the cycle.
* Do not let the pH drop below 7. If it does, do a partial water change (25% or more, as needed) to bring the pH back above 7.0.
* Having tank water temps above 70°F is important for rapid precycling. If your tank temp is lower, the process will take much longer.

**B. FIVE DAYS BEFORE EGG DELIVERY**

1. Turn on the chiller, setting the temperature to the temperature of the hatchery water. (You’ll receive an e-mail informing you what that temperature is.)
2. Test the water for pH, ammonia, nitrite, nitrate, and carbonate hardness (KH). The pH of the tank should be stable within a range of 7.0 - 7.6 for optimum biological processes.
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 E for instructions on how to use baking soda to correct low KH.

**C.** **ONE DAY BEFORE EGG DELIVERY**

1. Using the digital thermometer, check to see that the water temperature is at the desired level.
2. Place the air stone near but not underneath the breeder basket.
3. 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 one or both of these flows or reposition the basket.

**D. EGG DELIVERY PROTOCOL**

1. Be sure the filter is operating at its highest flow rate.
2. Eggs will arrive in a container of hatchery water at a temperature approximately the same as your tank. (The eggs will be transported from the state hatchery in coolers to keep the temperature as stable as possible.)
3. When the eggs arrive, place the closed container in the tank and allow it to float on the surface of the water for 20 or 30 minutes. This will gradually sync the temperature of the water in the container with your tank’s temperature.
4. Gently pour the eggs into the breeder basket.
5. Add Nite-Out II to the tank after the eggs are in the basket. See Appendix E for directions for adding bacterial solutions to the tank. (The filter represents 80% of the system’s biological oxidation processes.)
1. We believe these mixed results were because (a) the instructions were misunderstood or not carefully followed and/or (b) the water in some classrooms was too cold. We have clarified the instructions that follow, and this year we strongly recommend that teachers acquire and use a tank heater during the pre-cycling period. [↑](#footnote-ref-1)
2. Ammonia and nitrite levels of 5 ppm would be **highly toxic** if there were fish in the tank. [↑](#footnote-ref-2)