

UBC Animal Care Guidelines  
SOP-005 – Water Quality Control (pH)  
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## **How to adjust pH in standalone aquariums for stickleback (*Gasterosteus aculeatus*) care**

### **Purpose**

This standard operating procedure (SOP) describes methods for increasing pH to obtain ideal parameters to maintain stickleback in lab aquaria.

### **Policy**

These parameters must be regularly checked and documented to ensure in compliance with CCAC. Failure to abide by the SOP may result in disciplinary action against the individual(s).

### **Responsibility**

Student, technical personnel, investigator who have successfully completed the ethic training requirements of the Canadian Council on Animal Care (CCAC) and National Institutional Animal User Training (NIAUT) Program.

### **Materials**

- pH test kit (i.e. API, Nutrafin)
- limestone
- crushed coral
- commercial alkaline buffer
- air pump
- air line tubing
- air stone
- sodium bicarbonate (baking soda)
- hose for water change

### **Procedure**

Test pH using manufacturer's instruction. Stickleback from most populations prefer pH between 7.4 - 7.6 (stickleback from limestone lakes, such as Paxton,

Priest, and Cranby on Texada Island, can tolerate pH up to 8.3). If the water parameters fall outside the preferred range, follow the instructions below:

### **If pH falls below the preferred range**

*Gradually increase* pH using one or more of the following methods:

1. Add limestone or crushed coral to the aquarium. The carbonate in these compounds will react with and remove excess  $H^+$  ions in the water.
  - Crushed coral and limestone are advantageous as the release of carbonate is governed by the surrounding water chemistry. As a result, crushed coral and limestone will raise the pH to a maximum of 7.8 regardless of the amount added. Crushed coral and limestone will develop a hard surface layer and should be scrubbed once every 3 months to ensure reactivity.
2. Add baking soda to the aquarium (gradually).
  - The direct addition of baking soda can raise the pH very quickly and it is possible to overshoot the target pH. This can cause pH shock in the fish. It is best to gradually add baking soda by dissolving 1 teaspoon of baking soda in 1 cup of water for every 5 gallons of water in the tank. Most of our tanks are 30 gallon. Add  $\frac{1}{4}$  of the baking soda-water mixture to the tank, wait 30 minutes or longer and add another  $\frac{1}{4}$ . Continue this procedure until the mixture is used up. Wait 24 hours and test the pH again.
3. Aeration can raise the pH slightly.
  - Aerate the water by adding an air stone to the fish tank or increasing the flow of air. Excess  $CO_2$  dissolved in the water decreases pH (makes it more acidic). As the tank water is exposed to atmospheric air through aeration, the tendency of the dissolved gases to approach equilibrium will transfer oxygen into the water and carbon dioxide out of the water, resulting in a higher pH. This method will result in only a slight change in pH. Use an alternate method if you require a larger magnitude change.
4. Use a commercial alkaline buffer and follow manufacturer's instructions.