

Activity #2

Salinity Tolerance Lab

● ● ● In Advance *Obtaining Lab Supplies*

- Order brine shrimp cysts (eggs) from a science supply house such as Carolina Biological Supply, Sargeant-Welch, Flinn, or Frey. Other sources include local pet stores and online aquaculture suppliers. (If you are unfamiliar with any of these sources, an Internet search will quickly help you identify a supplier.)

● ● ● Class Period One *Brine Shrimp Lab*

Materials & Setup

For each student

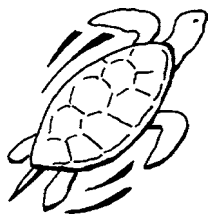
- Student Page “Lab Background and Procedures: Brine Shrimp Salinity Tolerance” (pp. 31-33)
- Student Page “Lab Worksheet: Brine Shrimp Tolerance for Fluctuating Environmental Conditions” (pp. 34-38)

For each lab group of three to four students

- Brine shrimp cysts
- 1/8 tsp measure
- Four test tubes (150 ml) with stoppers
- Labels or labeling pens for the test tubes
- Test tube rack
- Sea salt or noniodized salt
- Graduated cylinder (more than 100 ml)
- Triple beam or electronic balance
- Distilled water or tap water that has been aged 24 hours in an open container to dechlorinate it

Instructions

- 1) Divide students into lab groups of three to four students. Hand out the student pages and make sure each group has a complete set of equipment and supplies.
- 2) Conduct the “Brine Shrimp Salinity Tolerance” lab using the procedures outlined in the student page.
- 3) If more than 24 hours will elapse between the two lab sessions, feed the shrimp on the second day by placing a tiny amount of brewer’s yeast or dried spirulina algae (available in pet stores) in each test tube.



● ● ● Class Periods Two and Three *Brine Shrimp Lab, Continued*

Materials & Setup

For each lab group of three to four students

- Hand lens or dissecting microscope
- Sampling pipette (transparent 1 ml or larger)
- Four petri dishes

Instructions

- 1) Continue the brine shrimp lab, covering questions as the lab proceeds.
- 2) At the end of the lab, discuss groups' findings. Bring up the following questions and points in this discussion:
 - What is the advantage of brine shrimp, like hypogeal shrimp, being able to tolerate a range of salt concentrations?
 - What is the difference between a *tolerance* of environmental conditions and habitat *preference*? (In other words, brine shrimp may be able to survive and even reproduce in certain environmental conditions but may not congregate in those conditions if there is a more favorable option.)
 - At low salinity levels and optimal food levels, female brine shrimp can produce 75 free-swimming larvae per day. At salinities above 150 percent and low oxygen levels, the female produces non-developing cysts. In such unfavorable conditions, the female can release 75 cysts. These cysts float and eventually may drift ashore. Development will not continue until the cysts are washed back into the water and reach an area of favorable salinity and oxygen levels.
 - Shrimp reproduction did not factor into this experiment because brine shrimp do not reach adulthood until they are about eight days old.
 - Brine shrimp can live in extremely harsh and variable conditions with temperatures ranging from 43° to 95° F and salinities usually in the range of 28–70 parts per thousand. They can survive in salinities up to 340 parts per thousand.

Journal Ideas

- Explain what a variable is and what is meant by “controlling” a variable. Why is controlling variables important to scientific investigations? Use the brine shrimp experiment to illustrate your definitions and ideas.
- If you were going to study the habitat preferences of the *‘ōpae ‘ula* (endemic Hawaiian shrimp found in anchialine ponds), what variables would you test? Why?

Assessment Tools

- Conduct during lab
- Student Page “Lab Worksheet: Brine Shrimp Tolerance for Fluctuating Environmental Conditions”
- Journal entries