

SALS Activity 4

The effect of acidification of water on animals with calcium carbonate shells

Materials:

- SALS app downloaded on iPhone or iPad
- SALS probe
- Three 500 mL beakers
- Water (about 500 mL)
- Vinegar (about 500 mL)
- Two 50 mL syringes notched at 25 mL and 50mL
- One box of white blackboard chalk
- Cookie sheet
- Scotch tape, stickers, or other tactile indicator
- Latex or plastic gloves
- Minute timer

Directions

1. Identify one of the notched syringes with a tactile marker and use this one for vinegar only. Use the unmarked syringe for water. It is important not to mix them up!
2. Place the three beakers in a row on the cookie sheet along with the water and vinegar. Identify the beakers from left to right as beakers 1, 2, and 3. Use tactile markers if necessary.
3. Using the appropriate syringes, transfer
 - 250 mL water into beaker 1
 - 125 mL water and 125 mL vinegar into beaker 2
 - 250 mL vinegar into beaker 3
4. Take a reading of the fluid in each beaker with the SALS probe and save them as tones 1, 2, and 3 on the iPhone/iPad.
5. Place a stick of chalk in beaker 1 and wait 5 minutes. Take a tone/Hertz reading with the SALS probe and save it as tone 4.
6. Repeat step 5 for beakers 2 and 3 saving the readings as tones 5 and 6, respectively. The appearance of bubbles in the beakers may cause the SALS tone to oscillate, but this is okay.
7. Wearing the gloves, examine whatever is left of the chalk sticks in each beaker and make a note of how different they are from a fresh chalk stick in each case.
8. Compare tones 1 and 4, 2 and 5, and 3 and 6 and see if these results correlate with the status of the chalk sticks after their 5-minute soak in water, water and vinegar solution, or vinegar.

Questions to answer

1. Knowing that vinegar contains an acid (acetic acid) and chalk is made of calcium carbonate, form a hypothesis explaining what happened in the beakers.

2. Many aquatic animals that live in oceans or lakes have shells made of calcium carbonate (e.g., corals, sea urchins, snails, and clams). What do you think the effect of environmental acidification of these waters can have on the survival of these animals? How do you think this might impact environmental food chains?

3. What is the cause of ocean and lake acidification? Are humans involved, and how can the process of acidification be mitigated or even prevented?