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Purpose: The goal of the lab activity is to teach students how to use the Submersible Audible Light Sensor to distinguish changes in concentration and color.

Learning Objectives:

1. Learn how to operate the SALS sensor
2. Learn how to make a solution
3. Learn how to dilute a solution
4. Using the SALS sensor learn how to distinguish a more concentrated solution in comparison to less concentrated solution.
5. Learn to distinguish different colored solutions using the SALS sensor.

Materials:

- 2 Packages of darker colored Kool-Aid or other powder drink
- 2 2 Quart Containers or Pitchers
- 1 cup measuring cup
- 1 cup sugar
- 4 quarts water
- 5 plastic spoons
- 10 disposable cups
- 2 400 ml Beakers
- 2 large glasses or plastic cups
- 1 SALS sensor
- 1 roll of clear plastic wrap
- 1 light box

Procedure:

1. Break up students into groups of three to five.
2. Have the students help mix 1 package of Kool-aid in one 2 quart container according to package directions – 8 cups water, 1 packet of Kool-aid flavor, 1 cup sugar. Stir well or shake.
3. Have the students help mix 1 package of Kool-aid in one 2 quart container 8 cups water, 1 packet of Kool-aid flavor stir well or shake.
4. Measure 2 cups of the non sugar Kool-aid into a 400 ml beaker
5. Pour a small amount of the sugared Kool-aid into a cup for each group member.

6. Cover your light box with a coat of plastic wrap.
7. Place the beaker containing the non sugared Kool-aid on the light box and insert the probe of the SALS Device.
8. Turn SALS Device on using the power button. (see attached diagram of Device).
9. Push the Play button to hear the tone this color and concentration of Kool-aid makes. Taste the Kool-aid in your cup for a reference of what this tone means.
10. Store the tone in the memory by hitting the Store button and then Memory 1. This allows you to compare this tone to the tones of the next concentrations. (Careful...there is also a Memory 2 so don't get confused)
***BE SURE TO REMEMBER TO STORE TONE IN MEMORY AND WHICH MEMORY IT IS IN!
11. Remove Kool-aid from light table.
12. Measure and pour out 1 cup of Kool-aid from the 400 ml beaker.
13. Add 1 cup of sugared Kool-aid to your glass.
14. Add 1 cup of water to dilute the Kool-aid mixture to the beaker containing the non-sugared Kool-aid.
15. Add 1 cup of water to dilute the Kool-aid mixture to the glass containing the sugared Kool-aid.
16. Pour a small amount of the diluted sugared Kool-aid from the glass to each student's cup.
17. Place the beaker of Kool-aid mixture onto the light table and insert the probe of the SALS Device.
18. Push the Play button to hear the tone this color and concentration of Kool-aid makes.
19. Taste your Kool-aid mixture as a reference and compare how it tastes to the first Kool-aid concentration.
20. Compare the tone of the first Kool-aid concentration to the second concentration by hitting the play button and then the Memory 1 button.
21. Store this tone in the memory by hitting the Store button and then **Memory 2**.
***BE SURE TO REMEMBER TO STORE TONE IN MEMORY AND WHICH MEMORY IT IS IN!

22. Repeat the dilution process being sure to use the already once diluted non sugared Kool-aid in the beaker.
23. When diluting the sugared Kool-aid be sure to use $\frac{1}{2}$ cup of Kool-aid and $1 \frac{1}{2}$ cups water.
24. Compare the tone of this concentration of Kool-aid to the first two concentrations stored in Memory 1 and Memory 2.
25. Compare your color to each of the other three colors at the initial concentration (regular Kool-aid) and listen for the difference in the tones each color makes.