SALS Activity 5
Determining the concentration of an unknown sample using a standard curve

Materials

- SALS app downloaded onto iPhone or iPad
- SALS probe
- Five 250 mL beakers
- 50 mL cylinder or syringe
- 1 mL syringe
- Water for solutions and rinsing
- Liquid food coloring (one color)
- Transfer pipette
- Tray or cookie sheet
- Paper towels
- APH Bold Line Tactile Graph sheets, Draftsman Tactile Drawing Board, or Sensational Black Board
- Braille/large print labels
- Tactile symbol stickers
- 30 cm ruler or other straightedge

Directions

1. Teacher Instructions prior to activity (This preparation assumes the teacher is sighted.)

- Label four of the 250 mL beakers 1, 2, 3, and 4 in braille and/or large print, and label the fifth with the letter “U” for *unknown*.
- Measure 200 mL water into each beaker using the cylinder or larger syringe.
- Add food coloring in increasing amounts to the four numbered beakers; e.g., 2 drops to beaker 1; 4 drops to beaker 2; 6 drops to beaker 3; and 8 drops to beaker 4. These constitute the standard or *known* solutions.
- Add 2, 3, 4, 5, 6, 7, or 8 drops of food coloring to the unknown beaker and record this amount for later reference. **Note**: if more beakers are available, more unknowns can be prepared to increase the challenge.
- Prepare a key relating the number of drops to the concentration of the standard solutions:
    - 2 drops = 0.01 drops/mL
    - 4 drops = 0.02 drops/mL
    - 6 drops = 0.03 drops/mL
    - 8 drops = 0.04 drops/mL

2. Student instructions

- Move standard solutions 1 – 4 to a well and evenly lit area of the lab and place them on the tray or cookie sheet.
- For each standard solution, make a measurement with the SALS probe using the Hertz feature and record the readout for each one, making sure to rinse and dry off the SALS probe with a paper towel between each measurement. Remember to take all measurements in the same place in each container (e.g., distance from the bottom of the beaker) and under the same lighting conditions.
- Reorder the known standard solutions on the tray from highest to lowest frequency (Hertz) which should be from the lightest to darkest solution visually.
- Make a measurement of the unknown(s) using the Hertz feature and record the readout(s). Place the beaker with the unknown solution in the most logical place among the standard solutions.

3. Prepare the standard curve

- Label the x (horizontal) and y (vertical) axes on a graph with Concentration in drops/ml and Hertz, respectively, and add numbers in the proper range for each axis.
- Plot the Hertz readings for each of the standard solutions on the graph, making sure they correlate to their known concentrations (x and y coordinates).
- Using a straightedge, draw a straight line to connect the standard solution Hertz readings, connecting as many points as possible.

Questions to answer

1. What is the concentration of the unknown solution? State the reasoning behind your answer.

2. How does the answer relate to the placement of the unknown solution beaker among the known standards?

3. Do you think an unknown outside the range of the standard curve could be accurately interpolated with this graph? Why or why not?