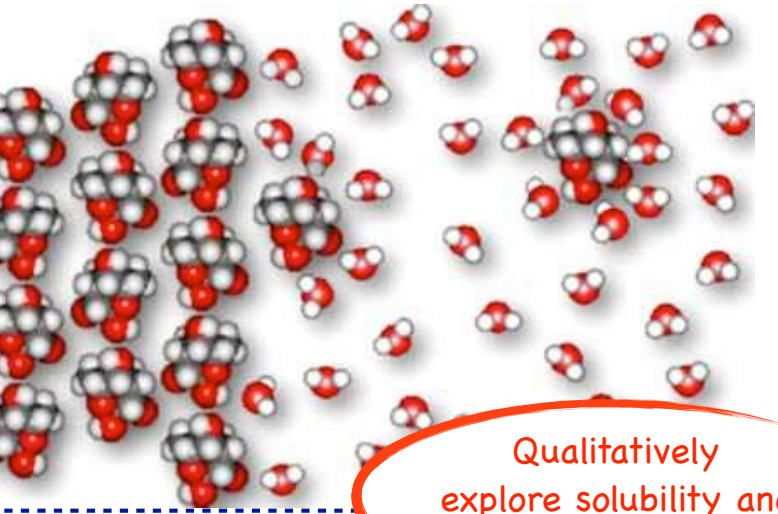
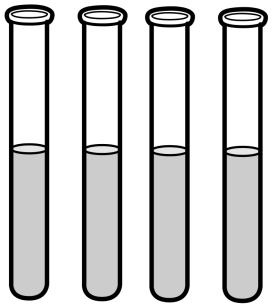
Exp 05: Exploring Solutions

Part A: Saturated Solutions



Qualitatively explore solubility and saturation.

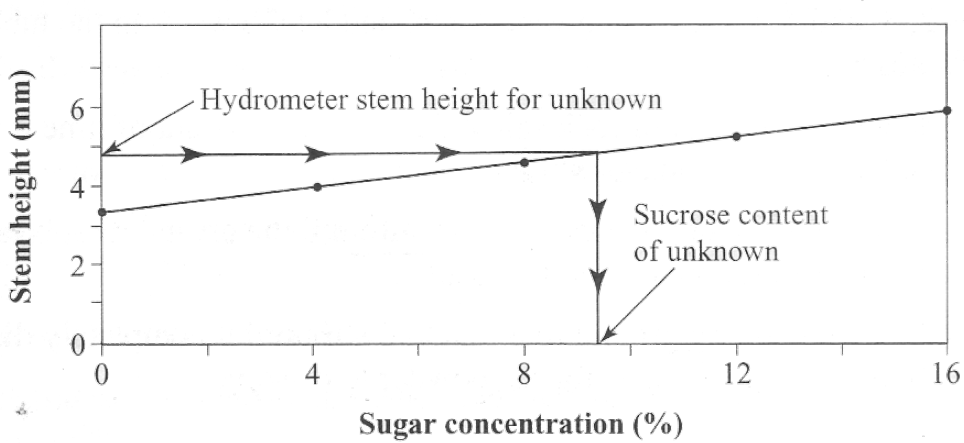
Part B: Rate of Solubility



Observe and record how these processes effect rate of solubility.

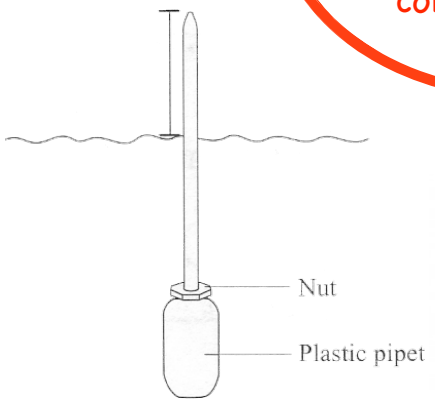
- Temperature
- Particle Size
- Agitation

Part C: Calibrating your Hydrometer



Part D: Measuring your Unknown

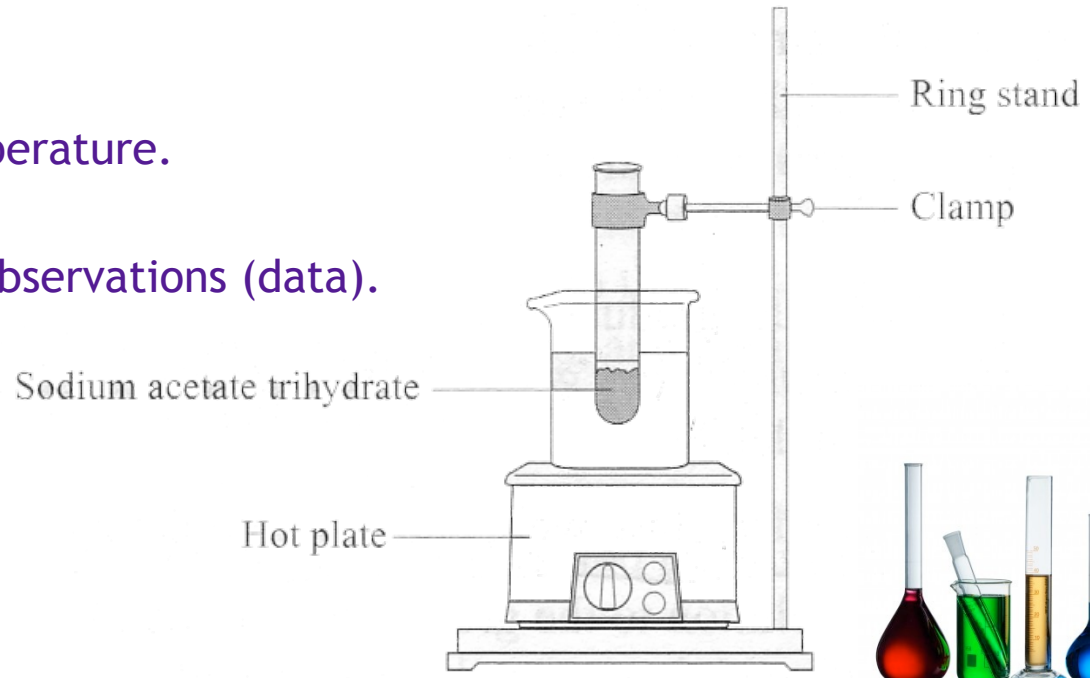
Build a density curve to calibrate your hydrometer. Then use the curve to find the sugar content of your unknown.



A Exploring Saturation

1. Setup hotplate and ring stand.
2. Fill a 400 mL beaker about 2/3 with water. Set heat to medium (raise heat if needed).
3. Bring water to a boil.
4. Add sodium acetate (NaOAc) to a small test tube (about 1/4 full).
5. Add enough water to just cover the crystals.
6. Clamp the tube so the crystals are below the water.
7. Use a stir rod, mix the crystals until they dissolve.
8. Raise the test tube.
9. Turn off the heat.
10. Let the solution cool to room temperature.
11. Drop one crystal into the solution.
    Watch carefully and record your observations (data).

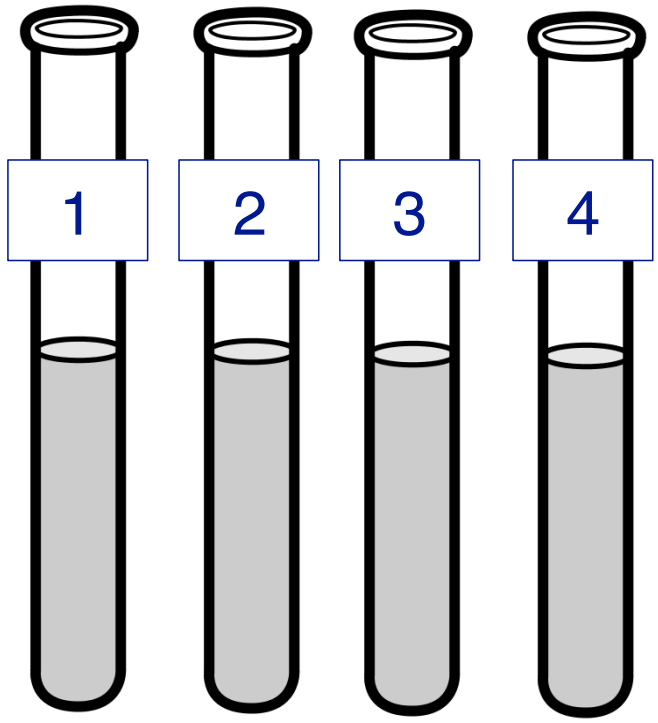
There are no calculations or conclusions for part A.

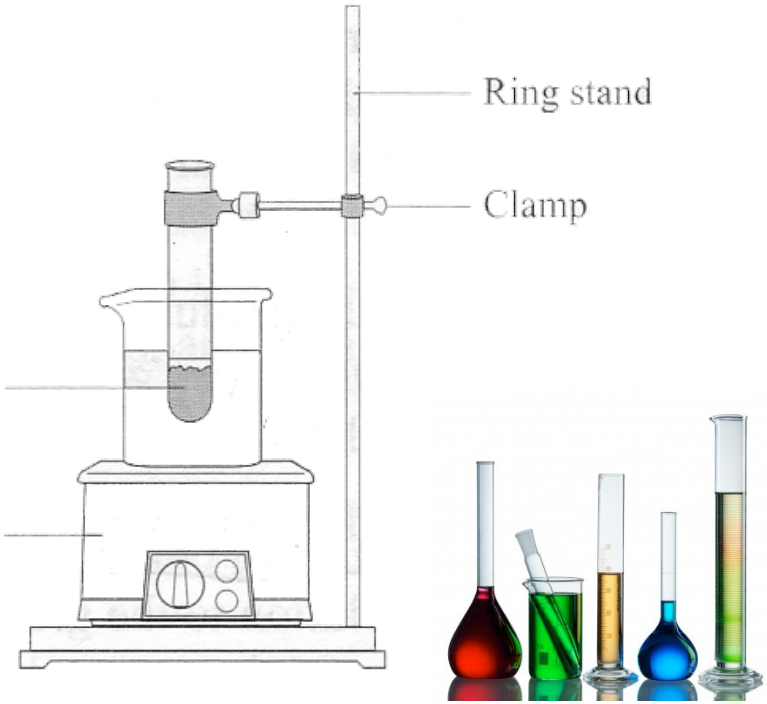


B Solution Rate

1. Use a wax pencil to number test tubes, fill each about half full of water.
2. Collect 4 pea sized crystals of rock salt.
    1. Grind one to dust.
3. Place one crystal in tube #1, measure the seconds it takes for this crystal to dissolve. (Do not shake)
4. Reheat the water bath from part A. Heat tubes #2-4 for about 5 minutes.
    1. To tube #2, add one crystal. Measure the seconds it takes for the crystal to dissolve. (Do not shake)
    2. To tube #3, add one crystal. Stir the solutions with a glass rod rapidly. Measure the seconds it takes for the crystal to dissolve.
    3. In tube #4, add the ground rock salt and stir rapidly. Measure the seconds it takes for it to dissolve.

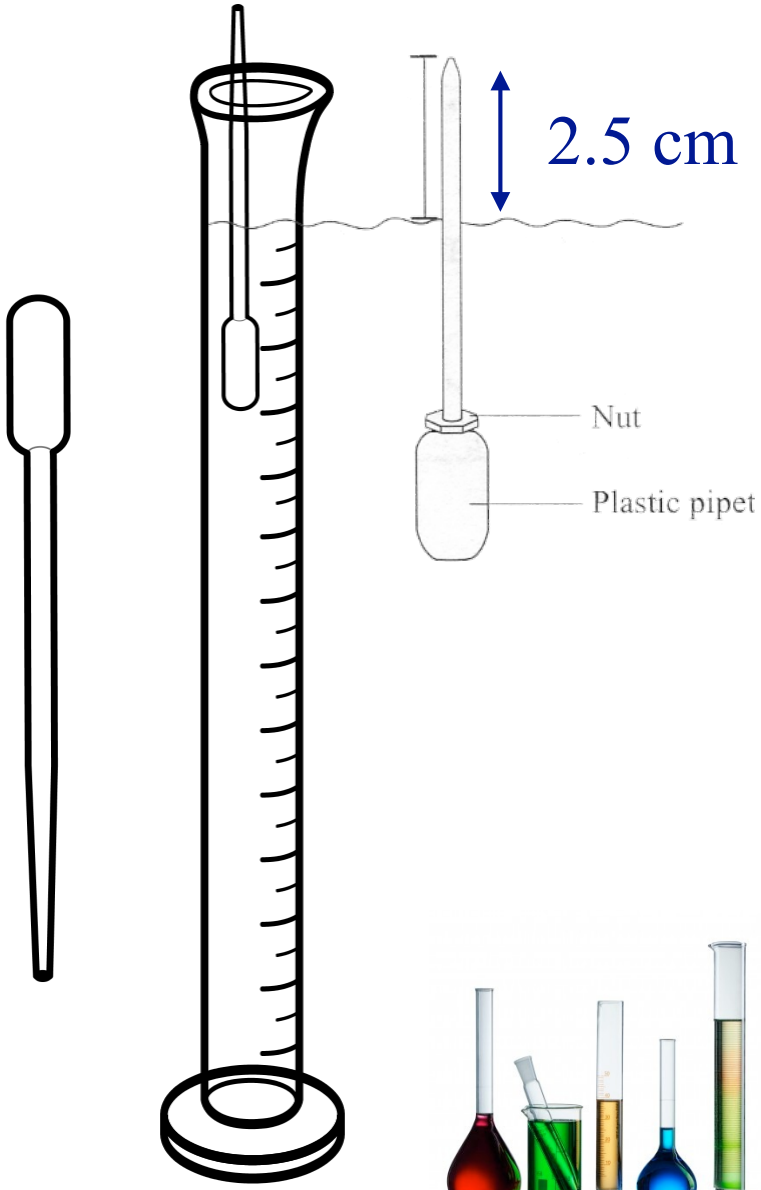
There are no calculations for part B.
Based on your observations conclude how the factors of particle size, agitation, and heat effect the rate of dissolving.





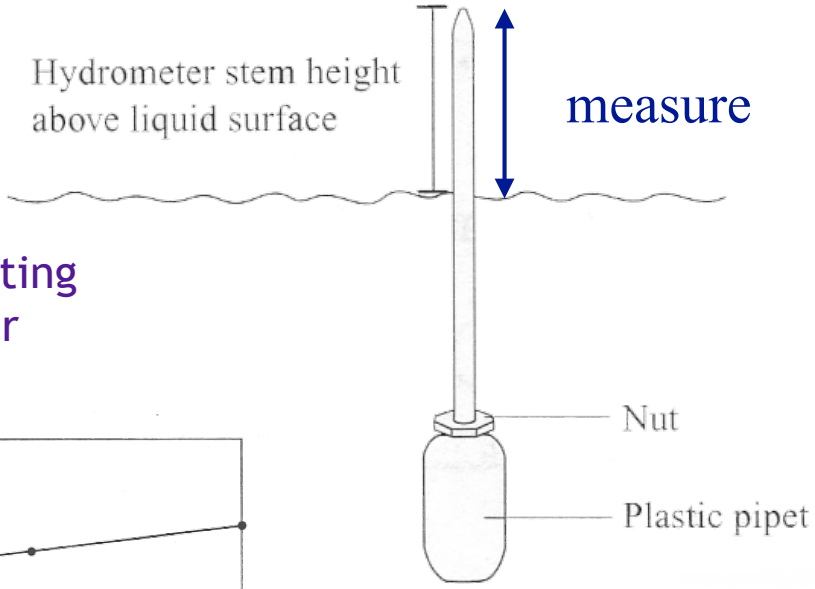
C Calibrating your Hydrometer

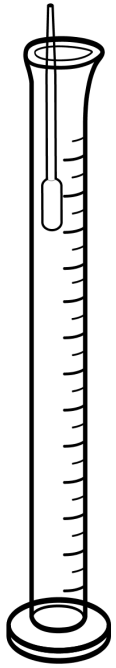
- Fill 100 mL graduated cylinder with 100 mL of water.
- Prepare the hydrometer:
  - Fill a pipet half full of water.
  - Invert the pipet.
  - Slip a bolt onto the pipet.
  - Float it in the graduated cylinder.
  - Measure how far above the water the tip of the pipet floats.
    - Your goal is to haves it float 2.5 cm above the water.
    - Add more or remove water from the pipet bulb until your hydrometer sticks about 2.5 cm above the water.
    - Record the height to the nearest 1 mm (0.1 cm)
  - Empty the graduated cylinder and dry it.
  - Rinse the outside of the hydrometer and dry it.
    - *Don't loose any water from the inside of the hydrometer!*



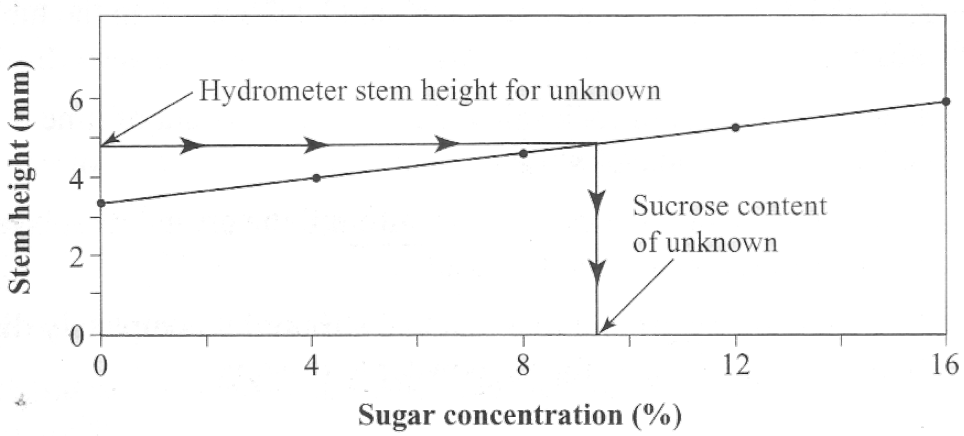
C Calibrating your Hydrometer

- Add 100 mL of 4% sugar water to the cylinder.
- Measure the height of the bulb in the new solution.
- Record the height for the 4% solution.
  - Empty the graduated cylinder and dry it.
  - Rinse the outside of the hydrometer and dry it.
    - *Don't loose any water from the inside of the hydrometer!*
- Repeat with 8%, 12%, and 16% solutions.





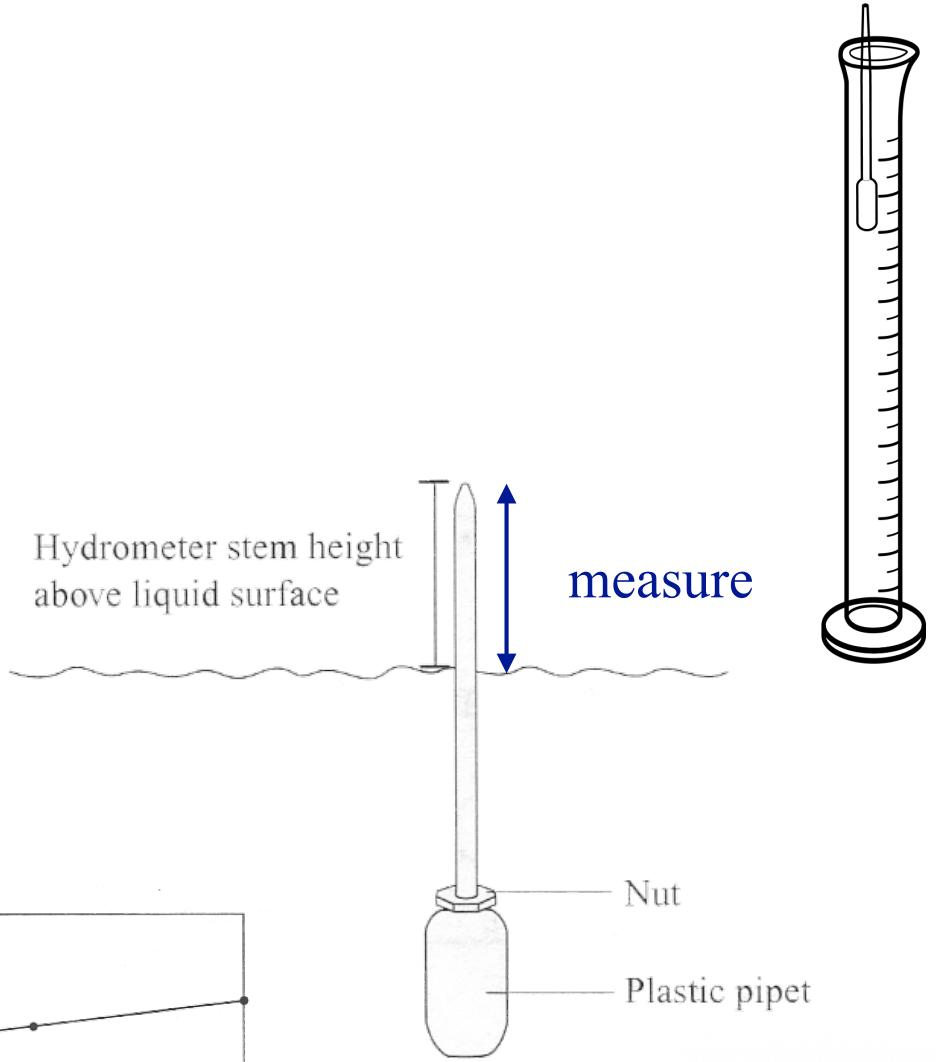
- For your calculations, produce a graph relating sugar concentration to the stem height your hydrometer.

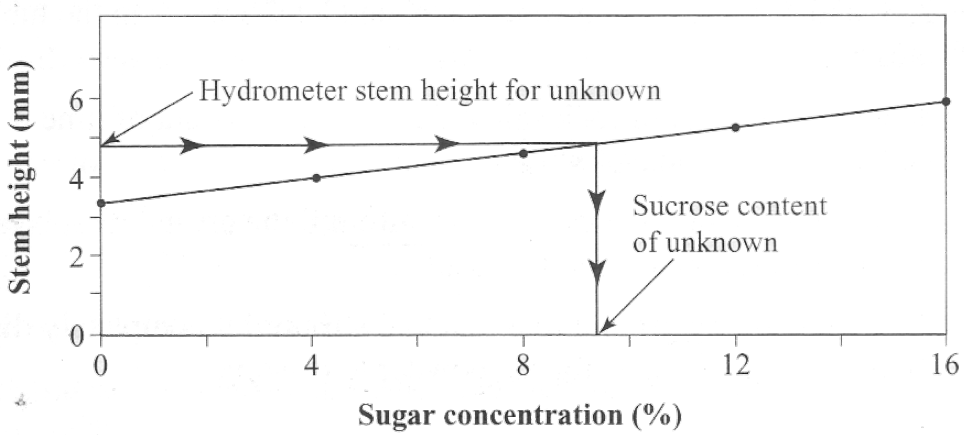


D Measuring your Unknown

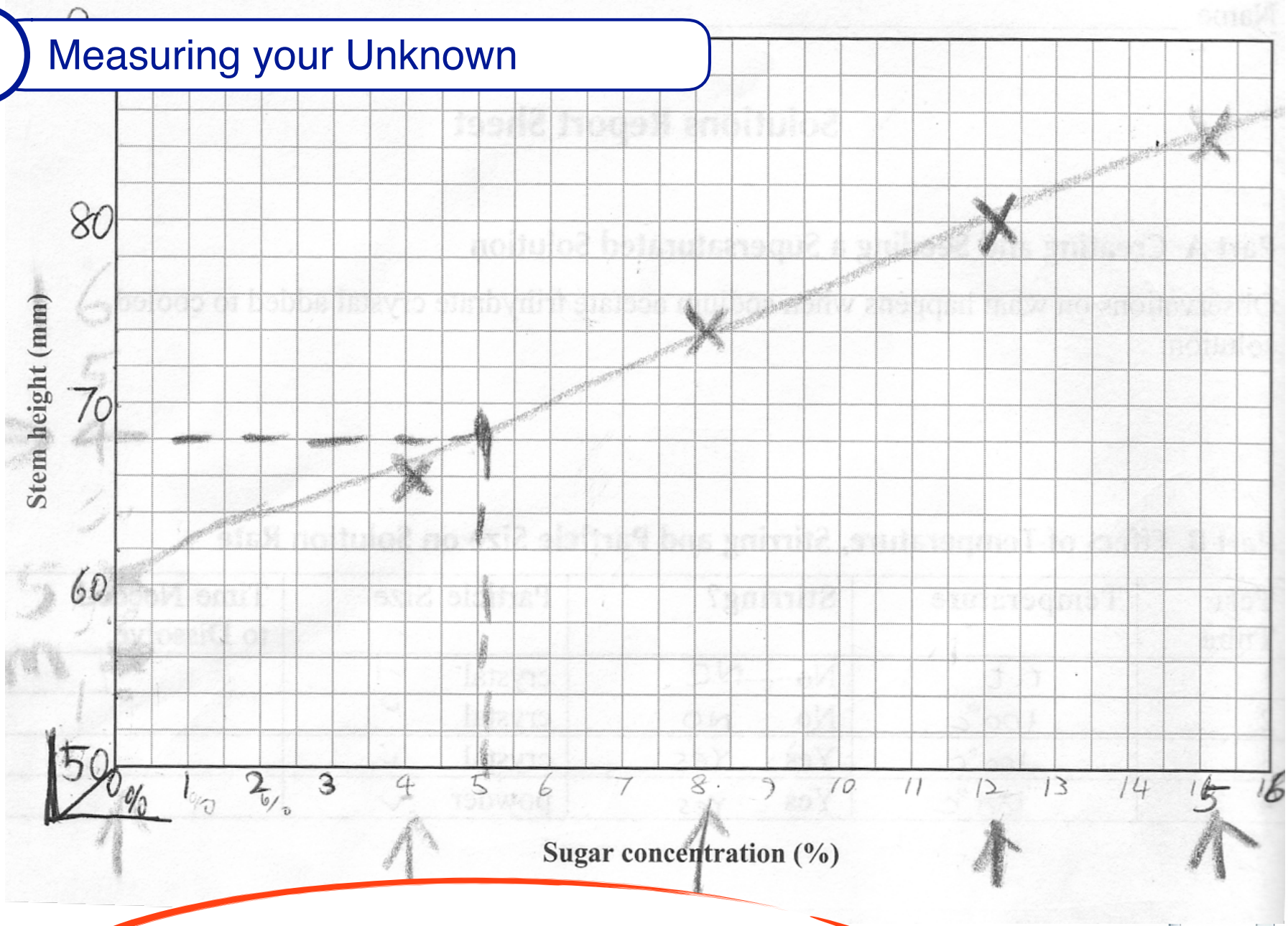
- Add 100 mL of the unknown solution to the cylinder.
- Measure the height of the bulb in the new solution.
- Record the height.

- Find where this height lies on your graph, from this determine the sugar concentration of your unknown solution





D Measuring your Unknown



For your calculations construct a graph of the relationship between the stem heigh of the hydrometer and the sugar concentration.
Determine the concentration of your unknown.

Questions?