

Introduction to AS biology June 2017

Aims

To produce a dilution series of a solute with which to identify the water potential of potato cells

To demonstrate an understanding of the principles behind osmosis in plant cells

You should read these instructions carefully before you start work.

Preparing the dilution series

1. Label six boiling tubes 0, 0.25, 0.50, 0.75 and 1.0 mol dm⁻³ sucrose.
2. Use the 1.0 mol dm⁻³ sucrose solution and water to make up 20 cm³ of sucrose solution of each of the following concentrations:

0.25 mol dm⁻³

0.50 mol dm⁻³

0.75 mol dm⁻³

1.00 mol dm⁻³

Complete **Table 1** to show the volumes of 1.0 mol dm⁻³ sucrose solution and water that you used to make up each concentration.

3. Stand the boiling tubes containing the sucrose solutions in a water bath set at 30 °C. Use a thermometer to check the temperatures in all tubes reaches 30 °C.
4. Using the chipper, cut six chips from your potato tuber. Make sure you remove any peel on the potatoes. Use a ruler, scalpel and tile to cut all of the chips to the same length. Blot the potato chips dry with a paper towel, i.e. roll each chip until it no longer wets the paper towel and dab each end until dry. **Do not squeeze the chips.** Put each potato chip onto a clean square of paper towel which you have numbered in the same way as the boiling tubes.
5. Weigh each potato chip. Record these initial masses in a suitable table.
6. At the water bath, set the stop clock to zero. Quickly transfer each potato chip from its square of paper towel to its own boiling tube with the same number.
7. After precisely 20 minutes, remove the chips from the boiling tubes. Blot the chips dry, as before. Then reweigh them. Record these final masses in your table.
8. Calculate the change in mass and then calculate the percentage change in mass.
9. Plot a graph of your processed data and use this to determine the concentration of sucrose which is which has the same water potential as the potato tuber cells.

Table 1

Concentration of sucrose solution/mol dm ⁻³	0	0.25	0.5	0.75	1.0
Volume of 1.0 mol dm ⁻³ sucrose solution / cm ³	0				20
Volume of water/cm ³	20				0

Draw your table in the space below

Points to think about and complete prior to September

- 1. What are the different variables in this experiment and how have you controlled them?**
- 2. Explain the differences between a plant and animal cell in terms of osmosis and the cell structure?**
- 3. Does your graph clearly show how you have worked out the potato's solute potential**
- 4. What are the potential sources of error in this piece of work? (Why might your results be different from your colleagues?) How could these errors be minimised?**
- 5. Complete the questions based on the work that you have done**