

Leaving Cert Biology

Conduct any Activity to
Demonstrate Osmosis

Experiments



CONDUCT ANY ACTIVITY TO DEMONSTRATE OSMOSIS

Materials/Equipment

Distilled water

Sucrose solution (80%)

2 Beakers

2 Glass rods

Small funnel

Length of dialysis tubing (80 cm)

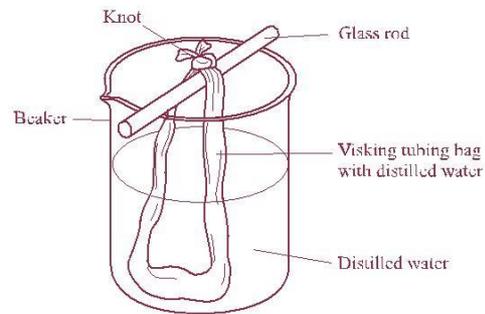
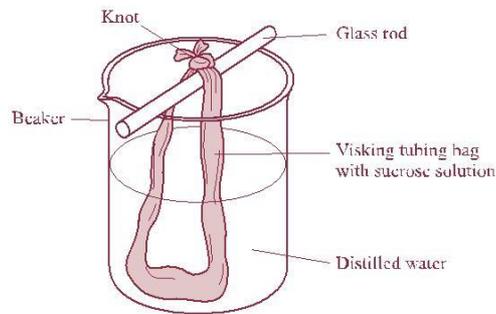
Electronic balance

Scissors

Ruler

Labels

Paper towels



Procedure

1. Familiarise yourself with all procedures before starting.
2. Soften two 40 cm strips of dialysis tubing by soaking them in water.
3. Tie a knot at one end of each strip.
4. About half-fill one piece of tubing with the sucrose solution and the other with distilled water.
5. Eliminate as much air as possible from the tubes and tie a knot at the open end of each tube. Then attach the two ends of each tube as in the diagram.
6. Wash off any excess sucrose solution from the outside of the sucrose tube and pat dry both tubes with the paper towels.
7. Observe and record the turgidity of each tube.
8. Find the mass of each tube and record.
9. Suspend the tube containing the concentrated sucrose solution, by means of a glass rod, in a beaker of distilled water and label it 'sucrose solution'.
10. Similarly, place the tube containing the distilled water into a second beaker of distilled water and label it 'distilled water'. This acts as the control.
11. Allow the tubes to stand for at least 15 minutes.
12. Remove the tubes and dry as before.
13. Observe and record the turgidity of each tube.
14. Again find the mass of each tube and record.

15. Replicate the investigation or cross reference your results with other groups.

Result

Tube contents	Turgidity at start	Turgidity after test period	Mass at start (g)	Mass after test period (g)
Sucrose solution				
Distilled water				

Conclusion/Comment

SKILL ATTAINMENT

CONDUCT ANY ACTIVITY TO DEMONSTRATE OSMOSIS

Following instructions

Familiarise yourself with all procedures before starting
Follow instructions step by step
Listen to the teacher's instructions

Correct manipulation of apparatus

Soften the tubing in water
Tie leak-proof knots
Wash off excess sucrose
Dry the tubes
Use the electronic balance
Suspend the tubes from the rods

Observation

Observe the appearance of the tubes at the start
Observe the appearance of the tubes after the test period

Recording

Write up the procedure
Tabulate the results

Interpretation

Draw reasonable conclusions from your observations and results

Application

Become aware of any other application(s) of what you learned in this activity

Organisation

Exercise caution for your personal safety and for the safety of others Work in an organised and efficient manner
Label as appropriate
Work as part of a group or team Clean up after the practical activity

Background information

Diffusion and osmosis

Molecules and ions in solution can move passively in a particular direction as a result of diffusion.

Diffusion is the movement of molecules or ions from a region of their high concentration to a region of their low concentration down a concentration gradient. It is possible for the net diffusion of different types of molecules or ions to be in different directions at the same time, each type moving down its own concentration gradient. Thus in the lungs, oxygen diffuses into the blood at the same time as carbon dioxide diffuses out into the alveoli.

Osmosis is a special type of diffusion. Osmosis is *the passage of water molecules from a region of their high concentration to a region of their low concentration through a partially permeable membrane.* **Water** is the solvent in all biological systems. Unlike active transport, diffusion and osmosis are passive, i.e. do not require the expenditure of energy.

Certain membranes, previously known as semi-permeable membranes, allow the passage of *solvent molecules only* and completely exclude solute molecules or ions. The membranes of living cells, however, allow the passage of certain solute molecules or ions in a selective manner depending on the nature of the membrane. They are therefore best described as **partially permeable** rather than semi-permeable.

Advance preparation

- Make up an 80% w/v solution of sucrose.

Helpful hints

- For best results, use dialysis tubing about 2 cm wide.
- Treacle or golden syrup could be used instead of the 80% sucrose solution.
- If using treacle or golden syrup, heat it in a beaker in a hot water bath to decrease its viscosity. This makes it easier to add to the dialysis tubing bag.
- Syringes could be used to fill the dialysis tubing bags.
- Make sure to wash any sucrose solution off the knots.
- A useful activity might be to measure and record the mass of the tubes at five-minute intervals throughout the activity.