

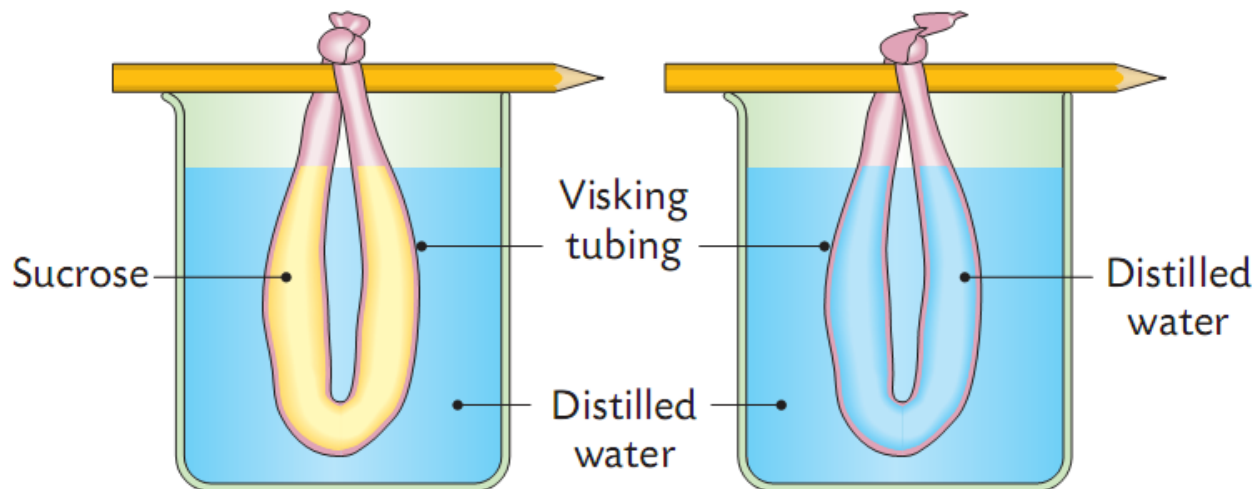
Chapter 13 - Diffusion and Osmosis

Learning objectives

- To define the terms 'diffusion' and 'osmosis' and give examples
- To explain how cell membranes are selectively permeable
- To define the term 'turgor' and explain turgidity in plant cells
- To describe how high levels of salt and sugar are used in food preservation
- To investigate osmosis.



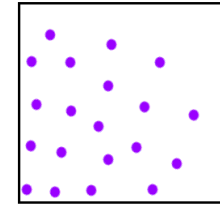
Experiment



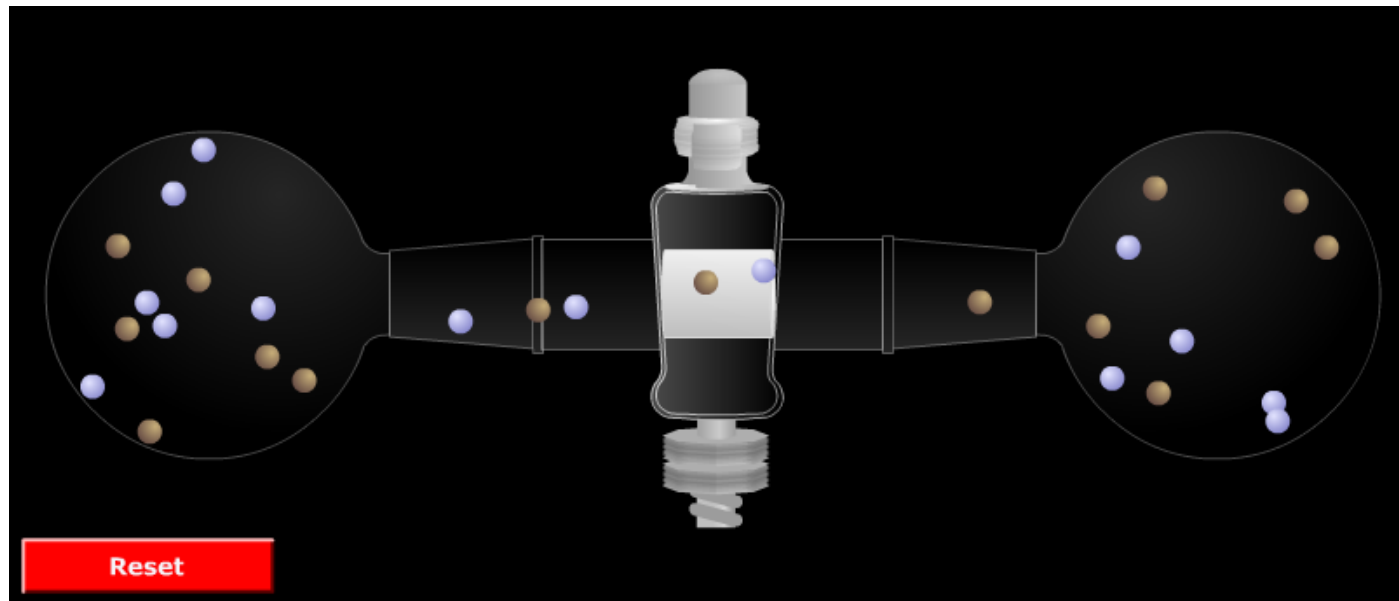
Weight	Sucrose Solution	Distilled Water
Before		
After		

Chapter 13 - Diffusion and Osmosis

Diffusion is the spreading out of molecules from an area of high concentration to an area of low concentration.



Example - Sugar in a cup of tea spreads out
- Deodorant spreads out too

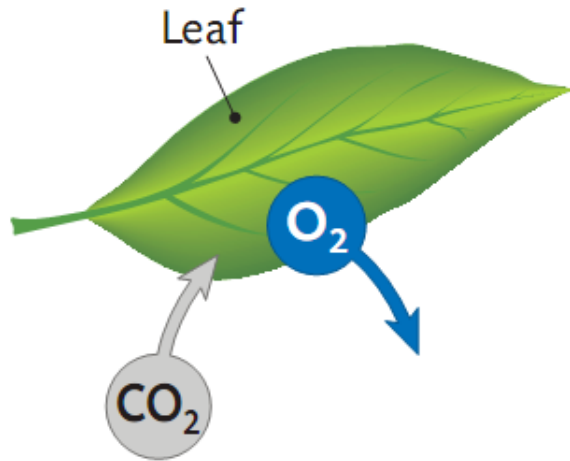


Diffusion in Biology

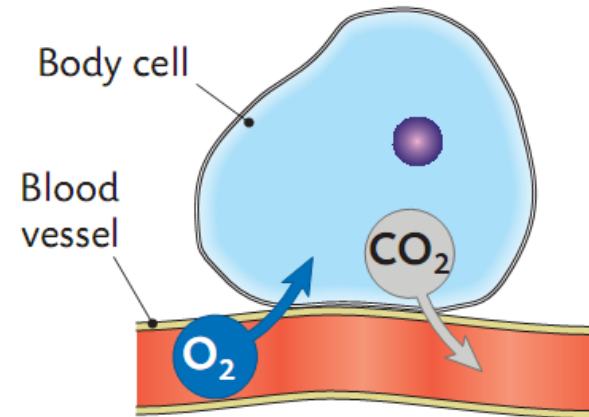
Diffusion is a **passive** process as there is no energy used up.

Examples in biology are,

CO₂ diffusing into a leaf,
O₂ diffusing out of a leaf.



O₂ diffusing onto a red blood cell,
CO₂ diffusing out of a cell.

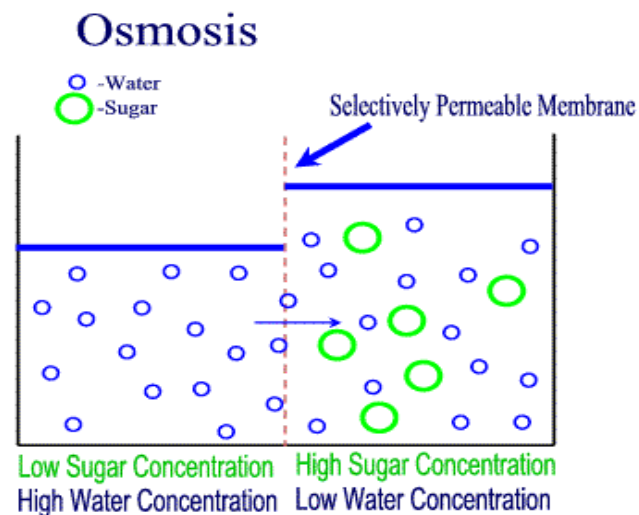


Osmosis

Osmosis is the movement of water molecules across a selectively permeable membrane from a region of high water concentration to an area of low water concentration.

In the diagram the fluid tries to balance out its concentration of sugar. The sugar cannot pass through the selectively permeable membrane.

If the sugar cannot move then the water has to move instead. The water level on the left drops as the water moves in to dilute the sugar.

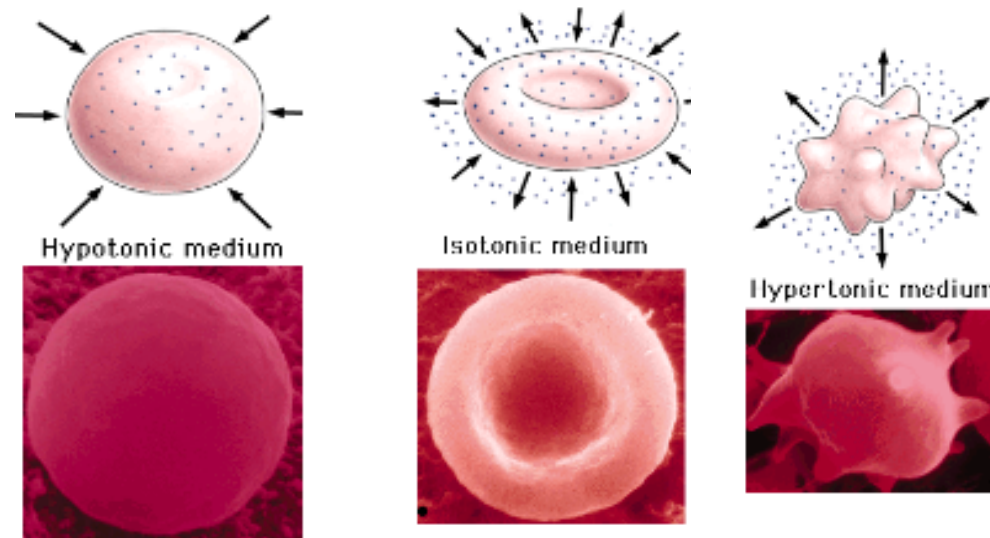


Osmosis and Animal cells

Animal cells in a solution of the same concentration as their cytoplasm are **ISOTONIC**. The water will move in and out at the same rate.

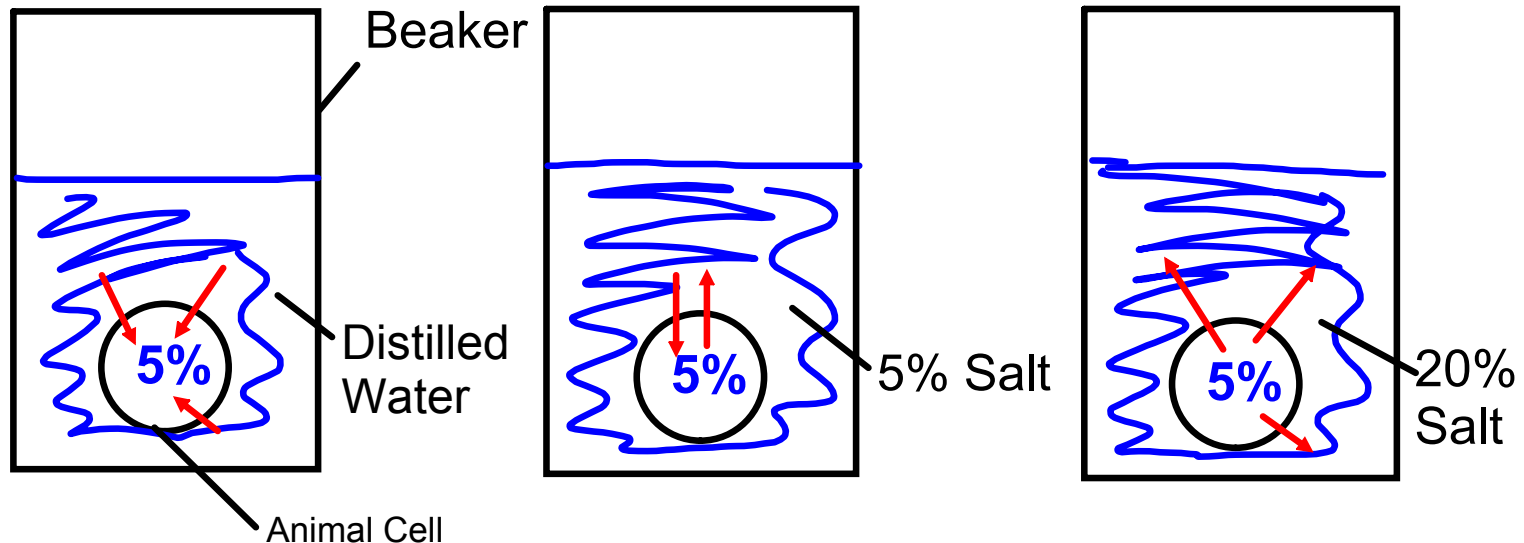
Animal cells in a more concentrated solution than the concentration of their cytoplasm are **HYPERTONIC**. The cell will shrivel up, (**Crenation**)

Animal cells in a less concentrated solution than the concentration of their cytoplasm are **HYPOTONIC**. The cell may burst.



Animal Cell

We can place an animal cell, e.g. **Amoeba** in different salt concentrations to see what happens to the cell.



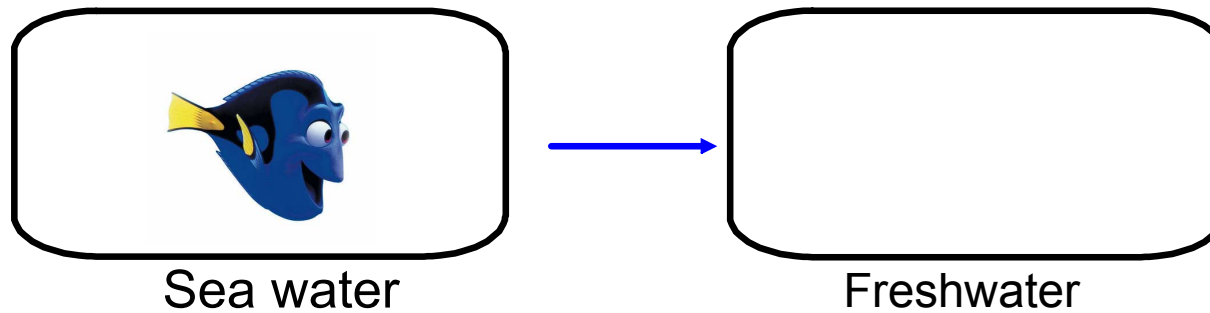
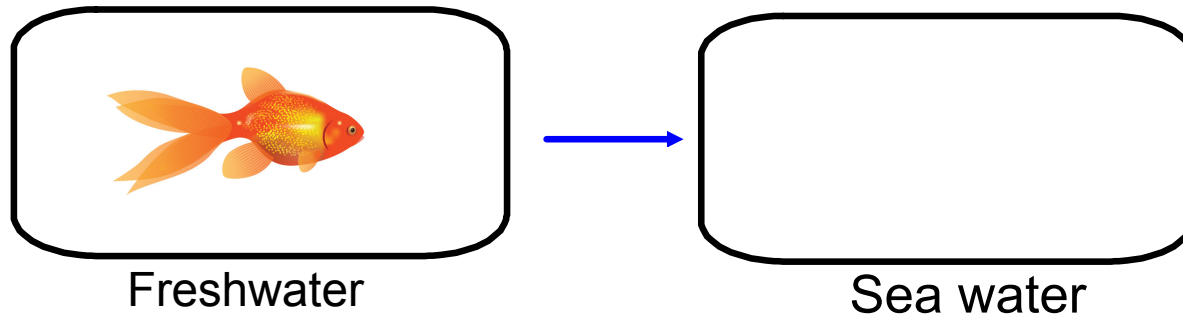
Hypotonic - Low
Water goes into cell

Isotonic - Same
Water and cell
stay the same

Hypertonic - High
Water goes out of cell

CRENATION - Cell shrivels up

What will happen to the fish?



Osmosis and Plant cells

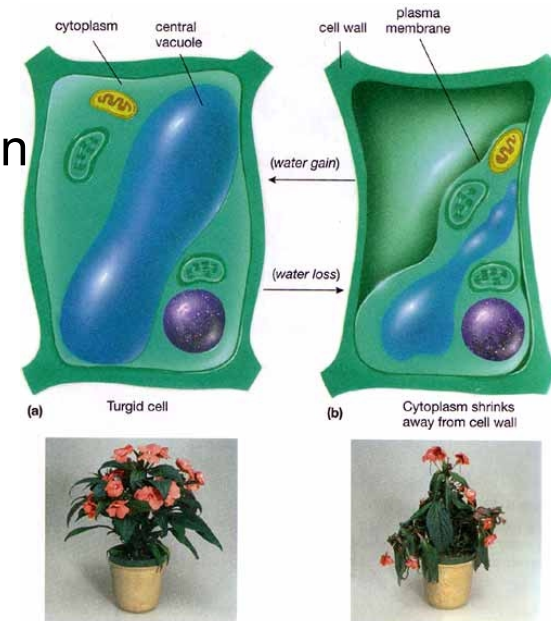
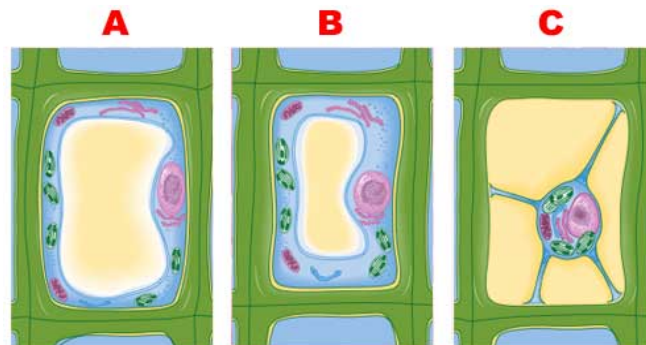
Cell walls are fully permeable

They let most water, gases and solutes through.

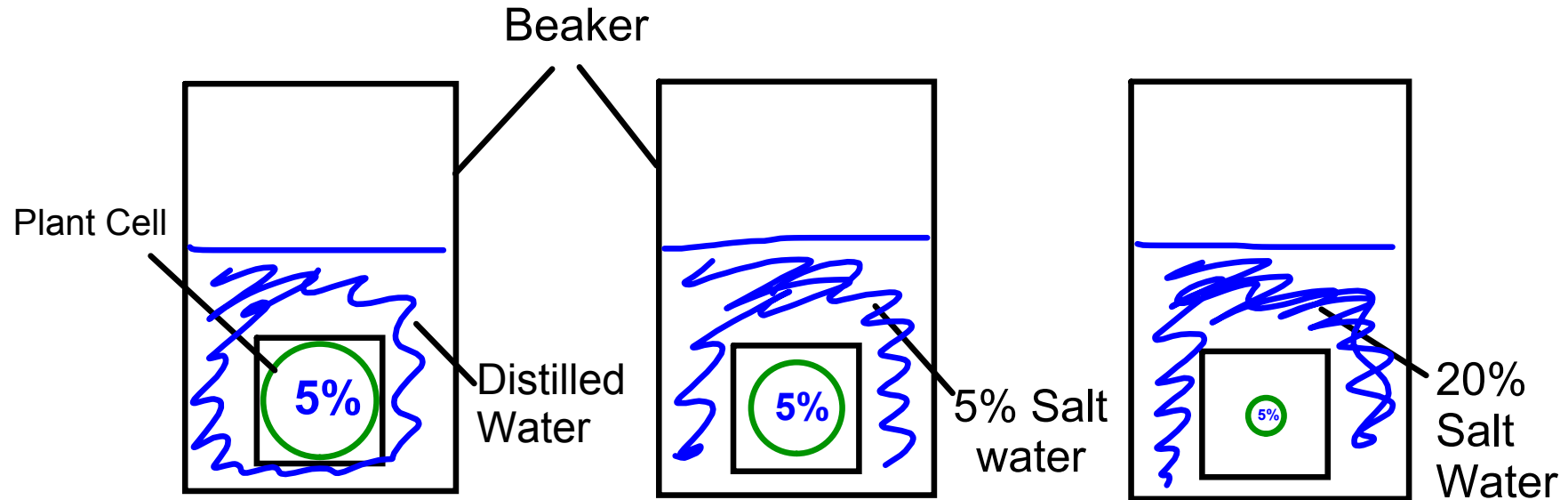
A. Plant cells in a less concentrated solution than the concentration of cell, swell up. It is firm or **TURGID**.

B. Plant cells in an equal concentrated solution as the concentration of cell, stay the same.

C. Plant cells in a more concentrated solution than the concentration of cell, shrivel. The cytoplasm comes away from the cell membrane and it is **PLASMOLYSED**.



Plant Cell



Plasma swells up
Turgid - full of water
 Gives plant strenght

Hypotonic Solution

Plasma stays same

Plasmolysed - no water
 Plant wilts

Isotonic Solution

Hypertonic Solution

OSMOSIS AND FOOD PRESERVATION

Bacteria and Fungi are similar to plants as they also have a Cell Wall. Osmosis is used to kill micro organisms and stop them decaying food.



Foods such as fish and **bacon** can be soaked with a **salt** solution. **Jam** and marmalades have extra **sugar** to help stop them from going off.

Any micro-organisms (Bacteria or Fungi) landing on the food will **lose water** trying to dilute the food's salt/sugar. The micro-organisms' cell will **shriveled** up and die.