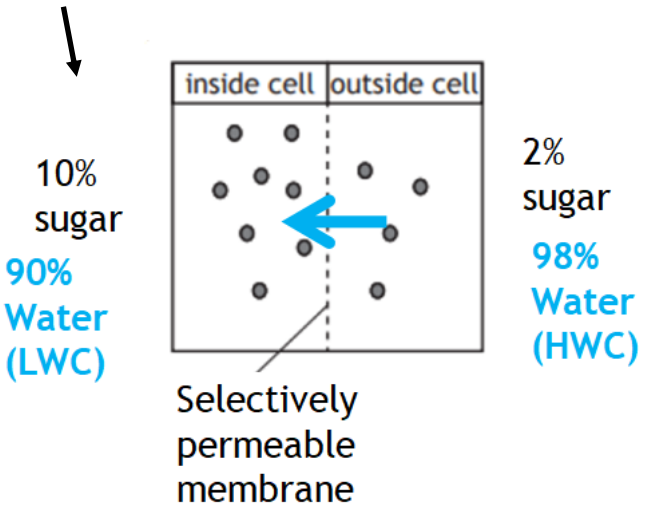
Osmosis

Osmosis

Movement of **WATER** molecules from an area of **higher water** concentration to an area of **lower water** through a **selectively permeable** membrane.

Energy Requirement

Osmosis does **not** require energy.



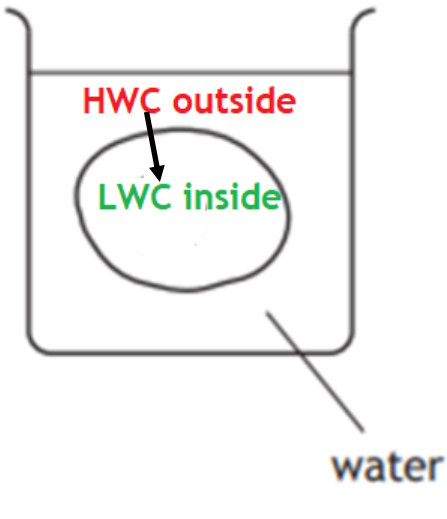
Cell placed in **pure water**;

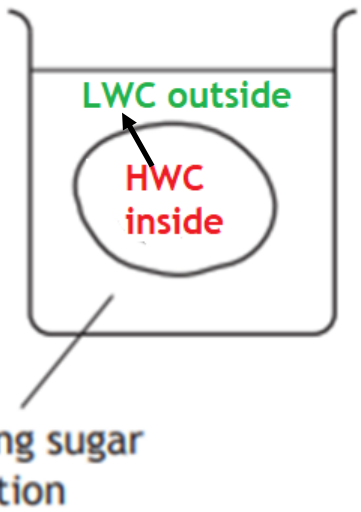
Water moves INTO the cell, cell **gains mass**.

Cell placed in **sugar/salt** water;

Water moves OUT of the cell, cell **loses mass**.

Explaining water movement





Osmosis

Osmosis in Animal Cells

Cell placed in **pure water**;

In a high water concentration animal cells will swell and **BURST**.

Cell placed in **sugar/salt** water;

In a low water concentration animal cells will **SHRINK.**

Osmosis in Plant Cells

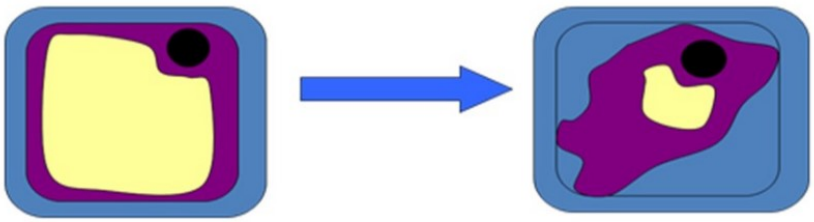
Cell placed in **pure water**;

Normal plant cell

Turgid plant cell

1. Vacuole has swollen (taken in extra water)
2. Cytoplasm and cell membrane push against the cell wall.
3. The cell wall supports the cell preventing it from bursting.

Cell placed in **sugar/salt** water;



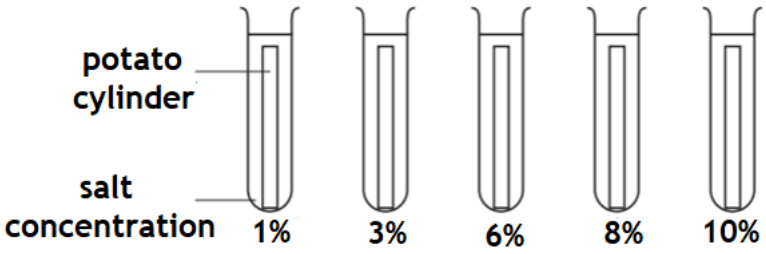
Normal plant cell

Plasmolysed plant cell

1. Vacuole has shrunk
2. Cytoplasm and cell membrane pull away from the cell wall.
3. The cell wall supports the cell preventing it from shrinking.

Osmosis

Potato Experiment

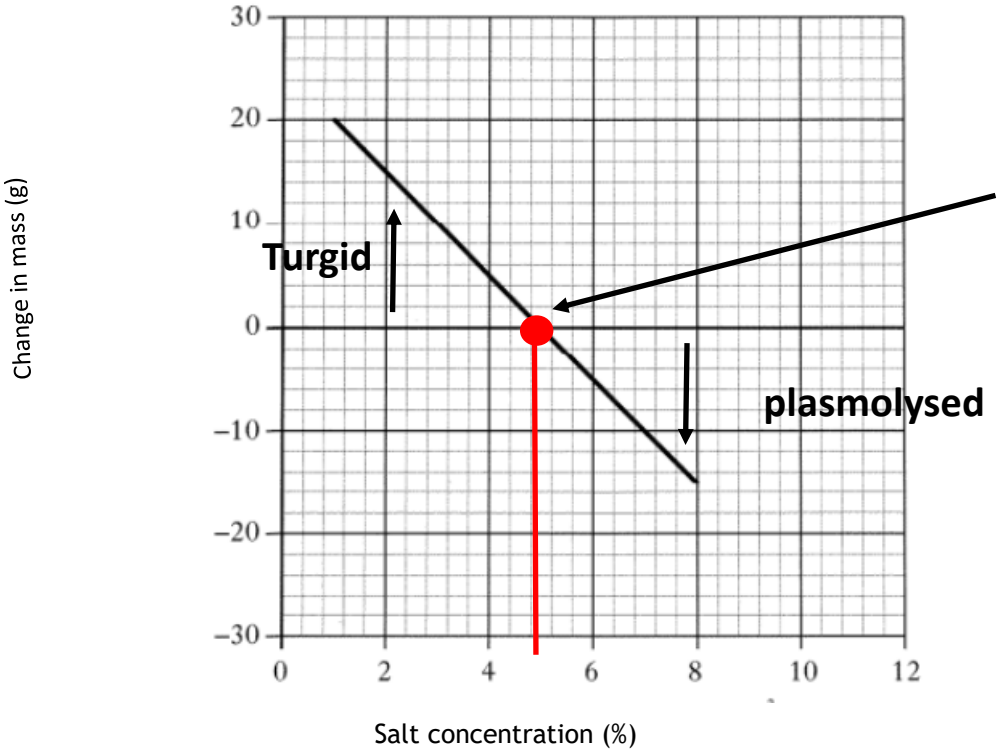


salt concentration (%)	Change in mass (g)
1	+15
3	+10
6	–5
8	–15
10	–20

Potatoes are weighed then left in different concentrations of salt.
They are blotted dry then reweighed,

<u>Explain why potato cylinders are blotted dry?</u>
To remove surface water from potato cylinders.

The most **turgid** cells are **1% salt concentration**
The most **plasmolysed** cells are **10% salt concentration.**



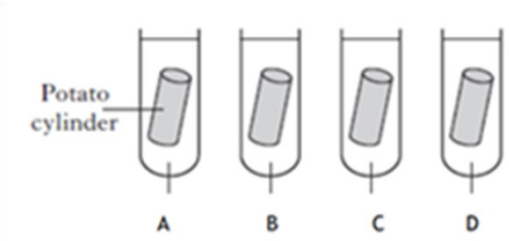
<u>Cell Cytoplasm concentration</u>

This is the concentration inside the cell (5%)

This is because it does not gain or lose mass

Osmosis

Potato osmosis Experiment



Solution	Mass of potato at start (g)	Mass of potato after one hour (g)
A	4.5	3.9
B	4.5	4.3
C	4.5	4.5
D	4.5	5.5

Solution A has lost the most so is the most plasmolysed.

Solution D has gained the most so is the most turgid.

Solution C has not changed so this is the concentration inside the cells.

Percentage Change

This is calculated when the **starting masses** are **different** for a valid comparison.

Example 1—not needed

Starting masses are the same(4.5g) so NO need to convert to percentage change.

Solution	Mass of potato at start (g)	Mass of potato after one hour (g)
A	4.5	3.9
B	4.5	4.3
C	4.5	4.5
D	4.5	5.5

Example 2—% change calculation needed

Starting masses are not the same so need to convert to percentage change in mass.

	Initial mass (g)	Mass after 30 minutes in salt solution (g)
A	2.5	3.0
B	3.0	3.5
C	3.0	2.5
D	3.5	3.0

Osmosis

Percentage increase/decrease calculations

Worked Example 1:

A plant cell is placed in pure water. The plant cell weighed 12g before, and now weighs 15g after osmosis has occurred. Calculate the percentage decrease in mass?

Change = 15-12g = 3g

Original number = 12g

Change/original number x 100

3/12 x 100 = **25%**

Distilled water

Worked Example 2:

The cells weighed 16g before being placed into salt solution. The cells now weigh 4g. Calculate the percentage decrease in mass?

Change = 16-4 = 12g

Original Number = 16g

Change/original number x 100

12/16 x 100 = **75%**

Strong sugar solution