

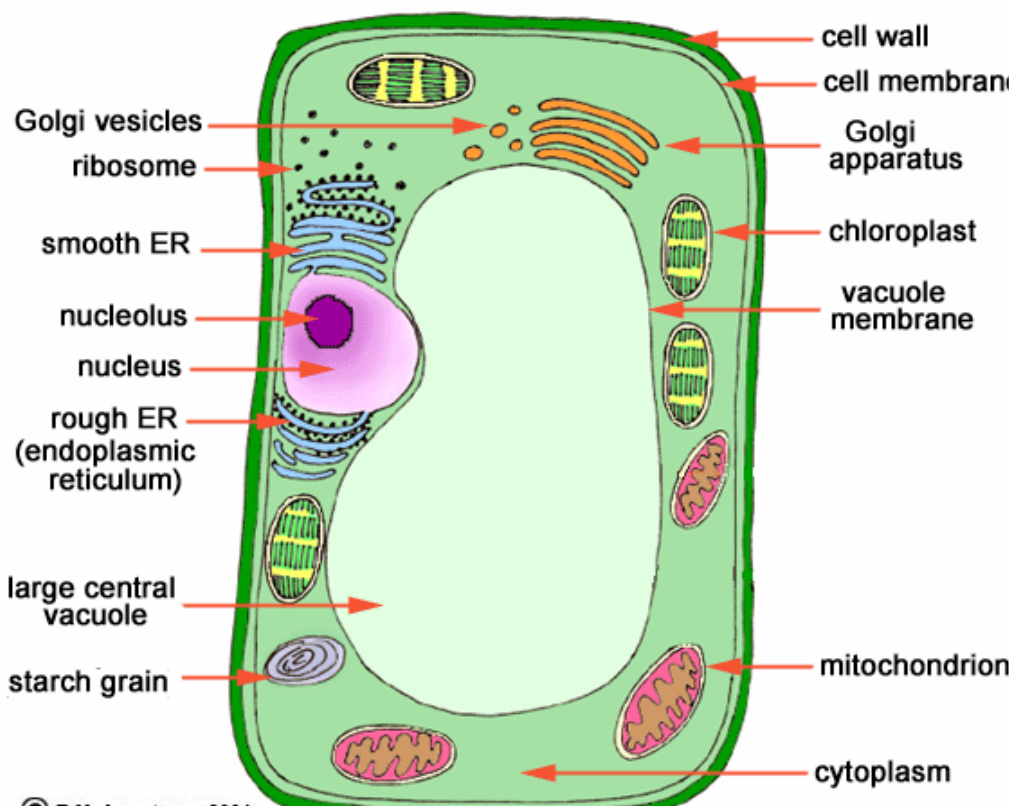
## Investigating Osmosis in a potato

### Typical plant cell

Plants use osmosis to move water in and out of its cells, osmosis is a special type of diffusion. Osmosis happens when there is an imbalance in the water potential inside the cell and its surrounding, the water moves from a high water potential to a low water potential osmosis is a type of diffusion but only happens with a semi permeable membrane

several factors could affect the rate of osmosis these are

- Temperature- molecules would have more kinetic energy so increases



rate of osmosis

- The concentration of water- different concentrations have different mass changes
- The type of potato- different types of potatoes have different molarities in the cells
- Size of potato chip- larger surface area means more osmosis because more places for water to pass
- The volume of solution different volumes would have more molecules in so rate would increase
- If there was skin on the potato- skin would prevent osmosis from occurring at that part of potato

I am going to investigate the relationship between Osmosis and concentration of sucrose solution.

In this experiment I will test if the concentration of the solution could affect osmosis because a lower molar concentration would cause the cell to increase in mass whereas a higher molar concentration solution would cause the cell to lose mass. I have chosen to use distilled water, .2Moles, .4Moles .6Moles, .8Moles and 1Moles because it gives a wide range and can be easily repeated, Molars(M) is the ratio of sugar compared to the water the higher the number the higher the concentration of sugar there is.

I predict as the sucrose solution gets more concentrated than the point of equilibrium the potato will lose mass, this is because the sucrose can't get through the semi permeable membrane so water moves out of the cell causing to try and reach the point of equilibrium so decreases in mass. When the sucrose solution is less concentrated than the point of equilibrium the sucrose inside the cell can't get through the semi permeable membrane so water outside the cell moves in causing the cell to gain mass I think the molarity of the potato is about .4M.

Apparatus	Degree of accuracy	reason
Chopping board	na	For safety
100ml beaker	25ml	Each solution has same volume
Boiling tube	na	Hold solution with potato core
Boiling tube rack	na	To hold boiling tubes
Stirring rod	na	Push potato core out of borer
Marker pen	na	To identify each solution
Electronic balance	0.01 (2dp)	To measure the mass of potato core

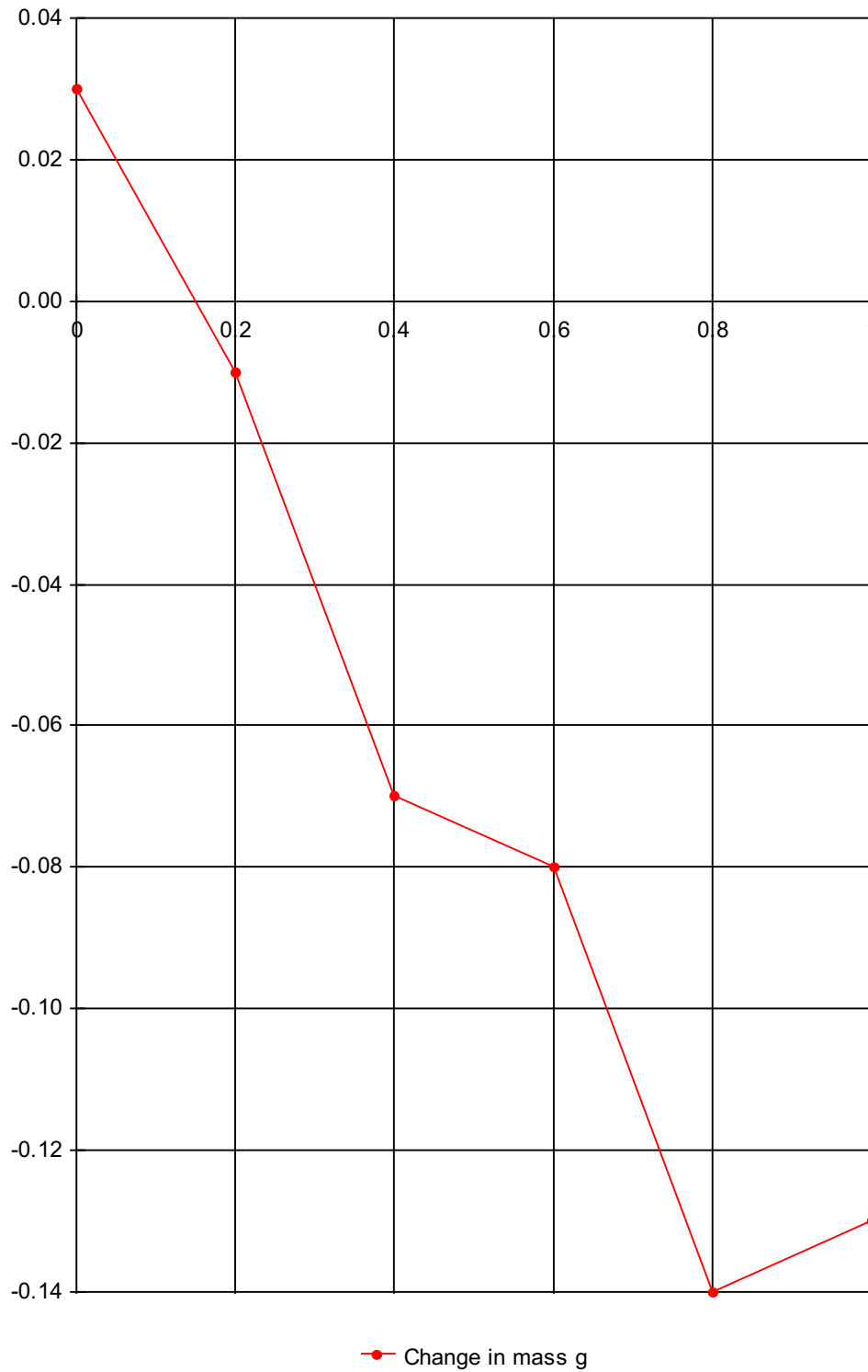
scalpel	na	To cut potato core to equal size
Distilled water	Water potential 0	So don't contaminate items
Sucrose solutions	.2Moles-1moles	To get results
stopwatch	0.01s	To measure time passed
potatoes	na	Same potato so each get reliable results
forceps	na	Pick up potato llllllllllllllllllllcorejjjjjjj
Cork borer	5 bore	To get equal diameters of potato

I will make my potato sample by using a borer each will be a 1 cm long to get accurate results using the scalpel on the chopping board, then place each in a boiler tube with 25ml of sucrose solution and I will record the mass of the potato using an electronic balance to improve accuracy we use it to 2dp to give accurate results before and after the 25 minute time period, and also record the change in mass.

Molarity	Initial mass	Final mass	Change in mass g		
0	1.52	1.55	0.03		
0.2	1.57	1.56	-0.01		
0.4	1.54	1.47	-0.07		
0.6	1.49	1.41	-0.08		
0.8	1.51	1.37	-0.14		
1	1.48	1.35	-0.13		

From the table we can see that the molarity of the potato is between 0M and 0.2M

### osmosis in a potato



At 0M the potato gained mass, at .2M the potato loses a slight amount of mass, .4M more mass is lost at .6M the rate at which mass is lost decreases then changes to the same rate at .8M which it was between .2 and .4 then at

1M the potato loses mass but loses less than .8 I believe .6 and 1 could be anomalies. Mass is gained at 0M because the inside of the potato has a lower water potential than outside so water moves in to reach equilibrium the point where molecules are equal on both sides of the cell whereas at higher molarities there is less water potential inside the potato so water moves out of the cell to reach equilibrium. From the graph I believe the molarity of the potato is .07M because this is where there would be no change in mass so equilibrium would have been reached.

Factor	Reason	How
Length of potato	Make it more accurate	Use a ruler so all potatoes exactly the same
Volume of solution	Make it more accurate	Use cylinders with more accurate scale
repeats	Make it more reliable	Do another test to get average for results
time	Make it more accurate	To let osmosis completely finish
bung	Make it more accurate	To prevent evaporation
temperature	Make it more accurate and reliable	Make sure all are same
Electronic balance	Make it more accurate	Use to 3dp
Wet potatoes	Make it more accurate	Dry them first so excess water doesn't affect true mass
Number of solutions	More reliable	Higher number to get larger range of results to help spot inaccuracies