

Science Course Work

Effects Of Salt Water On Plant Cells

Plan

I plan to investigate the effect of a salt –water concentration will have on a plant cell. I am going to use potatoes to test if it has any effect by investigating if their size changes after being in the concentration for a period of time. The amount of salt in the concentration is one variable that could affect the experiment but there are others that I must keep the same to ensure accurate results. I must try to keep the temperature as level as possible as a higher temperature will speed up the reaction. I am going to perform each experiment twice and then find an average change. This is to make the experiments results more reliable. The process I am investigating is called osmosis. The definition of osmosis is the diffusion of water through a semi-permeable membrane from a high water concentration to another.

Prediction

I predict that if there is a low concentration of salt in the water there will be more diffusion and the cells will get bigger. There will be more diffusion because the salt will use up some of the water on one side of the membrane and the water levels become unequal. This causes the water molecules to change from one side to the other. If there is little salt in the water the chip will get bigger because it will draw in more water and will become swollen. When like this the cell is called turgid. The opposite happens when there is a high concentration of salt in the water. The cell is called flaccid when this happens.

Equipment

A number of different pieces of equipment will be needed to carryout this experiment.

1. Potatoes will be needed to use for testing if the size changes.
2. Scalpel will be needed to cut the potato to the right length
3. Bore will be needed to cut chips from the potato
4. Vernier Callipers will be needed to measure the length of the potato chip with more accuracy than a ruler.
5. 10 teat tubes will be needed because 5 different concentrations are going to be tested twice each.
6. Salt solutions will be needed to test the potato chips

Method

To conduct the experiment I will bore 10 separate chips from a potato and then cut them to 25mm in length using a vernier calliper to ensure accuracy. I will then add 5 different salt-water solutions ranging from 0 percent salt to 2 percent salt rising in half a percent of salt each time to the ten test tubes. I will then place the 10 potato chips into the test tubes recording their lengths first. I will then leave them for approximately three hours. After that I will remove the chips and measure them to compare with the results before.

Results

Once the experiment has been conducted I have collected the results and put the data and the data from calculations into a series of tables.

Experiment One

Percentage of Salt in Concentration	Length before the Start of Experiment (mm)	Length After Experiment (mm)
0	25	28.2
0.5	23.5	26.2
1	23.3	23.5
1.5	24.6	22
2	25	20.5

Experiment Two

Percentage of Salt in Concentration	Length before the Start of Experiment (mm)	Length After Experiment (mm)
0	23.5	26.1
0.5	24	26.6
1	24	24
1.5	24.5	22.5
2	25.2	22.5

Difference in Experiment One

Percentage of Salt in Concentration	Calculations	Change in Length
0	28.2-25	3.2
0.5	26.2-23.5	2.7
1	23.5-23.3	0.2
1.5	22-24.6	-2.6
2	20.5-25	-4.5

Difference in Experiment Two

Percentage of Salt in Concentration	Calculations	Change in Length
0	26.1-23.5	2.4
0.5	26.6-24	2.6
1	24-24	0
1.5	22.5-24.5	-2
2	22.5-25.2	-2.7

Percentage Change for Experiment One

Percentage of Salt in Concentration	Calculations	Percentage Change (%)
0	3.2÷25	12.8
0.5	2.7÷23.5	11.5
1	0.2÷23.3	0.86
1.5	-2.6÷24.6	-10.6
2	-4.5÷25	-18

Percentage Change for Experiment Two

Percentage of Salt in Concentration	Calculations	Percentage Change (%)
0	$2.4 \div 23.5$	10.2
0.5	$2.6 \div 24$	10.8
1	$0 \div 24$	0
1.5	$-2 \div 24.5$	-8.2
2	$-2.7 \div 25.2$	-10.7

Average Percentage Change for Both Experiments

Percentage of Salt in Concentration	Calculations	Average Percentage Change (%)
0	$12.8 + 10.2 \div 2$	11.5
0.5	$11.5 + 10.8 \div 2$	11.2
1	$0.86 + 0 \div 2$	0.4
1.5	$-10.6 + -8.2 \div 2$	-9.4
2	$-18 + -10.7 \div 2$	-14.35

Analysis

The data in the above tables proves my prediction. It shows that the less concentration of salt the more the plant cell enlarges. This is because the high water concentration is causes some of the molecules to pass through the membrane into the plant cell in an attempt to even out the levels of water. This then causes the cell to swell. The opposite happens if there is a low concentration of water and this causes the cell to shrink.

Evaluation

The results that I have collected are reliable because I conducted the experiment twice in order to find an average but the results collected could have been much fairer. They could have been better if I had conducted each different experiment a number of times that way I would have received a much fairer average that could have meant that extreme results would have had less of an effect. I could have also had a wider range of salt concentrations rather than just the five I tested. The time the experiment was left for may also have had an effect on the results. The longer the time would give longer time for the diffusion to take place.