Biology plasmolysis coursework essay

Intro I am going to do an investigation into what concentration of sucrose solution would cause “ Incipient Plasmolysis”. Theory Plasmolysis is the result of a (in particular) plant cell which has lost vast amounts of water. When this happens, turgor pressure within the cell has decreased to the point where the cytoplasm of the cell membrane peels away from the cell wall. When this begins to happen it is called Incipient Plasmolysis and when the cytoplasm is almost completely gone it is call “ full/complete” Plasmolysis. Plasmolysis is only possible if the cell is placed in a hypertonic solution, which is a solution where the water external to the cell has more solutes than within the plant cell and because of that the water potential outside the cell would be lower than inside the cell.

This would cause water (turgor pressure) to be lost by Osmosis. Osmosis is the net movement of water from high pressure to low pressure across a partially permiable membrane and it is that reason that it requires no energy for the movement. Osmosis eventually stops/slows down when water pressure has become balanced out between the “ movements”. Planning & Implementing In this study I will use different solutions of sugar mixed in water (Sucrose solution) and I will be using sugar because it is known to be hypertonic. I will use red onion cells because the cell sap is coloured making the process of incipient plasmolysis easier to see. By that I mean it will be easier to see the cell membrane peeling away from the cell wall.

If this is correct it will change the water from being hypotonic to being hypertonic in high enough sucrose concentrations. Preliminary Results Before I started this experiment I did a preliminary test, to test whether certain methods of conducting the experiment would work. This was

important because it allowed myself to not only prepare but also detect any early onset problems that could occur. For the initial experiments I did a single test for each concentration of sucrose and as you can see below the results seem to be consistant with the theory.

I used the information I obtained in the preliminary findings to rectify some things in methods, such as for example; the amount time for each experiment, list of concentrations etc. The Method that was used to acquire the preliminary results seems to work, and I will use it to conduct the experiment with it. Also it is relatively easy to setup and analyse the results and we do have the equipment for it to be a usable method of conducting the experiment with. Equipment The equipment list is as follows: Light Microscope Glass Slide/s Timer Scalpel Cutting Tile 10ml Measuring CylinderRed Onion Pieces Sucrose Solution Water Pipette Cover Slip/s Method Gather all the equipment Setup microscope, cut out onion pieces & peel off the required amounts of skin.

Place the “ Onion skin” on the glass slide. Prepare concentration of sucrose using the measuring cylinder. Mix in the amount of water & sucrose needed. Using the pipette to extract the solution from the measuring cylinder the mixture of sucrose. Place a drop of the liquid on the onion skin, start the timer & slowly close the cover slip using the scalpel.

Wait the amount of time allocated (10mins) & then stop the Timer. Place the slide under the microscope, observe how many cells are plasmolysed, and write down the result. Repeat the process again if necessary, either using a different or same concentration of sucrose. Procedure & Safety It is

important to do the same procedure throughout the practical, this would help reduce the likelihood of producing erroneous results. For example, it could produce results that are extremely different than to the other results taken, also making sure the method is the same throughout will also help save time as well.

As a side note, the reason I will use the scalpel instead of my fingers to lower the glass slide is mainly because it would be more accurate in how it’s laid down. This will help reduce the amount of air bubbles trapped, making it easier to see the cells under a microscope. Also during the experiment I have to make sure that I don’t mix both liquids. For example, pouring water into the cylinder that contain-s/ed sucrose. In the experiment I cannot write down the result as a “ cell count”, as all red onion skin cells are different (e. g.

size, arrangement.). Using the equation above, I will record this as a percentage. If a result doesn’t seem to be consistant with the rest by being either too high or too low then I will repeat the test on that concentration to get a more accurate result. I am going to analyse my results by observing how many cells have had their protoplasm’s peeled away from the cell wall.

For acquiring the percentage of that I will use this equation: For acquiring the percentage of cells plasmolysed I will use this equation: Total No. of plasmolysed cells (e. g. 39) divided by the Total No. of cells (e.

g. 56). Then multiply this number by a 100 (e. g. 39 divided by 56 multiplied by a 100 = 69.

64%). This would be the percentage of cells plasmolysed. Prediction The prediction is, I believe that the highest concentration of sucrose would cause the most cells to be plasmolysed and the lower concentration would obviously produce the least amount of cells being plasmolysed. This prediction is in line with the theory of plasmolysis.

Analysis Obtaining: This is my table of results, which also shows the amount of water (H2O) & sucrose used to make the different concentrations of sucrose. As you can see I did 3 different sets of results for each concentration, because mainly to produce a more accurate result from the average. Analysing: The plots on the graph are the average result on each concentration of sucrose. Well analysing the graph, it shows that the concentration of sucrose that would Incipient Plasmolysis would be approximately 61. 66% in Red Onion cells. To show this I have drawn a line of best fit, and marked off from 50% plasmolysis towards the line of best fit, and down to the concentration of sucrose solution that would cause incipient plasmolysis.

Reading through the results there is a trend that is going on. It concurs with the prediction I made, which is; as the concentration of sucrose solution increases so do the amount (%) of cells plasmolysed. All of the results I obtained follow this pattern, especially the average of cells plasmolysed. In each increase of sucrose solution the amount of cells plasmolysed increase. This relates to my scientific work as I had to prove that I could conduct an experiment that would cause Incipient plasmolysis. Since the results do show that Incipient Plasmolysis has been reached and I have a method that “ works” the experiment has been a success in that regard as well.

Overall it does prove my prediction, on this experiment. Evaluation: The method I used to conduct the experiment was suitable for it. It did prove through the results that Incipient plasmolysis within the red onion cells had occurred, it also allowed myself effectively to record the results and was written down simply in numbered form to make it easy to follow. The results I had received were fairly consistant throughout the experiment, there were some that were slightly higher or lower than the mean in a concentration group but despite that they still followed the result pattern.

The averages of each concentration group were consistant with the pattern of the experiment. To maintain that the majority of the results I got were accurate, I made sure that I carefully followed the method and re-experiment if the result received were too inaccurate/inconsistant. In the experiment there were a few anomalous results though I did redo these, but the reason they could have been anomalous is either because: Accidentally used the wrong concentration, the timer was set for too long or too soon, cells weren’t counted properly, or any other mistake that was made in trying to follow the method. If I could improve on my investigation, firstly I would try and get a better microscope, as the microscope I used would blur or dim the image when zoomed in at a certain amount.

The magnification I used had decent image quality though it was a bit difficult counting the cells, it is possible that there could have been mistakes in the counting of plasmolysed cells because of that. I tried some other configurations on the microscope; I tried Zooming further but this caused the image quality to degrade by becoming blurred and/or darkened and , this made it very difficult to see particular details such as for example, the cell

membrane. Zooming out more helped correct the blurring & darkness issues but it became much more difficult to count the cells and also see important cell details. Increased magnification without the image degrading or darkening too much would have helped make the results much more accurate, as the details of the cells would be easier to see and there would be fewer cells to count. The microscope is a very important piece of equipment in this experiment as it is what is used to observe and collect results with.

Another factor that could have had an effect on the reliability of the experiment are air bubbles trapped underneath the cover slip. Air bubbles could have affected the experiment by preventing the concentration from reaching the red onion cells. These cells could have been prevented from being plasmolysed thus making the results slightly less reliable. To reduce the amount of air bubbles occurring underneath cover-slip’s I would slowly lower it using the scalpel. Air bubbles could be seen under the microscope generally as circular shaped and transparent, the majority of them weren’t hard to spot.

In the future I could extend on this investigation by seeing what would happen at longer times or higher concentrations of sucrose solution or other plasmolysis inducing chemicals.