

Investigating isotonic point of a potato essay sample



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Aim: Finding the isotonic point of potato cells by testing it in different concentrations of salt water.

This diagram shows the movement of water through hypotonic, hypertonic and isotonic. But what are the arrangements of molecule for them? This is shown on this simple diagram.

Hypothesis: I believe the isotonic point will be around 0.25 mol. This is because I feel that the 0.1 solution will be too hypotonic. Therefore I believe at around 0.25 there will be little or no change in the mass of the potato because I'm predicting that this will be the isotonic point.

Fair Test:

- Three potato slices were used for each solution so that more accurate results could have been obtained.
- All potatoes slices were of the same mass, this was done by using the same cork borer therefore the diameter was always constant so the volume would remain the same
- All potato slices were taken from one potato so the cells will be similar.
- The temperature will remain the same for all beakers.

Safe Test:

- We will be using scalpel and cork borer therefore we made sure we handled them with care

- We made sure we used the beakers appropriately, so that they did not break and cause any damage.

Variables: Independent- Concentration of the solution

Dependent - Change of the mass of the potato chip

Controlled:-

- Mass and volume of the potato chip
- The size of the potato slice
- Volume of the salt solution
- Length of potato

Apparatus:

- 1) A raw potato
- 2) Cork borers
- 3) Scalpel
- 4) Weighing scale
- 5) Salt solution of concentration 0. 1M, 0. 2M, 0. 3M, 0. 4M and 0. 5M.
- 6) Tissue paper
- 7) Cello Tape

8) 5 Beakers

Method:

- 1) Collect a fresh raw potato and remove the skin of it.
- 2) Using the cork borers and cut out 15 chips of roughly the same size, length and thickness. Use the scalpel to cut the chips into equal length. So that it is a fair test.
- 3) Weigh each chip using the weighing scale and record the reading, then take the average of the results.
- 4) Arrange the chips into five groups of three and set aside for now.
- 5) Collect 5 beakers and in each beaker put 80cm³ of salt solution with the different concentration listed in the apparatus above. I. e. fill one beaker with 0. 1M and the second beaker with 0. 2M and so on until u have filled the last beaker with 0. 5M. Then label each beaker.
- 6) Place one group of three chips into each beaker and leave them for a day. To avoid evaporation cover them with tissue paper.
- 7) Next day take out the chips carefully and dry them using tissue paper, this is to make sure that there will be no effect in the mass of slices.
- 8) Then weigh each chip and record the results and take the average of the results.

Physical Observation (Before):

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- * Potatoes were light yellow in colour.
- * The thickness of the chip was very thin and narrow.
- * The potato chips were quite soft.
- * Extremely turgid

Physical Observation (After):

- * The colour remained the same, therefore still yellow in colour.
- * The thickness was roughly the same.
- * Not as turgid as before.
- * The potato chips were softer than before.

Analysis & Conclusion: Looking at our graph we can see that nearly all the points fit into the line of best fit. But there was just one point that was slightly off. Therefore that was taken to be the anomaly, reason for the anomaly will be explained in the evaluation. Finding the isotonic point you must get the value of the x-intersect of the line. Therefore the isotonic point was 0.26 mol. This isotonic point is when there is no osmosis occurring within the cell. Therefore this means that on this point no water is being gained or lost. After finding the isotonic point we can see that my hypothesis has been proved correct, as the isotonic point was found near to the estimated 0.25 mol. After that we see that the trend continues as the change in mass decreases as the concentration increases. Therefore we can say by looking at the graph that

as the concentration increases the change will be negative meaning that the mass also decreases.

Evaluation: In this experiment not many huge errors had occurred as the results obtained were almost perfect. But as seen on the graph there was one small anomaly that occurred, this could be due to some minute errors made during the experiment. One error can be that due to time constraints as the experiment had taken place during classes, the procedure may have been rushed this could have caused slight change in value to the data collected. E. G the potato chips may not have been of all equal size when cutting them in a hurry, and reading the weights of each chip may have been hurried so that the exact value may have been wrong. Another error found was that there may have been much interference to the weighing scale due to the surrounding therefore this would not allow the scale to rest at a fix point. Another error found was that when taking the chips out of the beaker and drying them with the tissue, due to time constraints all the chips may not have been dried properly.

Therefore not the same proportionate of water must have been removed from each chip. What may have happened is that I could have moved a lot of water from one chip but a lot less from the other. Then when taking the mass of the chip it would likely to be wrong as the weight may be more in some and less in other. Therefore this affects the initial mass of the chip. I feel that these may have been the small errors that had caused the anomaly. Also I feel that to improve the results I feel we should have taken a wider range of concentration this would have bettered our accuracy in the results.

If I were to do this experiment again I would make sure that I have enough
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time to carry out the experiment so the procedure will not be rushed. Next time I will make sure to use a ruler while cutting the chips. So that it will be a fair test. I will also try to reduce as much of the surrounding activity that affects the weighing scale e. g. by turning off the fans. And lastly I shall dry all the potatoes properly. I feel that by following this it will lead to obtaining much better results.