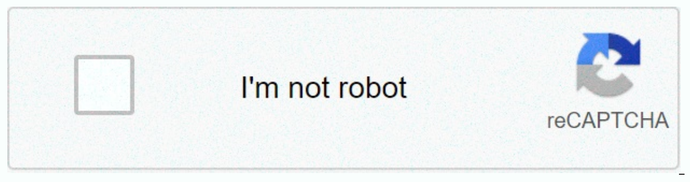


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# Osmosis and diffusion lab answer key

Lab 1 Osmosis & Diffusion Osmosis Lab Introduction: Cells contain ingenith energy. This causes the molecules in the cell to move and collide with each other. Diffusion is one of the results of this molecular movement. Diffusion is a random movement of molecules from the higher concentration area to areas with lower concentrations. Osmosis is a special diffusion in which water moves selectively in a permeable membrane (a membrane that allows only certain molecules to decompose). Diffusion or osmosis occurs until a dynamic balance is achieved. This is the point where concentrations in both regions are equal and there is no net movement from one region to another. If two solutions have the same soluble content, the solution is said to be isotonic. If the solutions differ in concentration, the area with a higher soluble concentration is hypertonic and the area with a lower soluble content is hypotonic. Because the hypotonic solution contains a higher solubility level, it has high soluble potential and low water potential. This is because the water potential and solubility potential are inversely comparative. A hypotonic solution would have high water potential and low solubility potential. An isotonic solution would have equal solubility and water potential. Water potential (y) consists of two main things: physical pressure component, pressure potential (yp) and soluble effects, soluble potential (ys). The formula that displays this relationship is y = yp + ys. Water always moves from areas with high water potential to areas with low water potential. The power of water in the cell against the plasma membrane causes the cell to be pressured by turgor, which helps maintain the shape of the cell. When the water moves away from the cell, the cell loses the pressure and water potential of the turgor. The turgorical pressure of a plant cell is usually achieved with a hypotonic solution. The loss of water and turgor pressure while the cell is in a hypertonic solution is called plasmolity. Hypothesis: During these experiments, it is shown that difusion and osmosis occur between the different concentrations of the solution until dynamic balance is achieved, which affects the cell by causing plasmolysis or increased turgor pressure during the process. Materials: Lab 1A – Start Lab 1A by first collecting the desired equipment. The necessary materials are dialysis tube, idicalium idide solution (IKI), 15% glucose/ 1% starch solution, glucose Testape or Lugol solution, distilled water and a 250 ml mixer. For Lab 1B – Lab 1B, you need to collect six pre-seasoned dialysis tube strips, distilled water; 0,2 M, 0,4 M, 0,6 M, 0.8M and 1,0 M sucrose solution; six 250 ml beaks or cups and a scale. Lab 1C – Lab 1C these items are needed: potato, knife, potato kernel borers, six different solutions and scale. During 1D – Lab 1D, only paper, pencil and calculator are required for calculations. Lab 1E – n Lab 1E these objects are needed: microscopic slide, cover slide, onion cells, light microscope and 15% NaCl solution. Procedures: Lab 1A – After collecting the materials, pour the glucose/starch solution into the dialysis tube and close the bag. Test the solution for the presence of glucose. Let's test the distilled water and the IKI mixer for glucose. Put the dialysis bag in a bag and let stand for 30 minutes. When the time is up, test both the bag and the bag for the presence of glucose. Save all data in the table. Lab 1B – Get six dialysis tube strips and fill each with a solution with a different molarity. Mass in every bag. Put each bag in distilled water and let stand for half an hour. With 30 minutes remaining, remove each bag and determine its mass. Save all data to the appropriate table. Lab 1C – sing potato kernel borer, get 24 cylindrical slices of potato, four from each cup. Specify the mass of the four cylinders. Immerse four cylinders in each of the six beaks or cups. Let him stand overnight. When time is up, remove the cores from the sucrose solution and mass them. Save all data to the appropriate table. Lab 1D – Use collected paper, pen and calculator to determine the soluble possibilities of solutions and answer the questions asked to better understand this part of the lab. Lab 1E – Use the materials to prepare the wet fastening slide of the onion splash. Draw what you see in the onion cell under the microscope. Add multiple drops of NaCl to the slide. Now draw the appearance of the cell. Information: Lab 1A - Table 1.1 Contents Original Color Final Color Final appearance of glucose bag 15% Glucose / 1% Starch solution clear Dark blue + + Beaker H2O + IKI Orange to Brown Orange Brown _ + Lab 1A Questions 1) Glucose is removed from the bag and iodine-potassium iodide is getting into the bag. The change in the color of the contents of the bag and the presence of glucose in the bag prove this. 2) In the results, IKI moved to the bag, causing the bag to change color. The IKI moved into the bag so that the concentrations outside the bag were equal to those inside the bag. The glucose solution moved out of the bag, which made glucose. Glucose moved to ensure an equal soluble concentration inside and out of the bag. (3) If the initial and final percentage concentrations of glucose and IKI in the bag and bag and in the cinching system were given, they would show the differences and indicate the movement of these substances in order to achieve a dynamic equilibvre. 4) Based on my findings, the smallest substance was IKI then glucose molecules, water molecules, membrane pores and then starch molecules are the largest. (5) If the experiment were to begin with glucose and IKI inside the bag and starch in the bag, glucose and IKI would move out of the bag to achieve equal concentrations, but starch would not be able to pass into the bag because its molecules are too large through the permeable membrane. Lab 1B — Table 1.2 Dialysis Bag Results Contents in dialysis bag Initial mass Mass difference Mass difference Mass change in mass a) distilled water 26,5 g 26,6 g 0,1 g 0.4% b)0.2M 28.1g 29.3g 1.2g 4.3% c)0.4M 27.3g 30.1g 2.1g 2.1g 8g 10.3% d)0.6M 28.3g 32.3g 4.0g 14.1% e)0.8M 25.9g 30.9 g 7g 4.8g 18.5% f)1.0M 26.7g 32.9g 6.2g 23.2% Table 1.3 Dialysis bag results : CategoryData group 1 Group 4 Total distilled water 0.4% 1.16% 0.79% 1.54% 3.89% 1.0% 0.2 M 4.3% 5.99% 6.44% 5.9 4 % 22,67 % 5,67 % 0,4 M 10,3 % 10,49 % 10,33 % 8,45 % 39,57 % 9,89 % 0,6M 14,1 % 14,1 % 14,1 % 86 % 16,04 % 15,1 % 60,1 % 15,03 % 0.8M 18,5 % 19,80 % 17,97 % 20,0 % 76,27 % 19,07 % 1.07% 1.07% 0M 23.2% 18.77% 23.55% 21.9% 87.42% 21.86% Lab 1B Questions: 1) The molarity of bag sucrose determines the amount of water , which either moves into the bag or from the bag that changes the mass. For example, when a solution of 0.2 M was in the bag, water entered the bag to make the concentrations inside and outside the bag more equal. Thus, the mass increased by 1.2 g 2) If each bag were placed in a solution of 0.4 M instead of distilled water, the masses of the bags would have changed in different ways. The mass of bags filled with distilled water and 0.2 million sucrose would have gone down because water would have left the bag. The mass of the 0.4 M bag would have remained the same, as the concentrations are now equal. The masses of 0,6, 0,8 and 1,0M bags would have increased because water would have been transferred to the bag to even out concentrations. (3) In the data collected, the percentage change in mass was calculated to show how much the mass increased or decreased. Mass difference is not enough because the initial masses of dialysis bags were not all the same. 4) If the original mass of the dialysis bag was 20 g and its final mass was 18 g, the percentage change in mass is 20%. (5) The sucrose solution of distilled water in the bag would have been hypotonic. Laboratory 1C Table 1.4 Final mass difference in the initial mass of beaker % change in initial mass temperature. Distilled water 1,5 g 2,0 g 0,5 g 33 % 20 °C 20°C 0,2M 1,5 g 1,6 g 0,1 g 7% 21°C 20°C 0.4M 1.5g 1.6g 0.1g 7% 20°C 20°C 0.6M 1.. 5g 1.5g 0.0g 0% 21°C 20°C 0.8M 1.5g 1.2g -0.3g -20% 2 1°C 2 0°C 1.0M 1.5g 1.4g -0.1g -7% 20°C 20°C Lab 1C Table 1.5 Class results Potato mass change in percentage Group 1 Group 2 Group 3 Group 4 Total distilled water 33 % 35,29 % 25 % 31,25 % 124,54 % 31,14 % 0,2 M 7 % 29,41 % 25 % 13,1 33 % 74,74 % 18,69 % 0,4 M 7 % 11,11 % -12,5 % -12,5 % -6,89 % -1,7 % 0,7 % 6M 0% -15.5% 79% -18.75% -20% -54.54% -13.64% 0.8M -20% -15.79% -18.75% -25% -79.54% -19.54% 89% 1.0M -7% 0% -18.75% -20% -45.75% -11.44% Lab 1 D Questions : 1) The water potential of the potato core after drying out is reduced due to evaporation of the water inside the potato and thus reducing water potential. (2) The soluble concentration of the plant cell is hypertonic because the soluble content is higher than the water content. Therefore, water breaks down into the cell to achieve dynamic balance. 3) The pressure potential of the system is 0. 4) In a dialysis bag, the water potential is higher. (5) Water decomposes from the bag because the water potential is greater in the bag and the water is transferred from areas with higher water potential to areas with lower water potential. (6) The zucchini cores placed in the sucrose solution at 27 °C resulted in the following percentage changes after 24 hours: percentage change of mass Sucrose molartyn 20% Distilled water 10% 0. 2M -3% 0.4M -17% 0.6M -25% 0.8M -30% 1.0M 8)ys=-iCRT ys=-(1)(0.35)(0.0831)))(295) ys=-8.580075 y=0+0 y=0+(-8,580075) y=- 8.580075 9) Adding soluble matter to soluble solution increases solubility potential; because the soluble content increases. (10) Distilled water would have a higher water molecule content and also a higher water potential. The size of red blood cells would increase because water moves from a higher area of water potential (distilled water) to an area of lower water potential (red blood cells) until a dynamic balance is achieved. Lab 1E Questions 1) After preparing the wet fastening slide, I have noticed onion cells under magnification and they appear to be small, empty boxes pushed tightly together. 2) By adding two or three drops of NaCl, the cells should have shrunk, but there were no changes. 3) The cells retained the same shape. 4) Plasmolysis is the loss of water and turgor pressure in the cell. (5) Onion cells should have been plasmolysed because the surrounding area had lower water potential and water should have moved away from the cells. 6) Lawns that live on the sides of salted roads on the winter end die because water flows from the cells as it migrates from grass cells to the hypertonic NaCl area circulating it. Lab 1D Plasmolysis of Cells – Drawings of onion cells 100X Onion cells in distilled water *Image of onion cells in saline not available. Error analysis: Lab 1A – The data collected in this laboratory test do not appear to contain inconsistencies, so no human error is detected. Lab 1B – In this laboratory test in accordance with the data collected by other laboratory groups, so no human error was believed to have occurred. Lab 1C – There was some difference in this experiment between the percentage change in the mass of the potato seed of the 1.0 M solution. Data is consistently reduced up to a 1.0M solution, so human error is thought to be a factor in this. Some of the mistakes that could have occurred are miscalculations of the initial and final masses or problems with the molarity of the solution itself. Lab 1D – In this part of the lab, only calculations were made, so there were probably no human errors during this time. Lab 1E – In Part 1E, after adding NaCl solution to onion cells, the cell size should have decreased, but there was no reaction. This may have happened partly because the onion itself had already dried and dried, or when the onion was examined through the microscope, its heat may have caused the loose water in the cells. Conclusion: Based on the results and data collected during the laboratory 1A experiment, it can be concluded that glucose and iodine potassium iodide can pass selectively through the permeable membrane and pass if the concentrations on each side are not equal. In laboratory 1B, it can be concluded that sucrose does not selectively penetrate the permeable membrane, but water molecules move over the membrane to the lower water potential area for dynamic balance. Lab 1C provided information to help conclude that potatoes contain sucrose molecules. This can be said because the cores were taken into the water when they rose into distilled water. This means they had lower water potential and greater solubility potential than distilled water. According to the data collected, the solubility potential is approximately 0.6 M sucrose solution. During lab 1D calculations, questions were made and questions answered to better understand water and soluble potential. If the onion cell test in part 1E of the laboratory had produced the correct results, conclusions could have been drawn. It has been thought that onion cells would have been plasmolysed because NaCl has added to the cells. This shows how onion cells had great water potential and moved beyond the cell, which had lower water potential. Then, after adding water back to the cells, the water would have moved back into the cells by increasing the pressure of the turgor. Water potential played a huge role in every part of the lab. Because water moves areas with high water potential, there were reactions in each section that led to different conclusions. Water potential was a key factor in every part of the experiment. In plant and animal cells, the loss or benefit of water can have different effect. In a plant cell, it is ideal to get an isotonic If the solution is hypertonic, the cell shrinks due to a lack of water intake. Conversely, if the solution is hypotonic, the cell can take too much water and the cell lyses and decomposes. For a plant cell, the ideal solution is a hypotonic solution, since the cell takes more turgor pressure into the water, which keeps the cells tightly packed and holds its shape. If the solution is hypertonic, the cell plasmolysed and died of lack of water. With an isotonic solution, the plant cell does not have enough turgor pressure to hold its shape. Back