Biology osmosis lab report assignment

The results illustrated that increased incineration gradient increases the rate of diffusion of water in the tubes. We concluded that as concentration of the solution increases, the diffusion rate of water out of the tubes increases proportionally. Introduction The cell membrane serves many purposes, such as regulating the transport of material into and out of the cell. However, not all macromolecules enter the cell through the same way. The cell is comprised of mostly cytoplasm and floats in an aqueous, watery medium.

The cell’s membrane functions as a hydrophobic phosphoric bilateral barrier between both aqueous regions. The heads of the hospitals are hydrophilic, and thus face the aqueous regions to the inside and outside of the cell, while the hydrophobic tails face inside. Because the inner region of the cell membrane is hydrophobic, macromolecules that are also hydrophobic pass through it the most easily (Sad 107). The cell membrane is selectively permeable, meaning that only certain substances are allowed to pass through. There are two types of transport across the membrane: passive and active transport.

Passive transport does not require energy, and active transport requires outside energy, often in the form of TAP, to move substances across he membrane (Sad 114). For this lab, the focus was on passive transport, specifically the passive process of osmosis. Osmosis is a form of diffusion. Diffusion refers to the random movement of solute particles across the cell membrane. The rate of diffusion is influenced by the temperature, molecular weight of the substance, and the concentration gradient (Affair 33). Osmosis refers to the diffusion of water molecules across the membrane.

Because water molecules are polar, they require the aid of special membrane channels called aspirins (Sad 118). In this lab, I tested the effect of the concentration radiant on the diffusion rate. I hypothesized that the greater the difference in concentrations, the faster the rate of diffusion. This hypothesis regarding the effect of the concentration gradient was based on previous knowledge regarding the behavior of particles within a system in pursuit of equilibrium. Water molecules naturally diffuse from an area of high concentration to an area of low concentration until equal concentrations are achieved.

At this point, the rates of diffusion across the membrane are equal so as to maintain equilibrium. The theory of the effect of the concentration gradient on osmosis is rooted in he law of thermodynamics, which states that the movement of particles is ultimately influenced by the chemical potential. The chemical potential gradient that affects the flux of solutes is a product of the concentration gradient as well as other driving forces, such as the pressure gradient and temperature (Wigwams 2). The solute concentrations across a cell membrane/boundary determine the direction of the net flow of water in osmosis.

If a solution is hypotonic, this means that it has a lower solute concentration than its surroundings. In order to achieve equilibrium through osmosis, water needs to leave the hypotonic ell or organism in order to dilute the surroundings, which have a much higher ratio of solute to water. Hypersonic means the exact opposite, in that the cell has a higher solute concentration than its surroundings, so water is more likely to enter the cell through osmosis in order to reach equilibrium. Isotonic refers to a state of equilibrium at which there are equal solute concentrations on either side of the membrane.

The following hypothesis was made in regard to effect of the concentration gradient on the rate of diffusion: The higher the concentration gradient, the faster the rate of diffusion. Materials ; Methods There were several steps completed to prepare for the experiment. Three dialysis tubes were filled with approximately the same volume of distilled water and then were tied shut. The initial mass (in grams) of the tubes was taken using a triple beam scale. I then filled three 500 ml beakers with 400 ml of water each and dissolved different masses of solute (table sugar) in each beaker in order to make 5%, 10%, and 20% solutions.

The beakers were labeled accordingly, and then 20 g, 40 g, and 80 g (respectively) of table sugar was weighed out using a digital call and placed into the corresponding beakers. The sugar was stirred in using a stirring rod until all of the solute was completely dissolved. One dialysis tube was submerged in each beaker. Osmosis was allowed to occur for 5 minutes and then all of the tubes were removed from the water. The tubes were dried off and measured on the triple beam scale. The mass was taken and recorded for all three tubes. Hen placed the tubes back into their respective solutions. The process was repeated four times for each tube in 5 minute increments, and then the materials were disposed of. The rate of effusion of water in each solution was calculated from the difference in start and end mass divided by the amount of time the tubes were in the solution. The independent variable in the experiment was the concentration of the solution, and the dependent variable was the rate of diffusion. Results: Table

1: Time (min) 51 10 | 15 | 20 | Mass Solution 19. 48 | 19. 42 | 19. 08 | 18. 89 | 18. 9 | Mass (g) for Solution | 19. 35 | 18. 95 | 18. 49 17. 91 | 17. 60 | Mass (g) for solution | 21. 65 | 19. 95 18. 59 | 17. 55 | 17. 08 | Chart 1: The results illustrated that increased concentration gradient changes water low due to osmosis. In each trial, I found that the rate of diffusion was faster in solutions with higher concentration gradients (see Chart 1). It can be seen both in the table and chart that with each increase in solution concentration, there is a greater difference between the initial and final mass of the dialysis tubes (see Table and Chart).

The rate of diffusion for the tube in the 5%, 10%, and 20% solutions respectively were 0. 231 g/min, 0. 454 g/min, and 1. 154 g/min (see Chart 1). This is due to the solute molecules moving from an area of high concentration to an area of low concentration. Discussion The actual results of the experiment agree with the expected results of all three hypotheses. Therefore, the results suggest that there is positive relationship between the concentration gradient of the solutes and their diffusion rate. The higher the gradient, the faster the diffusion rate.

This is because the solute particles will move from an area of high concentration to an area of low concentration in order to reach equilibrium. The lab was completed with few complications, and all the results supported the initial hypothesis so there are no anomalies or exceptions to report. The only problems I encountered involved the use of the dialysis tubing. Occasionally ran into trouble filling them up with the water and tying them. Also, I intended to create tubes of equal masses, but it was difficult to transfer the water from the graduated cylinder to the bag. Instead, the DID water on the spout on the sink was used.

However, the difference in diffusion rates between the several different concentrations of solutions was easily measured by weighing the bags periodically throughout the process of osmosis. Every bag decreased in weight. The dialysis tubing presented a electively permeable membrane through which only water molecules could pass. Therefore, it made sense that the water molecules exited the bags in order to dilute the more highly concentrated sucrose-water solutions in the beaker. The change in mass of the bag each five minutes was greatest for the tube that was placed in the beaker with the highest sucrose concentration.

This behavior supported the hypothesis. It just so happened that the initial weight of each bag increased slightly in accordance with the increase in solute concentration of the solution in which it was placed. As a result, it was difficult to observe the effect of water volume on the rate of osmosis. However, different experiments suggest that bulk flow affects the osmotic rate. Just as the pressure that accompanies the bulk flow of larger volumes influences vesicular transport, it also affects the movement of solute across intravenous's blood vessels (Brace 837-838). Hypothesize that a larger volume of water in the dialysis tubing translates to a faster osmosis rate as well due to increased pressure. This phenomenon would be interesting to test in a different experiment. Osmosis plays a vital ole in our everyday life. It is the mechanism by which our red blood cells maintain equilibrium as they pass through plasma, which is rich in salts and proteins, among other solutes (Sad 115). Depending on the concentration of the solution in which the red blood cell is placed, water will enter or exit its membrane in order to reach equilibrium.

If the solution outside the cell is hypersonic, the cell may lose so much water that it shrivels. On the other hand, a hypotonic solution outside the cell will cause water to enter the cell, and if the cell takes up too much water, it may else, or burst. Understanding osmosis promotes an understanding of the reason for these behaviors of red blood cells. As a result, steps can be taken to ensure an isotonic environment to avoid losing or shrilling of cells. Indeed, understanding the theory of osmosis and the behavior of water molecules due to osmotic pressure proves incredibly useful.

In fact, osmosis offers many possible applications as a source of potential energy. Reverse osmosis is utilized as a separation technique in many engineering projects. For example, reverse osmosis, which relies on not only the incineration gradient, but also the pressure gradient and water flux, is used for purification and wastewater treatment (Boatload-Santos 101 In conclusion, based on the results of the experiment, the concentration gradient of the solute across a membrane affects the rate of diffusion.