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Lab Report 1

Title: Investigating Diffussion and Osmosis Through Nonliving Membranes

Purpose: The purpose of this experiment was to observe the event of diffusion and osmosis of water and solutes through selectively permeable membranes known as dialysis sacs. The dialysis sacs contain pores which cause it to have a selectively permeable membrane, allowing us to observe what solutes and solutions can or cannot pass through.

Materials & Methods:

1. Label four 250 ml beakers with numbers 1-4.
2. In beakers 1,3, and 4 fill them halfway (125 ml) with distilled water. In beaker 2 fill halfway (125 ml) with the 40% glucose solution.
3. Have four dialysis sacs on hand and using a small funnel fill sacs 1 and 2 with 20 ml of 40% glucose solution, sac 3 with 20 ml of 10% NaCl solution, and sac 4 with 20 ml of 40% sucrose solution.
4. Weigh the initial weight of each sac in grams and record into the data table.
5. Then place each numbered sac into each of the corresponding beakers making sure the sac is completely submerged.
6. Leave the sacs to sit in each beaker for 45 minutes then remove the sacs from the beaker, pat dry the excess solution and record the weight into the data table.
7. Label 4 test tubes as 1A, 1B, 1C, and 1D and fill with 10ml of their respective sac's content (sac 1 in testube 1A, sac 2 in testube 1B, etc.)
8. Label 4 test tubes as 2A, 2B, 2C, and 2D. Fill these with 10mL of their respective beaker's content (beaker 1 in testube 2A, beaker 2 in testube 2B, etc.)

9. Place about 5 drops of Benedict's solution in tubes 1A, 1B, 2A, 2B, 4A, and 4B.
10. Then place the testubes in boiling water to observe possible color changes.
11. Add drops of Silver Nitrate to tubes 3A and 3B and observe for possible precipitate formation.

Results:

Beaker	Contents of Sac	Initial Weight (g)	Final Weight (g)	Change in Weight (g)	Tests- Beaker Fluid	Tests- Fluid in Sac
Beaker 1 1⁄2 filled with distilled water	Sac 1, 20 ml of 40% glucose solution	7.1	8.0	0.9	Benedict's test: **positive** light brown	Benedict's test: **positive** light brown
Beaker 2 1⁄2 filled with 40% glucose solution	Sac 2, 20 ml of 40% glucose solution	6.9	6.9	0.0	Benedict's test: **positive** light brown	Benedict's test: **positive** light brown
Beaker 3 1⁄2 filled with distilled water	Sac 3, 20 ml of 10% NaCl solution	7.2	7.8	0.6	AgNO3: **positive** milky white	AgNO3: **positive** milky white
Beaker 4 1⁄2 filled with distilled water	Sac 4, 20 ml of 40% sucrose solution	7.1	8.0	0.9	Benedict's test: **negative**	Benedict's test: **positive** light brown

Conclusion:

Diffusion is the movement of molecules from a region of their higher concentration to a region of their lower concentration, while osmosis is the movement of water across a membrane. Through this experiment we were able to observe event of both concepts take place. Both concepts of diffusion and osmosis were seen to take place in our data in every instance in which the final weight of the dialysis sac became greater than the initial weight. In sacs 1, 3, and 4 there was a positive change in weight, meaning that the sac gained weight due to a substance, in this case distilled water, entering through the sac's membrane. The movement of water and its

direction of movement can be explained by osmosis as the water moves down its concentration gradient, from higher concentration to lower. In sacs 1, 3, and 4 the concentration of water in the beaker surrounding the sac was greater than inside the sac. Since osmosis is the movement of water from higher concentration to lower concentration, the water moved into the sac. Therefore in sacs 1, 3, and 4 osmosis was seen to take place. However direction of the movement of the solute, or the contents inside the dialysis sac can be explained by diffusion. Similarly to osmosis, diffusion is the movement of higher concentration to lower concentration. In our case the concentration of contents inside the membrane was greater than outside, therefore the substances inside the sac would also want to move across the membrane outside of the sac. We see this process of diffusion take place in sacs 1 and 3, but not 4. Although osmosis took place in all three of the sacs, diffusion did not and can be explained by the results of the Benedict's test and the AgNO3 test. The solution in the beaker and the sacs of 1 and 3 both tested positive therefore displaying that glucose and particles of NaCl were small enough to pass through the dialysis sac's selectively permeable membrane. However, in the solution in beaker 4 tested negative, while the solution from the sac tested positive. This explains that none of the solution inside the sac was able to move scross the membrane to the outside of the sac. This is due to the fact that sucrose is too big to pass through the selectively permeable membrane. In sac 2 and beaker 2 the contents and the concentration are equal. Since the concentration of glucose solution is equal outside and inside of the dialysis sac there is no pressure for diffusion to take place. This is because there is no area where the concentration is greater or less. In addition the initial and final weight of the sac remained the same, confirming that there was no significant movement in one certain direction.