Osmosis paper

Section: submitted: OSMOSIS Osmosis is the movement of water molecules from an area of higher concentration to an area of lower concentration through a selectively permeable membrane (Miller and Levine, 186-187). But, the basic question is, how would this rate of movement or diffusion of water molecules through a selectively permeable membrane be affected by the differences in concentrations of sucrose? Most likely, if the concentration of sucrose in a solution is low, then the rate of diffusion of water molecules through a selectively permeable membrane would also be low. On the other hand, if the concentration of sucrose in a solution is high, then the rate of diffusion of water molecules through a selectively permeable membrane would also be high. These concepts were tested in an experiment conducted, which is illustrated below.

Materials and Methods:

In this experiment sucrose solutions of varied concentrations were used such as:

. 25M, . 5M, . 75M, and a control set-up with deionized water. These were placed in individual dialysis tubing which were semi-permeable bags, and labeled accordingly. With a string the individual dialysis tubing considered as baggies with corresponding content were tied to seal off, and keep it from spilling out. Next, the individually prepared bags were carefully wiped off excess external surface water with a paper towel. Using an electronic balance, the initial weight of individual bags with contents were taken and recorded. Subsequently, four beakers were prepared with 150ml of deionized water. Then, the individual bags were immersed in the prepared beakers with 150ml of deionized water, respectively for thirty five (35) minutes. After the lapse of thirty five (35) minutes, one by one the bags were taken out

carefully, wiped from external water and weighed. The results were also noted. After the experimental data were gathered, the materials were cleansed, and returned to the stock room, while the bags were properly disposed. As well, the working laboratory table was wiped dry and clean.

Results

The initial weight of the bag with . 25M solution was 17. 31g. After the experiment, its weight was 18. 23g. The bag with. 5M solution’s beginning weight was 9. 07g, after the experiment, the weight was 10. 75g. The bag with . 75M solution’s beginning weight was 3. 7g, after the experiment, the weight was 5. 09g. Finally, the initial weight of the control bag was 9. 95g, after the experiment, the weight was 10. 9g. These findings are reflected on the table below:

Table 1: Raw Data of the Group 1

Sucrose solution

Before(g) Theoretical Value

After (g) Experimental Value

E2-E1

(E1+E2)/2

% difference

. 25M

17. 31

18. 23

0. 92

17. 77

5. 18

. 5M

9. 07

10. 75

1. 68

9. 91

16. 95

. 75M

3. 7

5. 09

1. 39

4. 395

31. 63

Control (0. 00M Di-H2O)

9. 95

10. 9

0. 95

10. 425

9. 11

Discussion

Table 1 shows that There were 5. 18 % difference in . 25M sucrose solution, 16. 95% difference in . 5M sucrose solution, 31. 63% difference in . 75M sucrose solution, and lastly there were 9. 11 % difference in Control (0. 00M Di-H2O). The differences reveal the amount of water molecules that moved or diffused through the semi-permeable membrane into the solution. This means that water molecules moved from an area of greater concentration to an area of lesser concentration.

Figure 1: Distribution of Sucrose solution in % difference

Figure 1 shows that . 75M sucrose solution has the highest percentage (%) difference, which yields a value of 31. 63. This was followed by . 5M sucrose solution, then Control (0. 00M Di-H2O) with a percentage (%) difference value of 9. 11 and lastly the . 25m sucrose solution with 5. 18 % difference value.

The data from group two and group three were incomplete, so, it was not included in the analyses. Also, in the computation for percent difference, the formula: percent difference = absolute difference/average x 100% or percent difference = | E2 – E1 |/ (E1 + E2) / 2 x 100 % was used because the purpose was to find the percent difference between two measured values.

CONCLUSION

Where the concentration of sucrose in the solution was low, the rate of diffusion of water molecules through the semi-permeable membrane towards the solution was also low. On the other hand, when the concentration of sucrose in the solution was high, the rate of diffusion of water molecules through the semi-permeable membrane towards the solution was also high. In other words, the rate of movement or diffusion of water molecules through a semi-permeable membrane was directly proportional to concentrations of sucrose in solution.

Reference

Miller, Kenneth R. and Levine, Joseph. Biology. NJ: Prentice Hall. 2003.