NAME(S)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_DATE\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

SB1: Students will analyze the nature of the relationships between structures and functions in living cells.

1. Explain the roles of cell organelles for both prokaryotic and eukaryotic cells, including the cell membrane, in maintaining homeostasis and cell reproduction.
2. Explain the impact of water on life processes (ie. Osmosis and diffusion).

Osmosis and Diffusion Labs

**Materials and Procedures:**

1. Obtain the following materials:
   1. 4 plastic cups
   2. 1 graduated cylinder
   3. 1 hydrophilic water sphere
   4. 2 gummy bears (preferably the same color)
   5. 4 pieces of masking tape (only large enough to label the trial and put someones name)
   6. 1 baggy
2. Set-up for first trial
   1. Label one cup “hydrophilic sphere”, put one persons name and your period.
   2. Place 150mL of water into a cup.
   3. Weigh your sphere and record the data in the table below.
   4. Place the sphere into the cup.
   5. Wait 24 hours.
3. Set-up for second trial
   1. Label one cup “Gummy Bear #1, put one persons name and your period.
   2. Place 150 mL of unknown solution #1 in the cup
   3. Weigh the first gummy bear and record the data in the table below.
   4. Place the gummy bear into the cup.
   5. Wait 24 hours.
   6. Label one cup “Gummy Bear #2, put one persons name and your period.
   7. Place 150 mL of unknown solution #2 in the cup
   8. Weigh the second gummy bear and record the data in the table below.
   9. Place the gummy bear into the cup.
   10. Wait 24 hours.
4. Set-up for third trial
   1. Label the last cup “iodine cell”, put one persons name and your period.
   2. Place 150mL of iodine solution into a cup. Record the color of the solution in the table below.
   3. Place 25mL of starch solution in the baggie.
   4. Tie the end of the baggie so that no liquid can go into or out of the baggie. Record the color of the solution in the table below.
   5. Place the baggie into the cup with iodine water.
   6. Wait 24 hours.

**DATA Collection:**

**Data Table. Diffusion and Osmosis.**

|  |  |  |  |
| --- | --- | --- | --- |
| Trials | Initial Data | Final Data | Change over 24 hrs |
| Hydrophilic Sphere | Initial Mass(g) | Final Mass(g) | % change = ((Final mass – initial mass) / initial mass) \* 100  Percent change = |
| Gummy Bear #1 | Initial Mass(g) | Final Mass(g) | Percent change = |
| Gummy Bear #2 | Initial Mass(g) | Final Mass(g) | Percent change = |
| Iodine/Starch Baggie | Initial Color of solution-  Initial Color of baggie- | Final Color of solution-  Final Color of baggie- | Movement of the iodine-  Movement of the starch- |

**Predictions:**

1. Explain what you predict will happen to the hydrophilic sphere?

Why do you think that?

1. Explain what you think will happen to gummy bear #1 and gummy bear #2.

Why do you think that?

1. Explain what you think will happen to the starch baggie in the iodine solution.

Why do you think that?

**Post Lab Analysis: NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Scientifically describe what occurred to your Giant Sphere over the 24 hour time period. Include the following terms in your answer: osmosis, diffusion, water, hypotonic solution, hypertonic solution, and concentration
2. Explain what would happen to the Giant Sphere if you placed it a salt water solution for 24 hours after the initial 24 hour time period. Include the following terms in your answer: osmosis, diffusion, water, hypotonic solution, hypertonic solution, and concentration
3. What happened to the bears after being initially placed in water? (Look at your 24 hour results.) Explain the direction of water movement.
4. What happened to the bear that was placed in the unknown solution? Explain what you think caused the difference in gummy size between the water and the unknown.
5. Explain any change in color in the bears or their solutions. Describe the movement of water that produced the results.
6. What would eventually happen if it was left in the water for a few more days?
7. Explain the types of solutions you worked, were the solutions hypertonic, hypotonic or isotonic? Justify your answer.
8. Create an extension to this lab by briefly describing a new design and any differences you would see as a result of changes.
9. Based on your observations, which substance moved, the iodine or the starch? How did you determine this?
10. The plastic baggie was permeable to which two substances? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
11. Which substance was the baggie NOT permeable to? \_\_\_\_\_\_\_\_\_\_\_\_\_\_ How do you know?
12. Is the plastic baggie selectively permeable? Why, what does it mean to be selectivity permeable?
13. Sketch the cup and baggie in the space below. Use arrows to illustrate how diffusion occurred in this lab.
14. Describe the difference in color of the iodine solution initially compared to the iodine solution at the end of the experiment?
15. Did you see a difference in the mass of the baggy? Explain why or why not.
16. Explain what would happen if you did an experiment in which the iodine solution was placed in the baggie, and the starch solution was in the beaker? Be detailed in your description.
17. What errors may have occurred when you were weighing the bag after 24 hours? In other words, is there anything that could have been affecting the final mass that is un-intentional?

Application in Living Organisms

1. Obtain a Microscope. Obtain a microscope slide and three cover slips. Obtain three elodea leaves.
2. Set up your slide similar to the diagram below

Place one leaf on the left side, one leaf in the center and one leaf on the right hand side. Drop one or two drops of the indicated solutions on each leaf and then cover with a cover slip. Draw a diagram of the plant cells below.

|  |  |  |
| --- | --- | --- |
| Elodea leaf #1: tap water | Elodea leaf #2: distilled water | Elodea leaf #3: salt water |

1. Describe what each leaf looks like in regards to the chloroplast and their cell wall.
2. What is occurring in each leaf? Describe the movement of water for each leaf.
3. Which leaf is placed in an isotonic solution?
4. Which leaf is placed in a hypertonic solution?
5. Which leaf is placed in a hypotonic solution?
6. Explain what would happen if you placed a freshwater Protista in salt water? A salt water Protista in freshwater?

