Osmosis in potatoes experiment write up

Potato Osmosis Lab Write Up Introduction Explain the importance of water to the cell (60-90%, universal solvent, etc.) Explain the parts of a solution (solute & solvent) and what is meant by the concentration of the solution Discuss semipermeable cell membranes and osmosis Explain what determines the direction of movement of water to and from the cell (solute concentration inside & outside the cell, water potential, down into the concentration gradient, etc.) Explain the effect of water loss and water gain on plant cells Hypothesis (write objective from lab.) Materials The materials used include ... Procedure Day 1 Use a knife to ... (No numbers; type in paragraph form) Procedure Day 2 Carefully remove the ... (No numbers; type in paragraph form) Result Data Table 1. Do any of the ... answer Conclusion Rot hypothesis Discuss the original mass and appearance of potato kernels Discuss the mass change (if any and the flexibility of the grains after 24 hours in the solutions Explain the change in mass in each core that tells why the mass change occurred (water movement & in which direction & why it moved in this way) Explain the change in the flexibility of the grains (why were they stiffer or more flexible) Make a final statement on concentration gradient & movement of water over cell membranes Updated 26 April 2018 By Tricia Lobo Osmosis, the process in which solvent molecules move from an area of lower sunless concentration to an area with higher sunless concentration, can be easily demonstrated with potato experiments. Potatoes are full of both water and starch, and will get water when immersed in watery solutions. Conversely, they will lose water when they are in concentrated solutions, like those that contain a lot of starch. You can use potatoes to set up osmosis experiments for students of all ages and levels. Cut a potato into two, and immerse one of the halves in a very salty solution of water — one containing a quarter cup of salt in a cup of water. Dip the second piece in tap water that contains no added salt. Leave both in their respective solutions for half an hour, then remove the potato halves from their solutions and observe their differences. The salt solution will have shrunk, suggesting that water is spread from a less concentrated solution into a more concentrated solution. The one in the tap water solution, on the other hand, will actually swell slightly, suggesting that it takes in water. This experiment helps students distinguish between different degrees of concentration gradients. Make a saline solution, a sugar water solution, and for the third solution, simply use tap water. Make three thin slices of potatoes — 1/2 cm thick. Place each potato slice in each of the solutions and leave the slices in the solutions in a Note that the disc placed in salt is very flexible, while while placed in sugar is flexible, but less so. Since potatoes already contain sugar, less water will spread out of the potatoes placed in sugar water. The disc placed in water will be rigid, as it will absorb water. Give your students potato cylinders that are uniform in length and size: for example, you can cut them to be 70 mm in length and 7 mm in diameter. Make solutions of saline solution in three different concentrations, 20 percent, 0.9 percent and 0.1 percent. Invite students to measure the lengths and diameters of the potato cylinders before and after soaking them in the salt solutions for half an hour. Then, they calculate changes in the lengths and diameters of the cylinders, and draw saline concentrations versus the changes. Cut potatoes into four groups of small, uniform cubes measuring 1/2 cm by 1/2 cm. Make four different solutions of sucrose: 10 percent, 5 percent, 1 percent and 0.01 percent. Weigh each group, on a mass balance, before deepening it into the appropriate sucrose solution for half an hour. After immersion, weigh each group again and have your students calculate changes in the potato masses. Ask them to comment on why a group got mass, lost mass or kept the same mass. About the author Tricia Lobo has written since 2006. Her biomedical engineering research, Biocompatible and pH sensitive PLGA encapsulated MnO nanocrystals for molecular and cellular MRI, was accepted in 2010 for publication in the journal Nanoletters. Lobo received his bachelor's degree in biomedical engineering, with distinction, from Yale in 2010. With schools around the world closing, I know you may be scrambling for activities that can be done with students online. I have taken this classic biology lab activity that illustrates the principles of diffusion and osmosis and adapted it as an online activity. I did this lab many times with my 10th grade regular cinema class at Kelly High School in Chicago, but it can be used successfully with children ranging from middle school to AP Bio. Students can read through the background here and make their own graphs, analyze these data, and draw conclusions. I know you're working harder than ever before to teach your students despite the challenges you face. I hope you can use this activity or one of the others on this blog. Instructions are available here to create free access to DataClassroom for you students for 90 days. Stay well. -Aaron Reedy Molecules are constantly moving as a result of a cell's stored kinetic energy, causing them to bump into each other and move in random new directions. Diffusion is the movement of molecules from an area where there are many (high concentration) to an area where there are fewer (low concentration). Osmosis is the diffusion of water through a semi-permeable membrane. It is important to remember that a membrane membrane solvent (usually water) to pass, but limits the movement of a sunout (one thing dissolved in the solvent). Water will move over a semipermeable membrane from an area of lower solute concentration to an area with higher solute concentration. When each side of a membrane has equal solute concentration, the solution is said to be isotonic and water molecules will be equally likely to move in both directions across the membrane. In the case of a hypertensive solution, there is more dissolute outside the cell than inside the cell. Hypertonic solutions cause water molecules to move out of the cell and into the higher solute concentration region. Conversely, in hypotonic solutions there is a higher solute concentration inside the cell than outside, and water molecules move into the cell. Whenever possible, water will always move from an area with high water/low sun-out concentration to an area with low water concentration/high concentration of sustained. In this activity, we will explore osmosis by looking at a dataset produced with a classic classroom experiment. The experiment uses pieces of potatoes that are placed in six different solutions of water each with a different solute concentration. The soluten is sucrose and concentrations are measured in molarity units. The solutions range from no sunout to a high concentration of solute and are 0.0 (distilled water), 0.2, 0.4, 0.6, 0.8 and 1.0 molar sucrose. Pieces of potatoes are cut to similar sizes, weighed, and then placed in one of the six solutions overnight. The next day, the potato pieces are removed from the solutions, dries and their final masses are recorded. Each row in this neat dataset contains an observation for a single piece of potato. Each column in the dataset is a variable, and the cells in that column are the values of that variable. The variables recorded for each potato piece are Lab Group Name, Sucrose Concentration (Molarity), Initial Mass (g), Final Mass (g), and Mass Change (%). To see a video clearly illustrating and explaining the general procedure for this lab, watch Paul Andersen's Bozeman Science video walkthrough: 1. Click on the yellow Make a graph button to visualize your data. Select the scatter plot icon and Show Sucrose Concentration (Molar) on the X axis and Mass Change (%) on the Y-axis. You can add descriptive statistics as funds and medias by checking the box just to the right of the graph. Note patterns in the data:2. What are the independent and dependent variables in this experiment?3. How to change in mass (%) sucrose concentration (Molarity)? 4. Which substance is moved over the cell membrane in this activity? What is the specific name of the movement on this subject? 5. Now, change the variable called Sucrose Concentration (Molarity) to a Numerical Variable dropdown menu right below variable name near the top of the page. Then click the View button to return it to the graph again. Finally, add a regression line of best fit by checking the box just to the right of the graph. What is your best appreciation for the natural solute concentration inside a potato cell? Explain how your data is proof of that estimate. 6. Which solution is closest to being isotonic with respect to a potato cell? What solutions were hypertonic/hypotonic? How do you know that? Challenge question:7. Using the principles illustrated with this data, explain why you can't drink seawater when they're lost at sea. For a quick explanation of diffusion and osmosis, we highly recommend Paul Andersen's AP Biology Lab 1: Diffusion and Osmosvideo. The explanation of the potato lab begins at 5:36 p.m. Saam Baharmand Period October 5, 2014 Conclusion and evaluation of Osmosis Potato Lab Hypothesis: I believe that O Molar (M) solution of sugar and distilled water will be isotonic because there is no sugar in the solution. This hypothesis was not supported by the results from the lab. 1) The line chart for the collected data shows the least amount of change in mass (1.8%) in the potatoes soaked in the 0.2M sugar solution. This means that the potatoes soaked in the 0.2 M solution was the most isotonic of all potatoes. 2) The top mass of potatoes soaked in the 0.2M solution was 10.6g and the ending mass was 10.8g. This data collection shows that there was no significant loss or gain of mass in the potatoes (soaked in 0.2M sun.) making it isotonic. 3) The percentage (%) change in the mass of the potatoes in the 0.0M sugar solution was recorded on the graph at 31.8%. This means that there was a significant increase in the mass of the potatoes thus making the solution hypertonic and the potato cells hypotonic. Variables Independent: 5 ranges sugar solutions of 0.0M, 0.2M, 0.4M, 0.6M, and 0.8M (mixed with distilled water), Depending: % Mass Change of potatoes after 24 hours in solution Quantitative Ratio: When the gaps of the sugar solution change , % the mass of the potato changes as a result. The 0.2M solution turned out to be the most isotonic while 0.0M and 0.6M potatoes proved to be the most hypotonic and hypetonic respectively. The potatoes of 0.2M sun. Sol.