CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Shalin N. Shah

Project Number
J0525

Project Title
Osmosis and Diffusion

Abstract

Objectives/Goals
The objective of my project was to observe the osmotic pressure exerted by different solutes of varying molecular weight on water. My hypothesis was that the solutes with larger molecules would allow more osmosis than those with smaller molecules.

Methods/Materials
For my experiment, I used water as the control and made six 1% solutions using corn starch, potassium gluconate, sodium chloride, glucose, sucralose, and mannitol. I then used dental floss to tie the ends of semipermeable dialysis tubing to make a dialysis bag, which I filled with 5mL of a solute solution and immersed into a beaker of water. After one hour, I observed the volume of water that had entered the dialysis bag. To obtain more accurate results, I performed three trials for each of the six different solutes, plus the control, water.

Results
The order of the solutes' degree of osmosis from greatest to least was: corn starch, potassium gluconate, glucose, mannitol, sucralose, and sodium chloride. This has a significant relationship with the solutes' molecular weights from greatest to least.

Conclusions/Discussion
From my results I came to the conclusion that my hypothesis was correct. The larger solutes exerted more osmotic pressure on the water than the smaller solutes. By researching my project's topic I was able to apply it to the function of the kidneys in the human body. The nephron in the kidney is where membrane transport to maintain the body fluids and blood concentration occurs. One form of membrane transport is osmosis and diffusion.

Summary Statement
The purpose of my project was to observe the affect of different sized solutes on the osmotic pressure of water through a semipermeable membrane, and to relate it to the function of the kidneys in the human body.

Help Received
Mother helped collect materials; Advisor/sister helped with research