



CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s) Sean A. Horwitz	Project Number J1216
Project Title How Is the Rate of Escape of Helium Molecules through a Semi-permeable Membrane Affected by Varying the Temperature?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project goal is to determine how varying the temperature would affect the rate of Helium escape in Helium-filled latex balloons. I want to calculate how long it takes Helium to escape from a latex balloon. I want to know how temperature affects the rate of Helium escape. I believe that the rate of Helium escape in a semi-permeable latex membrane will positively correlate with varying temperature.</p> <p>Methods/Materials I inflated a series of ten 9 inch latex balloons to a capacity of 7 ½ inches with Helium. Each balloon was tied shut, with a piece of thread suspended from it, and to that I suspended paper clips. My lowered and elevated temperatures were controlled by an air conditioner, and a space heater. My room temperature was the temperature in the room the day I began testing. I measured the diameter of my balloons in centimeters, and then calculated the volume. I measured each balloon on an hourly basis during each trial. I calculated how much Helium escaped during the number of hours each individual balloon remained aloft.</p> <p>Results I predicted that the Helium would escape more quickly from latex balloons as the temperature increased. How fast Helium molecules can escape from a latex membrane depends on the size of the holes in the membrane, and how fast the molecules of Helium are traveling. The molecules of Helium have more kinetic energy at higher temperatures than they have at a lower temperature. Therefore, I found the rate of Helium escape to be directly dependent on temperature</p> <p>Conclusions/Discussion My hypothesis was correct. Omitting my room temperature data, and using the elevated and lowered temperature data, the difference in the rate of Helium escape was dramatic. In the elevated temperature, the balloons stayed aloft for 3 hours, while the ones in the lowered temperature remained aloft for 8 hours!</p>	
Summary Statement The rate of helium escape in a semi-permeable latex membrane correlates positively with varying temperature.	
Help Received My father helped me tie balloons, took photos, and helped me set up an Excel Spreadsheet.	