

Airwaves

Intro to Engineering
Period 2
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Design Brief

For this project we are to design an experiment and/or product to be taken 1000 feet into the air on a helium weather balloon. We will have to design and build the experiment and run pretests on it before it is ready to launch at balloon fest on May 31, 2008.

Purpose of Experiment

For our experiment we are going to send an air tight containment area (1 quart Mason jar) which will be holding shaving cream into the atmosphere at 1000 ft. It will be to see if the shaving cream will expand with the loss of pressure at a higher altitude. We will have to design a one way valve in order to let air out but not in to see the effects on it at that altitude.

Research

The ingredients in shaving cream are 8.2 percent stearic acid, 3.7 percent triethanolamine, 5 percent lanolin, 2 percent glycerin, 6 percent polyoxyethylene Sorbian monostearate, and 79.6 percent water.

Air Pressure

Meters	Feet	Kilopascals
0	0	101.33
153	500	99.49
305	1000	97.63

Hypothesis

Our hypothesis is as the shaving cream goes farther up in the air that the shaving cream will expand to at least .5 more ml. because the air bubbles in the shaving cream will want to expand with the loss in air pressure.

Proposed Experimental Method

We plan to send a jar of shaving cream up into the atmosphere at an altitude 1000 ft. We will be using shaving cream, Mason jar, helium weather balloon, beaker, and a one way valve. We will use a beaker with ml marks to measure where the shaving cream first was when the experiment started then after it goes up in altitude we will measure it again to get our final data. A problem is light and heat affecting the pressure within the jar so we will insulate it with tinfoil.

Instrument Characteristics

Our instrumentation is very basic so it won't have as many problems as the more sophisticated experiments. The jar will have to be air tight along with the connection between the check valve and the Mason jar. To keep the jar sealed we will have to make sure the seal is unbroken in any place. We will have to have the jar covered so the light won't affect the jar temperature, which will affect the pressure inside the jar. To keep that problem from making the data wrong we will have to cover the jar in tinfoil to reflect the sun's rays.

Altimetry

We will have to figure out the actual height of the balloon to get accurate readings for our experiment.

To find the actual height of the balloon we will have use a tangent. First we will have got the angle of the balloon using an altimeter. Then we will have to step off the distance from where we got the angle of the balloon to where we are directly under it. Then we use the formula $\text{tangent} = \text{opposite} / \text{adjacent}$ to solve the equation using basic algebra.