LAW OF CONSERVATION OF ENERGY INVESTIGATION

Purpose: To apply the Law of Conservation of Energy to determine the launch speed of a ‘rocket’ and compare it to the experimental value.

Apparatus:

* Black or cork bottle stopper
* Water bottle
* 175 mL vinegar
* 2 heaping scoops (black stopper) /1 heaping scoop (cork stopper) of baking soda
* 80 – 100 mL water
* Coffee filter

Procedure:

1. Find a test tube stopper that fits your bottle. Measure the length from the bottom of the bottle to the middle of the stopper (in m).
2. Determine the mass of the test tube stopper (in kg). Place the baking soda in a coffee filter. Roll up the coffee filter and twist the ends.
3. In your clean water bottle, put in 175 mL of vinegar, and add 80-100 mL of water to the bottle. It should be approximately half-full.
4. When it is your turn, place the coffee filter in your water bottle, and place the stopper on the top. Record the flight using the Vernier app and observe the maximum height your test tube stopper travels.

Observations:

1. Include your measurements of mass, initial height and final height.
2. Use the Vernier app to determine the experimental value for the launch speed. Include the graph in your Observations.

Calculations:

1. Use the Law of Conservation of Energy to determine the launch speed of your ‘rocket’. This is the accepted value.

Errors:

* Suggest possible errors and ways to improve the lab
* Determine the percent error for your experiment

Conclusion:

Write one!

Discussion:

1. Write an energy transformation equation for your ‘rocket’. Begin with the baking soda reacting with the vinegar.
2. How many joules of energy were wasted in your experiment? Where did this energy go?
3. Overall, are you convinced that the law of conservation of energy works? Explain why or why not.
4. What other way might you use to test the law of conservation of energy? Briefly describe a possible set up that could be used to test the law.