Study of Detergents and Scientific Method

Introduction:

This exercise is designed to introduce the scientific method and effective science communication in the form of a formal laboratory report.

Students are challenged to evaluate the claims of liquid dishwashing soap manufacturers by measuring the size of bubble-domes that can be created by using solutions of various brands. For the asked of this exercise, it must be assumed that bubble-dome size is directly correlated to the cleaning power of the liquid soap. In addition, students are also expected to determine which brand is the most cost-effective (best buy.) This can be accomplished by simply determining the bubble-dome to cost ratio (divide the cm diameter of the dome by the cost per ml in dollars.)

Procedure:

1. Using a ten-ml graduated cylinder (an eyedropper or other instrument), measure 2 ml of dishwashing liquid. Transfer to a 250-ml beaker
2. Measure 100 ml of water with a graduated cylinder. Pour into the beaker containing the soap.
3. Using a straw as a stirrer, mix the solution thoroughly.
4. Using a graduated cylinder, measure 10 ml of soap solution. Pour onto the lab table. Spread evenly with the palm of you hand to create a large (at least 18" diameter,) consistent filmy area.
5. Dip a straw into the soap solution within your beaker. Touch the surface of your film (near the center of the film) with a straw at approximately a 45-degree angle.
6. **Gently** blow a bubble-dome; continue blowing until it pops. You may take more than one breath to blow a bubble, for they can get quite large before popping.
7. With a ruler or meter stick, measure the diameter of the ring of soapsuds left by the popped bubble-dome. If the dome was irregular in shape, measure two or three diameters and average them.
8. Design your own data table and record at least five trails and then the average bubble-dome size in cm.
9. Graph the results and write a lab report based on your data. Remember to also include a table and graph devoted to cost effectiveness. You will need to record the price of each soap brand to perform this calculation.

Questions:

1. State a hypothesis for this experiment.
2. What is the independent variable for this experiment?
3. What is the dependent variable?
4. Which soap appeared to be the best cleaner? Remember that bubble dome size is directly correlated with cleaning power.
5. Which brand appears to be the "best buy", or most cost effective?
6. Did your experimental data support or negate your hypothesis? Explain
7. Was this a valid or fair test? List some experimental errors that may cause you to doubt this validity of your findings.
8. What suggestions would you make for further studies of this kind? What changes or extensions would you recommend?