Fantastic Fudge!

A Dimensional Analysis Lab

Introduction: Many situations involve using dimensional analysis, such as cooking or baking. Dimensional analysis is a way of converting measurements into more common units using conversion factors. In this lab, you will use dimensional analysis to convert measurement into a recipe for making fudge.

Procedure:

1. Use the conversion factors listed to convert all measurements into the specified units. **Round all numbers to whole numbers** and box your final answer.**

1 tsp = 5mL	1L = 1000 mL	1 cup = 200 mL
1 mL = 7 drops	1 cm^3 = 1 mL	1 tbs = 3 tsp
1 gallon = 4 quarts	1 cup = 48 tsp	1kg = 1000g
1 quart = 0.946 L	1 cup = 110g	1 m^3 = 1,000,000 cm^3

a. Convert 0.171 tsp of vanilla into drops.

b. Convert 0.00132 gal of milk into (tsp) teaspoons.

c. Convert .000015 m^3 of butter to tbs (tablespoons).

d. Convert 6.875 g of cocoa to tsp.

e. Convert 0.01375 kg of powdered sugar into tbs.

2. Turn the hot plate on and make sure the dial is on a low setting (between 2 and 3). If you cook your fudge over too high of a heat it will not turn out properly.
3. Obtain an aluminum cup and measure out each of the ingredients from your pre lab questions and mix them in your cup using a popsicle stick.
4. Stir the mixture until it is semisolid. Then remove your can from the hot plate and let it cool. Meanwhile obtain a piece of aluminum foil.
5. Weigh the piece of foil (in g). Record the mass here: **Mass of aluminum foil = _____g.**
6. Spoon your fudge out onto your square of aluminum foil and let cool. Once your fudge is cool, weigh the fudge and the foil. Record the mass here: **Mass of aluminum foil + fudge = _____g.**
7. Find the mass of the fudge by itself by subtracting the mass from Step 4 from the mass from Step 5. Record the mass here: **Mass of fudge = _____g.**
8. Before you leave class, wash and dry your can and spoon for the next class. Clean up your lab table, place the equipment back in good order, and enjoy your fudge!

Post Lab Questions:

1. Why is dimensional analysis helpful?

2. What is a conversion factor used for?

3. Convert the mass of your fudge into pounds. (1 lb = 16 oz, 1 lb = 0.464kg, 1 gram = 0.0035 oz). Use the proper three steps to convert. Show all of your work.

4. Suppose your physics teacher wants to make a little extra money by selling your fudge. Assume that fudge generally sells for 25 cents **per** gram (Hint: This is a RATE). If each group made the same amount of fudge as your group, how much money (in dollars) could your teacher make from four physics classes? (Assume there are 8 groups per class.). HINT: Your restatement of the question should follow the format

   X grams = _____ dollars,

   where "X" is the mass of your group's fudge! Show all of your work.