Heat of combustion

Purpose: To determine the amount of heat (in calories) liberated when a candle burns. The heat obtained when a known mass of candle burns will be used to warm a measured volume of water (we shall assume that 1 mL of water has a mass of 1g).

Procedure:

a. Attach a candle to a tin lid. Find the mass of the combination to the nearest 0.01g. Record the mass.

b. Set up the apparatus. The flame of the candle will almost, but not quite, touch the bottom of the can.

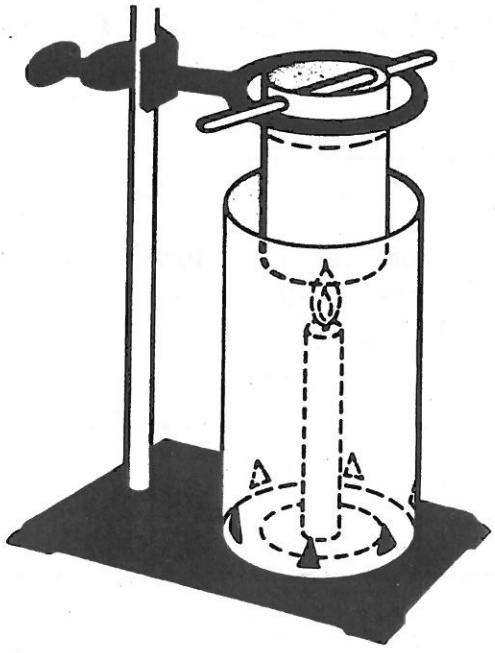
c. Using a 100 mL graduated cylinder, obtain approximately 200 mL of cold tap water, and put it into the can, which will be the calorimeter.

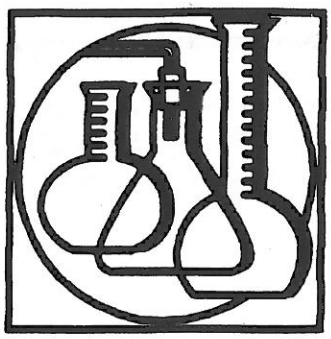
d. Cool the water with ice, if necessary, so that its temperature is about 10°C-15°C below room temperature. Add the ice directly to the water. Remove any remaining ice when the desired temperature as been reached.

e. Read and record the temperature of the water to the nearest 0.2°C. Light the candle and heat the water. Stir it gently until it reaches a temperature as much above room temperature as it was below at the start. Carefully blow out the candle, but continue to stir the water and watch the thermometer reading. Record the highest temperature that is reached.

f. Determine the mass of the candle and lid. Make certain that any drippings from the candle are weighed with it.

g. Measure the volume of the water to the nearest 1 mL.





CHEMISTRY LAB
LABORATORY

Energy of combustion

1. Determine the mass of candle wax burned _____
2. Determine the mass of water heated (1ml of H_2O = 1g _____
3. Determine the temperature , ▲t , of the water _____
4. Calculate the quantity of heat absorbed by the water in the can. _____
5. Calculate the heat of combustion for wax.(joules/gram) _____
6. Do you think an experiment using a more refined calorimeter would give a higher or lower value than the one determined in item 5? _____

   Explain:_____

   _____

   _____

7. Most candles are made of a mixture of waxes. Assume your candle was made of pure wax with the formula $C_{25}H_{52}$. Calculate the heat of combustion for this wax in kJ/mol.

   _____

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   _____

8. Assume that some black soot formed on the bottom of the can of water during your experiment. Would this contribute to a high or a low value for the heat of combustion?_____

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