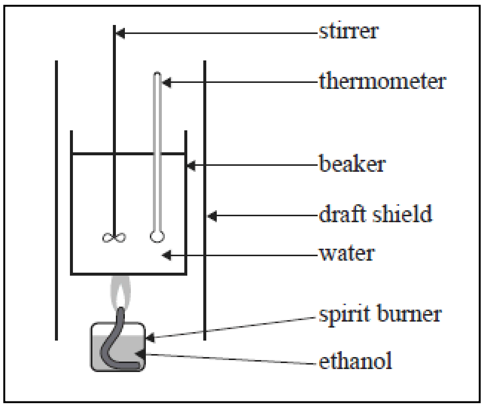
Thermochemical equations – calculating heat of combustion– determining the energy released by a specified amount of fuel.
Lesson 5

Define the following

- Heat of combustion

- Specific heat capacity of water (4.18 J/g/C°)

- How do we use the specific heat capacity of water to calculate energy released of a given amount of pure fuel? (Energy (J) = 4.18 X Mass X ΔT)



- Consider the apparatus shown on the right. It is used to measure the heat released from fuels.
  i. What three things do we need to measure?

  ii. Why is the result only an estimate and not an accurate measure of the total energy released?

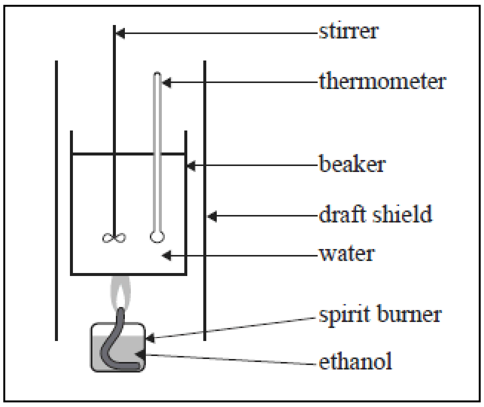
  iii. When measuring the heat of combustion of fuels what do we need to assume when using the apparatus shown on the right?

1) a) Calculate the amount of energy in kJ required to increase the temperature of 500.0 grams of water from 25.00 °C to 31.50 °C?
(Energy (J) = 4.18 X Mass X ΔT)

b) Calculate the amount of energy in kJ required to increase the temperature of 100.0 grams of water from 25.0 °C to 37.0 °C?

c) The apparatus shown on the right was used to heat 100.0 mL of water at 25.0 °C to 29.1 °C.

i. How much energy was needed in kJ?



ii. If 4.6 grams of ethanol was consumed calculate the heat of combustion in kJ/mol.

iii. Give the answer in ii. above in kJ/g

iv. What is assumed in ii. and iii above?

d) A student used the same apparatus as in c) above to determine the heat of combustion of methanol.

i. If 6.00 grams of methanol was used to increase the temperature of 20.0 grams of water at 22.00 °C to 23.70 °C what is the molar heat of combustion of methanol?

ii. Why is this only an estimate?