Thermochemical equations
Lesson 6B

1) Below are two thermochemical equations for the phase change of water

   $H_2O(s) \Rightarrow H_2O(l)$ $\Delta H = +6.00$ kJ/mol
   $H_2O(l) \Rightarrow H_2O(g)$ $\Delta H = +44.01$ kJ/mol
   Using the above information explain why the body cools down when we sweat.

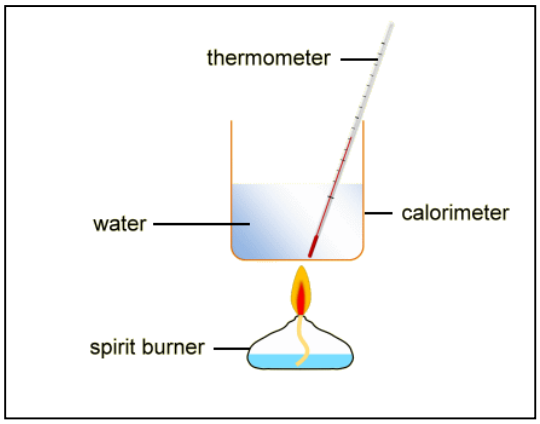
2) Exactly 30.00 g of ethane gas is completely burnt in excess oxygen. During this process it was found that 5,132 kJ of energy was used to break the reactants' bonds and start the reaction process. Upon the formation of products, a total of 6,652 kJ of energy was released.

   Using the experimental data, give the balanced thermochemical equation for the combustion of ethane.

3) Given that the ΔH_c of glucose is -2816 kJ/mol find the mass of glucose needed to produce 18.40 MJ of energy?

4) A spirit burner filled with 2-propanol was used to heat 350.0 mL of water at 12.2°C. The initial mass of the burner was measured at 235.6 g. It was then lit and placed under the beaker of water for 5.00 minutes, the flame was then extinguished and the spirit burner weighed once more.

a) If the final mass of the burner was 231.6 g and the maximum temperature reached by the water was 94.4°C calculate the ΔH_c of 2-propanaol. Assume no energy loss from the system.



b) Write a balanced thermochemical equation for the complete combustion of 2-propanol from the data collected in the experiment above.

c) How does the experimentally determined molar heat of combustion for 2-propanol compare with the value given in the literature of -2816 kJ/mol ? Briefly discuss reasons for the discrepancy.

d) What percentage of the total energy released by the 2-propanol has gone into heating the water?

e) The density of 2-propanol is 0.785 g/mL. Use this and the experimental value for ΔH_C (2-propananol), that you obtained in a) above to calculate the energy density of the fuel in $kJ.L^{-1}$.