Guiding Question revisited

What can be deduced from the temperature change that accompanies chemical or physical change?

In this chapter we have seen that although energy is always conserved, many chemical reactions involve a transfer of energy between the system and the surroundings. We introduced the concept of enthalpy and saw that the enthalpy change of a reaction gives an indication of the relative stability of the reactants and products. These ideas can be summarized:

- ☐ A system is the reaction container and its contents. The surroundings include everything outside the system of interest. Exothermic reactions release heat energy to the surroundings, and endothermic reactions absorb heat energy from the surroundings.
- ☐ The heat transferred from the temperature change using a conversion factor known as the specific heat capacity. The specific heat capacity (c) of a pure material is the heat needed to change the temperature of a unit mass of the material by 1 K.

  $Q = mc\Delta T$ for a pure substance.
- ☐ Generally, heat changes in the laboratory are determined by the temperature changes of a known mass of water. In experiments to determine the enthalpy of combustion, the water is heated in a copper calorimeter. In experiments to determine enthalpy changes in solution, the water is the solvent in an insulated calorimeter.
- ☐ The heat change transferred at constant pressure is known as the enthalpy change ΔH. ΔH is negative for exothermic reactions because they release heat, and positive for endothermic reactions which absorb heat.
- ☐ A thermochemical equation gives the equation for the reaction and the corresponding enthalpy change.