Year 12 Chemistry

Quick Quiz: Using and Controlling Reactions

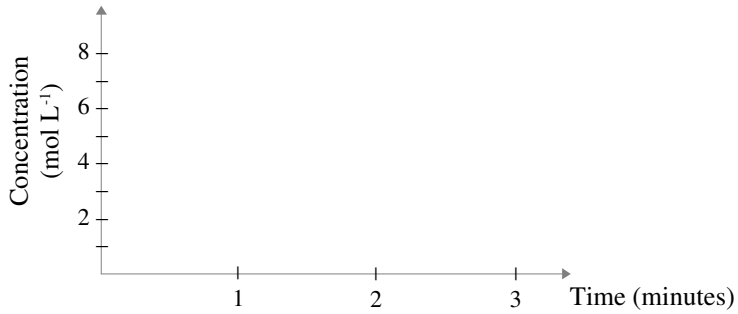
1. 2.1g of sodium chloride is dissolved in 10 mL of water and the water's temperature changes from 22.3°C to 19.0°C.
   (a) Show that the energy change is 0.14 kJ.

   (b) Write a thermochemical equation for the solution of sodium chloride.

2. Consider a reaction in which H_2 is reacted with O_2 in a sealed 0.2 L vessel at a fixed temperature.

   $2H_{2\,(g)} + O_{2\,(g)} \rightarrow 2H_2O_{(g)} \qquad \Delta H = -286 \text{ kJ mol}^{-1}$

   Initially, 1.4 mole of H_2 is present. When equilibrium is reached after 1 minute, there are 0.8 moles of H_2 gas present. The temperature is increased at 2 minutes, and equilibrium is re-established at 3 minutes.
   On the axes below, show the concentration of H_2 over the three minutes (estimate the final concentration using Le Chatelier's Principle).



3.
   (a) State what is required for an electrochemical cell to be a fuel cell.

   (b) State one advantage and one disadvantage of fuel cells compared to ordinary galvanic cells.

4. Consider these two half-reactions occurring in an electrolytic cell:

   (I) $2Cl^- \rightarrow Cl_2 + 2e^-$

   (II) $2H_2O + 2e^- \rightarrow 2OH^- + H_2$

   (a) State which of the two half-reactions above is occurring at the anode.

   (b) State which of the two half-reactions above is occurring at the positive electrode.

5. State one advantage and one disadvantage of using carbon-based fuels as sources of heat energy.