5. Given the reaction: $2\text{Al}(s) + 6\text{HCl}(aq) \rightarrow 3\text{H}_2(g) + 2\text{AlCl}_3(aq)$
   If the rate of production of $\text{H}_2$ is 5.50 L/min, calculate the rate of consumption of $\text{Al}$ in g/min. (3 marks)
   \[
   \frac{5.50 \text{ L} \text{H}_2}{\text{min}} \times \frac{1 \text{ mol} \text{H}_2}{2.44 \text{ L} \text{H}_2} \times \frac{2 \text{ mol} \text{Al}}{3 \text{ mol} \text{H}_2} \times \frac{27.0 \text{ g} \text{Al}}{1 \text{ mol} \text{Al}} = 4.42 \text{ g Al/min}
   \]
   Answer $4.42 \text{ g Al/min}$

6. At 25°C, which of the following reactions is fastest (1 mark)
   A. $\text{H}_2(g) + \text{I}_2(g) \rightarrow 2\text{HI}(g)$
   B. $\text{Ag}^+(aq) + \text{I}^-(aq) \rightarrow \text{AgI}(s)$
   C. $\text{C}_6\text{H}_5\text{O}_2\text{O}_6(s) + 6\text{O}_2(g) \rightarrow 6\text{CO}_2(g) + 6\text{H}_2\text{O}(l)$
   D. $5\text{C}_2\text{O}_4^{2-}(aq) + 2\text{MnO}_4^{-}(aq) + 16\text{H}^+(aq) \rightarrow 10\text{CO}_2(g) + 2\text{Mn}^{2+}(aq) + 8\text{H}_2\text{O}(l)$
   Answer $B$

   Give an explanation for your answer. (1 mark)
   Both reactants (aq.) are close proximity & highly mobile. Free & no bonds to break.

7. Consider the following reaction:
   \[2\text{H}_2\text{O}_2(r) \rightarrow 2\text{H}_2\text{O}(l) + \text{O}_2(r)\]
   If the rate of consumption of $\text{H}_2\text{O}_2$ is 0.020 g/s, calculate the rate of production of $\text{O}_2$ in mol/min. (3 marks)
   \[
   \frac{0.020 \text{ g} \text{H}_2\text{O}_2}{\text{s}} \times \frac{1 \text{ mol} \text{H}_2\text{O}_2}{34.0 \text{ g} \text{H}_2\text{O}_2} \times \frac{1 \text{ mol} \text{O}_2}{2 \text{ mol} \text{H}_2\text{O}_2} \times \frac{60 \text{ s}}{1 \text{ min}} = 0.018 \text{ mol} \text{O}_2/\text{min}
   \]
   Answer $0.018 \text{ mol} \text{O}_2/\text{min}$

8. Given the reaction: $\text{CO}_2(g) + \text{NO}(g) \rightarrow \text{CO}(g) + \text{NO}_2(g)$, sketch the shapes of the curves on the following graphs assuming that some CO$_2$ and NO is placed in a closed container and left to react. (2 marks)

   ![Graphs](image-url)