Core Worksheet – Chapter 8

1 Complete and balance the following equations: [4]

a $Zn + HCl \rightarrow$ _____

b $Na_2O + HNO_3 \rightarrow$ _____

c $NH_3 + H_2SO_4 \rightarrow$ _____

d $CaCO_3 + HCl \rightarrow$ _____

2 Classify the species in the following reactions as Brønsted–Lowry acids or bases and label the conjugate acid/base pairs. [12]

a $NH_3(aq) + H_2O(l) \rightarrow NH_4^+(aq) + OH^-(aq)$

b $CH_3COOH(aq) + H_2O(l) \rightarrow CH_3COO^-(aq) + H_3O^+(aq)$

c $CH_3COOH(aq) + NH_3(aq) \rightarrow CH_3COO^-(aq) + NH_4^+(aq)$

d $HSO_4^-(aq) + H_2O(l) \rightarrow SO_4^{2-}(aq) + H_3O^+(aq)$

3 State what is meant by a **Lewis acid** and a **Lewis base** and classify NH_3 and BF_3 as acid or base according to the Lewis definition. [4]

4 **a** Explain, using hydrochloric acid and ethanoic acid as examples, the difference between a strong acid and a weak acid. [2]

b Explain three methods by which a 0.10 mol dm^{-3} solution of ethanoic acid may be distinguished from a 0.10 mol dm^{-3} solution of hydrochloric acid. [6]

5 **a** Define pH. [1]

b Explain how the hydrogen ion concentration in a solution of pH = 2 differs from that in a solution of pH = 8. [2]

c 0.010 mol dm^{-3} hydrochloric acid has a pH of 2.0.
10.0 cm^3 of 0.010 mol dm^{-3} hydrochloric acid is added to 990.0 cm^3 of water to give solution A. 10.0 cm^3 of solution A is added to 90 cm^3 of water to give solution B. 1.00 cm^3 of solution B is taken and added to 999 cm^3 of water to give solution C. State the pH of solutions A and B and predict the approximate pH of solution C. [3]

6 **a** Write an equation for the dissociation of methanoic acid (HCOOH) in water. [1]

b State whether methanoic acid is a strong or weak acid. [1]

c Write an equation for the reaction between methanoic acid and magnesium. [1]

d Explain how adding a few pellets of sodium hydroxide to 25 cm^3 of methanoic acid will affect the percentage ionisation (dissociation) of the acid. [3]

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