Test yourself

Chapter 1

1   What is the balanced equation for the reaction between trimanganese tetroxide and aluminium?

   A $Mn_3O_4 + 4Al \rightarrow 2Al_2O_3 + 3Mn$

   B $3Mn_3O_4 + 8Al \rightarrow 4Al_2O_3 + 9Mn$

   C $2Mn_3O_4 + 8Al \rightarrow 4Al_2O_3 + 6Mn$

   D $4Mn_3O_4 + 8Al \rightarrow 4Al_2O_3 + 12Mn$

2   What is the Avogadro constant?

   A   The number of atoms in 1 gram of any element

   B   The number of atoms in 1 mole of molecules of any element

   C   The number of atoms in the formula mass of a compound

   D   The number of atoms in 1 mole of atoms of any element

3   What is the mass of carbon dioxide (molar mass = $44.0\,\mathrm{g\,mol^{-1}}$) in $1200\,\mathrm{cm^3}$ of carbon dioxide?

   A $2200\,\mathrm{g}$

   B $52.8\,\mathrm{g}$

   C $2.2\,\mathrm{g}$

   D $0.05\,\mathrm{g}$

4 What is the concentration of chloride ions in a solution containing 0.02 mol of calcium chloride, $CaCl_2$, in 200 cm^3 of solution?

    A   0.01 mol dm^{-3}

    B   0.02 mol dm^{-3}

    C   0.1 mol dm^{-3}

    D   0.2 mol dm^{-3}

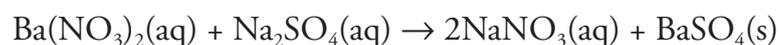**5** What information is given by a molecular formula?

    A   The ratio of each type of atom in a molecule

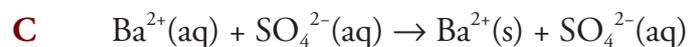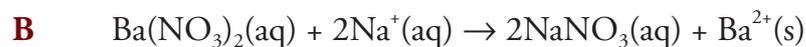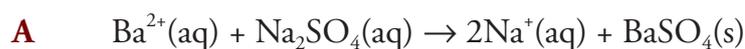   **B**   The number of each type of atom in a molecule

    C   The arrangement of the atoms in a molecule

    D   The number of atoms in a molecule

6 The equation for a reaction is:

$$Ba(NO_3)_2(aq) + Na_2SO_4(aq) \rightarrow 2NaNO_3(aq) + BaSO_4(s)$$

What is the ionic equation for the reaction?

    A $Ba^{2+}(aq) + Na_2SO_4(aq) \rightarrow 2Na^+(aq) + BaSO_4(s)$

    B $Ba(NO_3)_2(aq) + 2Na^+(aq) \rightarrow 2NaNO_3(aq) + Ba^{2+}(s)$

    C $Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow Ba^{2+}(s) + SO_4^{2-}(aq)$

    D $Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$

7   An oxide of copper contains 0.635 g of copper and 0.080 g of oxygen by mass.
(A_r values: Cu = 63.5, O = 16.0)

What is the empirical formula of this oxide of copper?

A Cu_2O

B CuO

C CuO_2

D Cu_2O_3

8   100 cm^3 of an aqueous solution of sodium hydroxide of concentration 0.10 mol dm^{-3} reacts with 200 cm^3 of aqueous phosphoric acid. The equation for the reaction is:

$$2NaOH + H_3PO_4 \rightarrow Na_2HPO_4 + 2H_2O$$

What is the concentration of the phosphoric acid?

A   0.025 mol dm^{-3}

B   0.050 mol dm^{-3}

C   0.10 mol dm^{-3}

D   0.040 mol dm^{-3}

9   Which one of the following reactions is accompanied by the largest percentage increase in volume?

A $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$

B $2NH_3(g) \rightarrow N_2(g) + 3H_2(g)$

C $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

D $S(s) + O_2(g) \rightarrow SO_2(g)$

10 Hydrochloric acid reacts with barium hydroxide:

$$2HCl + Ba(OH)_2 \rightarrow BaCl_2 + 2H_2O$$
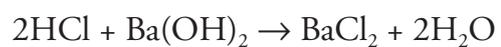
What is the volume of hydrochloric acid of concentration $0.050\,mol\,dm^{-3}$ which exactly neutralises $25.0\,cm^3$ of a $0.10\,mol\,dm^{-3}$ solution of barium hydroxide?

A $25\,cm^3$

B $50\,cm^3$

C $100\,cm^3$

D $200\,cm^3$