Chapter: Chemical Equations and Reactions

PART I In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

1. The production of a slightly soluble solid compound in a double-displacement reaction results in the formation of a
   a. gas.
   b. precipitate.
   c. combustion reaction.
   d. halogen.

2. To balance a chemical equation, it is permissible to adjust the
   a. coefficients.
   b. subscripts.
   c. formulas of the products.
   d. number of products.

3. In a chemical equation, the symbol \((aq)\) indicates that the substance is
   a. water.
   b. dissolved in water.
   c. an acid.
   d. insoluble.

4. The tendency for a replacement reaction to occur increases as the
   a. interval between any two elements in the activity series decreases.
   b. temperature decreases.
   c. valence electrons are used up.
   d. interval between any two elements in the activity series increases.

5. The coefficients in a chemical equation
   a. indicate the number of moles of each substance that react.
   b. show the number of grams of each substance that react.
   c. are the molar masses of the substances.
   d. show the valence electrons for each atom.

6. If metal X is lower than metal Y in the activity series, then
   a. X will replace ions of Y in solution.
   b. Y will replace ions of X in solution.
   c. Y will form oxides only indirectly.
   d. X will react with cold water.
7. In a reaction, the ions of two compounds exchange places in aqueous solution to form two new compounds. This reaction is called a
   a. synthesis reaction.
   b. decomposition reaction.
   c. single-displacement reaction.
   d. double-displacement reaction.

8. The use of a double arrow in a chemical equation indicates that the reaction
   a. is reversible.
   b. requires heat.
   c. is written backward.
   d. has not been confirmed in the laboratory.

Balanced Chemical Equation
Classify:

1. potassium metal is combined with chlorine gas
   \[ 2K(s) + Cl_2(g) \rightarrow 2KCl \]  
   Syn

2. A solution of carbonic acid is decomposed
   \[ H_2CO_3(aq) \rightarrow H_2O + CO_2 \]  
   Dec

3. Solid magnesium chlorate is decomposed
   \[ Mg(ClO_3)_2(s) \rightarrow MgCl_2 + 3O_2 \]  
   Dec

4. solid magnesium oxide is combined with water
   \[ MgO(s) + H_2O(l) \rightarrow Mg(OH)_2 \]  
   Syn
5. solutions of copper I chloride and silver nitrate are combined

\[ \text{CuCl}_2(\text{aq}) + \text{AgNO}_3(\text{aq}) \rightarrow \text{Cu(NO}_3)_2 + \text{AgCl(s)} \]

6. a strontium iodide solution is reacted with chlorine gas

\[ \text{SrI}_2 + \text{Cl}_2 \rightarrow \text{SrCl}_2 + \text{I}_2 \]

7. combustion of \( \text{C}_4\text{H}_{10} \text{ gas} \)

\[ 2 \text{C}_4\text{H}_{10}(g) + 13 \text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O} \]

8. sulfur trioxide is added to water

\[ \text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4 \]

9. solid dinitrogen trioxide is combined with water

\[ \text{N}_2\text{O}_3(s) + \text{H}_2\text{O} \rightarrow 2\text{HNO}_2 \]

10. combustion of \( \text{C}_3\text{H}_7\text{OH} \)

\[ 2\text{C}_3\text{H}_7\text{OH} + 9\text{O}_2 \rightarrow 6\text{CO}_2 + 8\text{H}_2\text{O} \]
11. Solid calcium is reacted with water

\[
\text{Ca}(s) + 2\text{H}_2\text{O} \rightarrow \text{Ca}(	ext{OH})_2 + \text{H}_2
\]

12. Solutions of nitric acid and tin II hydroxide react

\[
2\text{HNO}_3(\text{aq}) + \text{Sn}(	ext{OH})_2 \rightarrow 2\text{H}_2\text{O} + \text{Sn(NO}_3)_2(\text{aq})
\]

13. Solid potassium is combined with water

\[
\text{K}(s) + 2\text{H}_2\text{O} \rightarrow \text{KOH} + \text{H}_2
\]

14. Solutions of ammonium phosphate and iron II sulfide react

\[
2\left(\text{NH}_4\right)\text{PO}_4(\text{aq}) + 3\text{FeS}(\text{s}) \rightarrow 2\left(\text{NH}_4\right)_2\text{S}(\text{aq}) + \text{Fe}_3\left(\text{PO}_4\right)_2(\text{s})
\]

15. A piece of copper is placed in a solution of silver nitrate (assume copper II)

\[
\text{Cu}(s) + 2\text{AgNO}_3(\text{aq}) \rightarrow \text{Cu(NO}_3)_2 + 2\text{Ag}
\]