1. List some possible signals that a chemical reaction has occurred.

2. Balance each of the following chemical equations:
   (a) \( \text{FeCl}_2(aq) + \text{KOH}(aq) \rightarrow \text{Fe(OH)}_2(s) + \text{KCl}(aq) \)
   (b) \( \text{C}_4\text{H}_{10}(g) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(g) \)
   (c) \( \text{CsClO}_3(s) \rightarrow \text{CsCl}(s) + \text{O}_2(g) \)
   (d) \( \text{PBr}_3(l) + \text{H}_2\text{O}(l) \rightarrow \text{H}_3\text{PO}_4(aq) + \text{HBr}(aq) \)
   (e) \( \text{P}_4\text{O}_{10}(s) + \text{H}_2\text{O}(l) \rightarrow \text{H}_3\text{PO}_4(aq) \)
   (f) \( \text{C}_2\text{H}_5\text{OH}(l) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(g) \)

3. What is an oxidation-reduction reaction?

4. Explain what occurs in each of the following types of oxidation-reduction reactions:
   (a) composition  (b) decomposition  (c) replacement  (d) combustion

5. Complete and balance the following composition reactions:
   (a) magnesium metal is burned in oxygen
   (b) lithium metal reacts with fluorine gas
   (c) sodium metal reacts with nitrogen gas

6. Complete and balance the following decomposition reactions:
   (a) silver sulfide is decomposed
   (b) an electric current decomposes potassium bromide
   (c) nitrogen triiodide explodes on contact

7. Complete and balance the following replacement reactions:
   (a) magnesium metal is added to a solution of copper (II) chloride
   (b) chlorine gas is bubbled into a solution of potassium iodide
   (c) aluminum metal is added to hydrobromic acid
   (d) potassium metal is added to water
   (e) fluorine gas is bubbled into a solution of calcium chloride
   (f) zinc metal is added to acetic acid

8. Complete and balance the following combustion reactions:
   (a) hexane (\( \text{C}_6\text{H}_{14} \)) is burned
   (b) acetylene (\( \text{C}_2\text{H}_2 \)) is burned
   (c) methanol (\( \text{CH}_3\text{OH} \)) is burned

(Homework 5A continued on next page)
9. What is an exchange reaction?

10. Explain what occurs in each of the following types of exchange reactions:
    (a) precipitation         (b) acid-base

11. Complete and balance the following precipitation reactions:
    (a) solutions of silver nitrate and nickel (II) chloride are mixed
    (b) solutions of barium acetate and ammonium sulfate are mixed
    (b) solutions of aluminum bromide and potassium carbonate are mixed

12. Complete and balance the following acid-base reactions:
    (a) solutions of sodium hydroxide and nitric acid are mixed
    (b) solutions of potassium hydroxide and sulfuric acid are mixed
    (c) solutions of phosphoric acid and calcium hydroxide are mixed