Prepare Your Own Summary

In this chapter, you learned to classify reactions as one of six different types as well as predict the identity of the products of the reaction. You investigated the factors that affect the rate of chemical reaction and examined the role of catalysts in reaction rate. Create your own summary of the key ideas from this chapter. You may include graphic organizers or illustrations with your notes. (See Science Skill 11 for help with graphic organizers.) Use the following headings to organize your notes:

1. Six Types of Chemical Reactions
2. Classifying and Predicting Products of Reactions Based on the Reactants Only
3. Examples of Reactions Occurring at Different Rates
4. Four Factors Affecting the Rates of Reactions.

Checking Concepts

1. Identify each of the following reactions as synthesis, decomposition, single replacement, double replacement, neutralization (acid-base), or combustion.
   (a) $H_3PO_4 + 3NaOH \rightarrow Na_3PO_4 + 3H_2O$
   (b) $P_4 + 5O_2 \rightarrow P_4O_{10}$
   (c) $2Al + N_2 \rightarrow 2AlN$
   (d) $2HBr \rightarrow H_2 + Br_2$
   (e) $HF + KOH \rightarrow KF + H_2O$
   (f) $Au(NO_3)_3 + 3KI \rightarrow AuI_3 + 3KNO_3$
   (g) $Mg + 2\ HCl \rightarrow MgCl_2 + H_2$
   (h) $2Ti(NO_3)_3 + 3Cu \rightarrow 2Ti + 3Cu(NO_3)_2$
   (i) $(NH_4)_2CO_3 + Mn(NO_3)_2 \rightarrow 2NH_4NO_3 + MnCO_3$
   (j) $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$
2. Each reaction below has been identified by type. Use this information to help predict products. Copy and then complete each equation by writing the products of the reactions. **Hint:** Use the charges shown on the periodic table in Figure 4.3 on page 172. Remember to include subscripts and parentheses when required.
   (a) $Al + F_2 \rightarrow$ synthesis
   (b) $K + O_2 \rightarrow$ synthesis
   (c) $C_2H_6 + O_2 \rightarrow$ combustion
   (d) $C_6H_{12}O_4 + O_2 \rightarrow$ combustion
   (e) $Rb_2O \rightarrow$ decomposition
   (f) $SrF_2 \rightarrow$ decomposition
   (g) $BaCl_2 + Pb(NO_3)_2 \rightarrow$ double replacement
   (h) $AgNO_3 + K_2Cr_2O_7 \rightarrow$ double replacement
   (i) $Br_2 + NiI_3 \rightarrow$ single replacement, element is a non-metal
   (j) $Cl_2 + Mg_3N_2 \rightarrow$ single replacement, element is a non-metal
   (k) $HCl + Mo(OH)_2 \rightarrow$ neutralization (acid-base)
   (l) $Sn(OH)_2 + HClO_3 \rightarrow$ neutralization (acid-base)
   (m) $Al + CuI_2 \rightarrow$ single replacement, element is a metal
   (n) $Mg + FeF_2 \rightarrow$ single replacement, element is a metal
3. Which type(s) of reactions match the following descriptions?
   (a) There is only one reactant.
   (b) There is only one product.
   (c) The reactants are an acid and a base.
   (d) The products are an element and a compound.
   (e) The products are carbon dioxide and water.
   (f) Both reactants are compounds.
   (g) One reactant is an element. The other is a compound.