

Solving Problems: A Chemistry Handbook Answer Key

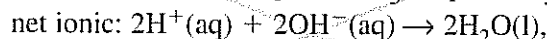
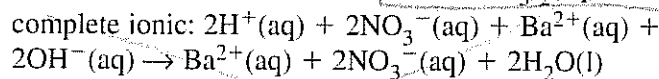
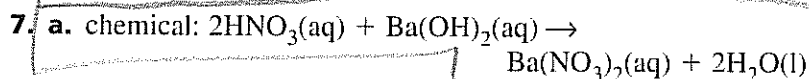
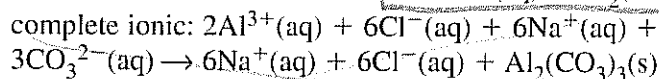
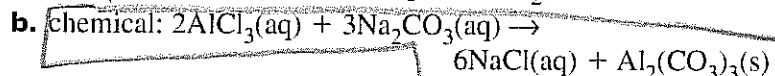
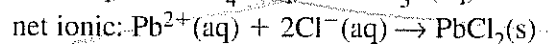
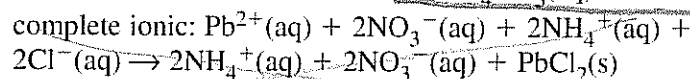
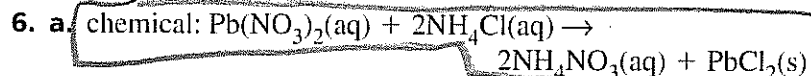
21. Resonance occurs when more than one valid Lewis structure can be written for a molecule or an ion.
22. The VSEPR model is used to determine molecular shape.
23. Hybridization is a process in which atomic orbitals are mixed to form new, identical hybrid orbitals.
24. A bond is polar when there is an electronegativity difference between the two bonded atoms. A molecule is polar when there are polar bonds and the molecular shape is not symmetric.

Chapter 9

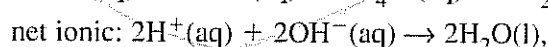
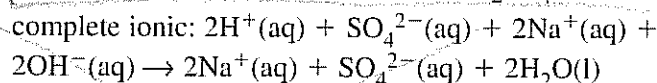
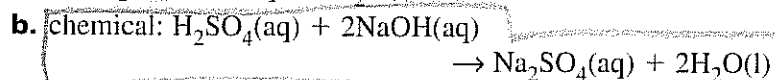
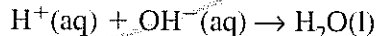
Practice Problems

1.
 - a. lithium(s) + chlorine(g) \rightarrow lithium chloride(s)
 $\text{Li(s)} + \text{Cl}_2\text{(g)} \rightarrow \text{LiCl(s)}$
 - b. nitrogen(g) + oxygen(g) \rightarrow nitrogen dioxide(g)
 $\text{N}_2\text{(g)} + \text{O}_2\text{(g)} \rightarrow \text{NO}_2\text{(g)}$
 - c. iron(s) + copper(II) nitrate(aq) \rightarrow copper(s) + iron(II) nitrate(aq)
 $\text{Fe(s)} + \text{Cu(NO}_3)_2\text{(aq)} \rightarrow \text{Cu(s)} + \text{Fe(NO}_3)_2\text{(aq)}$
2.
 - a. $2\text{K(s)} + 2\text{H}_2\text{O(l)} \rightarrow \text{H}_2\text{(g)} + 2\text{KOH(aq)}$
 - b. $\text{CaCl}_2\text{(aq)} + \text{Na}_2\text{CO}_3\text{(aq)} \rightarrow \text{CaCO}_3\text{(s)} + 2\text{NaCl(aq)}$
 - c. $\text{Br}_2\text{(l)} + 2\text{LiI(s)} \rightarrow 2\text{LiBr(s)} + \text{I}_2\text{(s)}$
3.
 - a. synthesis; $\text{N}_2\text{(g)} + 3\text{H}_2\text{(g)} \rightarrow 2\text{NH}_3\text{(g)}$
 - b. decomposition; already balanced
 - c. synthesis and combustion; $2\text{Se(s)} + 3\text{O}_2\text{(g)} \rightarrow 2\text{SeO}_3\text{(g)}$
 - d. combustion; $\text{C}_2\text{H}_4\text{(g)} + 3\text{O}_2\text{(g)} \rightarrow 2\text{CO}_2\text{(g)} + 2\text{H}_2\text{O(g)}$
4.
 - a. yes; $\text{Cl}_2\text{(g)} + 2\text{KI(aq)} \rightarrow 2\text{KCl(aq)} + \text{I}_2\text{(s)}$
 - b. yes; $\text{Mg(s)} + \text{CuSO}_4\text{(aq)} \rightarrow \text{MgSO}_4\text{(aq)} + \text{Cu(s)}$
 - c. no
 - d. yes; $\text{Pb(s)} + 2\text{AgNO}_3\text{(aq)} \rightarrow \text{Pb(NO}_3)_2\text{(aq)} + 2\text{Ag(s)}$
5.
 - a. $\text{ZnBr}_2\text{(aq)} + 2\text{KOH(aq)} \rightarrow 2\text{KBr(aq)} + \text{Zn(OH)}_2\text{(s)}$
 - b. $\text{CuSO}_4\text{(aq)} + \text{BaCl}_2\text{(aq)} \rightarrow \text{CuCl}_2\text{(aq)} + \text{BaSO}_4\text{(s)}$
 - c. $2\text{Fe(NO}_3)_3\text{(aq)} + 3\text{Na}_2\text{CO}_3\text{(aq)} \rightarrow$
 $\text{Fe}_2\text{(CO}_3)_3\text{(s)} + 6\text{NaNO}_3\text{(aq)}$

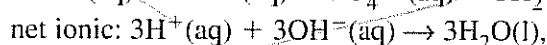
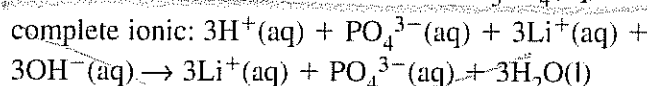
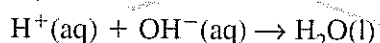
Solving Problems: A Chemistry Handbook **Answer Key**



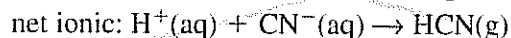
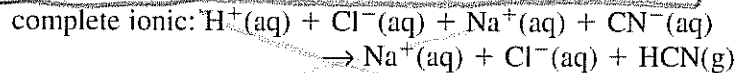
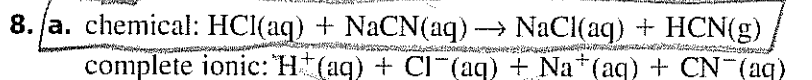
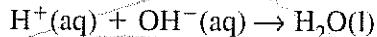
or, with coefficients reduced to lowest terms,

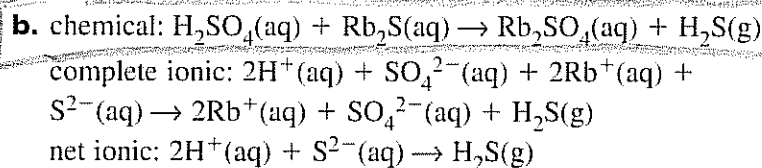


or, with coefficients reduced to lowest terms,



or, with coefficients reduced to lowest terms,



**Chapter 9 Review**

- 9.** A chemical reaction is a process in which the atoms of one or more substances are rearranged to form different substances. The reactants are shown to the left of the arrow, the products to the right. Physical states are shown by means of symbols in parentheses.
- 10.** All of the equations identify the reactants and products, use plus signs to separate the reactants and products, use an arrow to indicate "yield," and use symbols to indicate the physical states of the substances. Word equations show the names of the substances. Skeleton equations show the chemical formulas of the substances but are not balanced in terms of numbers of atoms. Balanced chemical equations also show chemical formulas but use coefficients to balance the number of atoms of each element on both sides of the equation.
- 11.** Write the skeleton equation. Count the atoms of the elements in the reactants and in the products. Change coefficients to make the number of atoms of each element equal on both sides of the equation. Write the coefficients in their lowest possible ratio. Check your work.
- 12.** In synthesis reactions, two or more substances react to produce a single product. In combustion reactions, oxygen combines with a substance and energy is released as light and heat. In decomposition reactions, a single compound breaks down into two or more elements or new compounds.
- 13.** In single-replacement reactions, atoms of one element replace the atoms of another element in a compound. In double-replacement reactions, there is an exchange of positive ions between two compounds.
- 14.** An aqueous solution is a solution in which the solvent is water. A solid that is formed when two aqueous solutions are mixed is called a precipitate.

16. gas, precipitate, water