Name _____ Date _____ Class _____

CHAPTER 8 REVIEW

Chemical Equations and Reactions

SECTION 1

SHORT ANSWER **Answer the following questions in the space provided.**

1. Match the symbol on the left with its appropriate description on the right.

d $\xrightarrow{\Delta}$	**(a)** A precipitate forms.
a $\downarrow$	**(b)** A gas forms.
b $\uparrow$	**(c)** A reversible reaction occurs.
f (l)	**(d)** Heat is applied to the reactants.
e (aq)	**(e)** A chemical is dissolved in water.
c $\rightleftarrows$	**(f)** A chemical is in the liquid state.

2. Finish balancing the following equation:

$3Fe_3O_4 +$ 8 $Al \rightarrow$ 4 $Al_2O_3 +$ 9 Fe

3. In each of the following formulas, write the total number of atoms present.

12 atoms	**a.** $4SO_2$
16 atoms	**b.** $8O_2$
51 atoms	**c.** $3Al_2(SO_4)_3$
3×10^{24} atoms	**d.** 6×10^{23} HNO_3

4. Convert the following word equation into a balanced chemical equation:
aluminum metal + copper(II) fluoride → aluminum fluoride + copper metal

$2Al(s) + 3CuF_2(aq) \rightarrow 2AlF_3(aq) + 3Cu(s)$

5. One way to test the salinity of a water sample is to add a few drops of silver nitrate solution with a known concentration. As the solutions of sodium chloride and silver nitrate mix, a precipitate of silver chloride forms, and sodium nitrate is left in solution. Translate these sentences into a balanced chemical equation.

$NaCl(aq) + AgNO_3(aq) \rightarrow AgCl(s) + NaNO_3(aq)$

6. **a.** Balance the following equation: $NaHCO_3(s) \xrightarrow{\Delta} Na_2CO_3(s) + H_2O(g) + CO_2(g)$

$2NaHCO_3(s) \xrightarrow{\Delta} Na_2CO_3(s) + H_2O(g) + CO_2(g)$

Name _____ Date _____ Class _____

SECTION 1 continued

b. Translate the chemical equation in part **a** into a sentence.

When solid sodium hydrogen carbonate (bicarbonate) is heated, it decomposes into solid sodium carbonate while releasing carbon dioxide gas and water vapor.

7. The poisonous gas hydrogen sulfide, H_2S, can be neutralized with a base such as sodium hydroxide, NaOH. The unbalanced equation for this reaction follows:

$$NaOH(aq) + H_2S(g) \rightarrow Na_2S(aq) + H_2O(l)$$

A student who was asked to balance this equation wrote the following:

$$Na_2OH(aq) + H_2S(g) \rightarrow Na_2S(aq) + H_3O(l)$$

Is this equation balanced? Is it correct? Explain why or why not, and supply the correct balanced equation if necessary.

It is balanced but incorrect. In two of the formulas the subscripts were changed, which changed the compounds involved. Water is not H_3O, and sodium hydroxide is not Na_2OH. The correct balanced equation is $2NaOH + H_2S \rightarrow Na_2S + 2H_2O$.

PROBLEM **Write the answer on the line to the left. Show all your work in the space provided.**

8. Recall that coefficients in a balanced chemical equation give relative amounts of moles as well as numbers of molecules.

30 mol **a.** Calculate the number of moles of CO_2 that form if 10 mol of C_3H_4 react according to the following balanced equation:

$$C_3H_4 + 4O_2 \rightarrow 3CO_2 + 2H_2O$$

40 mol **b.** Calculate the number of moles of O_2 that are consumed.

Name _____ Date _____ Class _____

CHAPTER 8 REVIEW

Chemical Equations and Reactions

SECTION 2

SHORT ANSWER **Answer the following questions in the space provided.**

1. Match the equation type on the left to its representation on the right.

c	synthesis	**(a)** $AX + BY \rightarrow AY + BX$
d	decomposition	**(b)** $A + BX \rightarrow AX + B$
b	single-displacement	**(c)** $A + B \rightarrow AX$
a	double-displacement	**(d)** $AX \rightarrow A + X$

2. c In the reaction described by the equation $2Al(s) + 3Fe(NO_3)_2(aq) \rightarrow 3Fe(s) + 2Al(NO_3)_3(aq)$, iron has been replaced by

(a) nitrate. **(c)** aluminum.
(b) water. **(d)** nitrogen.

3. a Of the following chemical equations, the only reaction that is both synthesis and combustion is

(a) $C(s) + O_2(g) \rightarrow CO_2(g)$.
(b) $2C_4H_{10}(l) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(l)$.
(c) $6CO_2(g) + 6H_2O(g) \rightarrow C_6H_{12}O_6(aq) + 6O_2(g)$.
(d) $C_6H_{12}O_6(aq) + 6O_2(g) \rightarrow 6CO_2(aq) + 6H_2O(l)$.

4. b Of the following chemical equations, the only reaction that is both combustion and decomposition is

(a) $S(s) + O_2(g) \rightarrow SO_2(g)$.
(b) $2C_4H_{10}(l) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(l)$.
(c) $2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$.
(d) $2HgO(s) \xrightarrow{\Delta} 2Hg(l) + O_2(g)$.

5. Identify the products when the following substances decompose:

its separate elements	**a.** a binary compound
metal oxide + water	**b.** most metal hydroxides
metal oxide + carbon dioxide	**c.** a metal carbonate
water + sulfur dioxide	**d.** the acid H_2SO_3

6. The complete combustion of a hydrocarbon in excess oxygen yields the products CO_2 and H_2O.

Name _____ Date _____ Class _____

SECTION 2 continued

7. For the following four reactions, identify the type, predict the products (make sure formulas are correct), and balance the equations:

a. $Cl_2(aq) + NaI(aq) \rightarrow$

single-displacement; $Cl_2(aq) + 2NaI(aq) \rightarrow I_2(aq) + 2NaCl(aq)$

b. $Mg(s) + N_2(g) \rightarrow$

synthesis; $3Mg(s) + N_2(g) \rightarrow Mg_3N_2(s)$

c. $Co(NO_3)_2(aq) + H_2S(aq) \rightarrow$

double-displacement; $Co(NO_3)_2(aq) + H_2S(aq) \rightarrow CoS(s) + 2HNO_3(aq)$

d. $C_2H_5OH(aq) + O_2(g) \rightarrow$

combustion; $C_2H_5OH(aq) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l)$

8. Acetylene gas, C_2H_2, is burned to provide the high temperature needed in welding.

a. Write the balanced chemical equation for the combustion of C_2H_2 in oxygen.

$2C_2H_2(g) + 5O_2(g) \rightarrow 4CO_2(g) + 2H_2O(l)$

2.0 mol **b.** If 1.0 mol of C_2H_2 is burned, how many moles of CO_2 are formed?

2.5 mol **c.** If 1.0 mol of C_2H_2 is burned how many moles of oxygen gas are consumed?

9. a. Write the balanced chemical equation for the reaction that occurs when solutions of barium chloride and sodium carbonate are mixed. Refer to **Table 1** on page 437 in **Chapter 13** for solubility.

$BaCl_2(aq) + Na_2CO_3(aq) \rightarrow BaCO_3(s) + 2NaCl(aq)$

b. To which of the five basic types of reactions does this reaction belong?

double-displacement

10. For the commercial preparation of aluminum metal, the metal is extracted by electrolysis from alumina, Al_2O_3. Write the balanced chemical equation for the electrolysis of molten Al_2O_3.

$2Al_2O_3(l) \rightarrow 4Al(s) + 3O_2(g)$

Name _____ Date _____ Class _____

CHAPTER 8 REVIEW

Chemical Equations and Reactions

SECTION 3

SHORT ANSWER Answer the following questions in the space provided.

1. List four metals that will *not* replace hydrogen in an acid.

Choose from Cu, Ag, Au, Pt, Sb, Bi, and Hg.

2. Consider the metals iron and silver, both listed in **Table 3** on page 286 of the text. Which one readily forms an oxide in nature, and which one does not?

Fe forms an oxide in nature, and Ag does not, because it is much less active.

3. In each of the following pairs, identify the more active element.

F₂ **a.** F_2 and I_2

K **b.** Mn and K

H **c.** Cu and H

4. Use the information in **Table 3** on page 286 of the text to predict whether each of the following reactions will occur. For each reaction that will occur, complete the chemical equation by writing in the products formed and balancing the final equation.

a. $Al(s) + CH_3COOH(aq) \xrightarrow{50°C}$

$2Al(s) + 6CH_3COOH(aq) \xrightarrow{50°C} 2Al(CH_3COO)_3(aq) + 3H_2(g)$

b. $Al(s) + H_2O(l) \xrightarrow{50°C}$

no reaction

c. $Cr(s) + CdCl_2(aq) \rightarrow$

$2Cr(s) + 3CdCl_2(aq) \rightarrow 2CrCl_3(aq) + 3Cd(s)$

d. $Br_2(l) + KCl(aq) \rightarrow$

no reaction

Name _____ Date _____ Class _____

SECTION 3 continued

5. Very active metals will react with water to release hydrogen gas and form hydroxides.

a. Complete, and then balance, the equation for the reaction of Ca(*s*) with water.

$Ca(s) + 2H_2O(l) \rightarrow Ca(OH)_2(aq) + H_2(g)$

b. The reaction of rubidium, Rb, with water is faster and more violent than the reaction of Na with water. Use the atomic structure and radius of each metal to account for this difference.

Both are alkali metals and readily form a stable 1+ ion by ejecting an s^1 electron. Rb has a larger radius than Na and holds its electron less tightly, making it more reactive.

6. Gold, Au, is often used in jewelry. How does the relative activity of Au relate to its use in jewelry?

Gold has a low reactivity and therefore does not corrode over time.

7. Explain how to use an activity series to predict the outcome of a single-displacement reaction.

In single-displacement reactions, if the activity of the free element is greater than that of the element in the compound, the reaction will take place.

8. Aluminum is above copper in the activity series. Will aluminum metal react with copper(II) nitrate, $Cu(NO_3)_2$, to form aluminum nitrate, $Al(NO_3)_3$? If so, write the balanced chemical equation for the reaction.

Yes; because aluminum is above copper in the activity series, aluminum metal will replace copper in copper(II) nitrate.

$2Al(s) + 3Cu(NO_3)_2(aq) \rightarrow 2Al(NO_3)_3(aq) + 3Cu(s)$

Name _____ Date _____ Class _____

CHAPTER 8 REVIEW

Chemical Equations and Reactions

MIXED REVIEW

SHORT ANSWER **Answer the following questions in the space provided.**

1. b A balanced chemical equation represents all the following *except*

(a) experimentally established facts.
(b) the mechanism by which reactants combine to form products.
(c) identities of reactants and products in a chemical reaction.
(d) relative quantities of reactants and products in a chemical reaction.

2. d According to the law of conservation of mass, the total mass of the reacting substances is

(a) always more than the total mass of the products.
(b) always less than the total mass of the products.
(c) sometimes more and sometimes less than the total mass of the products.
(d) always equal to the total mass of the products.

3. Predict whether each of the following chemical reactions will occur. For each reaction that will occur, identify the reaction type and complete the chemical equation by writing in the products formed and balancing the final equation. General solubility rules are in **Table 1** on page 437 of the text.

a. $Ba(NO_3)_2(aq) + Na_3PO_4(aq) \rightarrow$

double-displacement; $3Ba(NO_3)_2(aq) + 2Na_3PO_4(aq) \rightarrow$

$Ba_3(PO_4)_2(s) + 6NaNO_3(aq)$

b. $Al(s) + O_2(g) \rightarrow$

synthesis; $4Al(s) + 3O_2(g) \rightarrow 2Al_2O_3(s)$

c. $I_2(s) + NaBr(aq) \rightarrow$

no reaction

d. $C_3H_4(g) + O_2(g) \rightarrow$

combustion; $C_3H_4(g) + 4O_2(g) \rightarrow 3CO_2(g) + 2H_2O(g)$

Name _____ Date _____ Class _____

MIXED REVIEW continued

e. electrolysis of molten potassium chloride

decomposition; $2KCl(l) \rightarrow 2K(s) + Cl_2(g)$

4. Some small rockets are powered by the reaction represented by the following unbalanced equation:

$$(CH_3)_2N_2H_2(l) + N_2O_4(g) \rightarrow N_2(g) + H_2O(g) + CO_2(g) + \text{heat}$$

a. Translate this chemical equation into a sentence. (Hint: The name for $(CH_3)_2N_2H_2$ is dimethylhydrazine.)

When liquid dimethylhydrazine is mixed with dinitrogen tetroxide gas, the products are nitrogen gas, water vapor, and gaseous carbon dioxide, along with energy in the form of heat.

b. Balance the formula equation.

$(CH_3)_2N_2H_2\ (l) + 2N_2O_4(g) \rightarrow 3N_2(g) + 4H_2O(g) + 2CO_2(g)$

5. In the laboratory, you are given two small chips of each of the unknown metals X, Y, and Z, along with dropper bottles containing solutions of $XCl_2(aq)$ and $ZCl_2(aq)$. Describe an experimental strategy you could use to determine the relative activities of X, Y, and Z.

Wording and strategies will vary. First, place one chip of Y into $XCl_2(aq)$ and another into $ZCl_2(aq)$. If Y reacts with one solution but not the other, the activity series can be established. If Y replaces X but not Z, the series is Z > Y > X. If Y replaces Z but not X, the series is X > Y > Z. If Y reacts with neither solution, Y is at the bottom of the series. Next, put one chip of X into $ZCl_2(aq)$. If it reacts, the series is X > Z > Y. If it does not react, the series is Z > X > Y. If Y reacts with both solutions, Y is the most reactive. Last, put a chip of X into ZCl_2(aq). If it reacts, the series is Y > X > Z. If it does not react, the series is Y > Z > X.

6. List the observations that would indicate that a reaction had occurred.

Signs of a reaction include generation of energy as heat or light, formation of a precipitate, formation of a gas, and change in color.

Name _____ Date _____ Class _____

CHAPTER 9 REVIEW

Stoichiometry

SECTION 1

SHORT ANSWER **Answer the following questions in the space provided.**

1. b The coefficients in a chemical equation represent the

(a) masses in grams of all reactants and products.
(b) relative number of moles of reactants and products.
(c) number of atoms of each element in each compound in a reaction.
(d) number of valence electrons involved in a reaction.

2. d Which of the following would not be studied within the topic of stoichiometry?

(a) the mole ratio of Al to Cl in the compound aluminum chloride
(b) the mass of carbon produced when a known mass of sucrose decomposes
(c) the number of moles of hydrogen that will react with a known quantity of oxygen
(d) the amount of energy required to break the ionic bonds in CaF_2

3. a A balanced chemical equation allows you to determine the

(a) mole ratio of any two substances in the reaction.
(b) energy released in the reaction.
(c) electron configuration of all elements in the reaction.
(d) reaction mechanism involved in the reaction.

4. c The relative number of moles of hydrogen to moles of oxygen that react to form water represents a(n)

(a) reaction sequence.
(b) bond energy.
(c) mole ratio.
(d) element proportion.

5. Given the reaction represented by the following unbalanced equation: $N_2O(g) + O_2(g) \rightarrow NO_2(g)$

a. Balance the equation.

$2N_2O(g) + 3O_2(g) \rightarrow 4NO_2(g)$

4 mol NO_2:3 mol O_2 **b.** What is the mole ratio of NO_2 to O_2?

15.0 mol **c.** If 20.0 mol of NO_2 form, how many moles of O_2 must have been consumed?

True **d.** Twice as many moles of NO_2 form as moles of N_2O are consumed. True or False?

False **e.** Twice as many grams of NO_2 form as grams of N_2O are consumed. True or False?

Name _____ Date _____ Class _____

SECTION 1 continued

PROBLEMS **Write the answer on the line to the left. Show all your work in the space provided.**

6. Given the following equation: $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

28.0 g/mol N_2 **a.** Determine to one decimal place the molar mass of each substance and express each mass in grams per mole.

2.0 g/mol H_2

17.0 g/mol NH_3

b. There are six different mole ratios in this system. Write out each one.

3 mol H_2:1 mol N_2; 2 mol NH_3:1 mol N_2; 2 mol NH_3:3 mol H_2; or their reciprocals

7. Given the following equation: $4NH_3(g) + 6NO(g) \rightarrow 5N_2(g) + 6H_2O(g)$

1 mol NO:1 mol H_2O **a.** What is the mole ratio of NO to H_2O?

3 mol NO:2 mol NH_3 **b.** What is the mole ratio of NO to NH_3?

0.360 mol **c.** If 0.240 mol of NH_3 react according to the above equation, how many moles of NO will be consumed?

8. Propyne gas can be used as a fuel. The combustion reaction of propyne can be represented by the following equation:

$$C_3H_4(g) + 4O_2(g) \rightarrow 3CO_2(g) + 2H_2O(g)$$

a. Write all the possible mole ratios in this system.

4 mol O_2:1 mol C_3H_4; 3 mol CO_2:1 mol C_3H_4; 2 mol H_2O:1 mol C_3H_4;
3 mol CO_2:4 mol O_2; 2 mol H_2O:4 mol O_2; 2 mol H_2O:3 mol CO_2;
or their reciprocals

b. Suppose that x moles of water form in the above reaction. The other three mole quantities (*not* in order) are $2x$, $1.5x$, and $0.5x$. Match these quantities to their respective components in the equation above.

C_3H_4 is $0.5x$; O_2 is $2x$; and CO_2 is $1.5x$

Name _____ Date _____ Class _____

MIXED REVIEW continued

c. If 0.1 mol of N_2 combine with H_2, what must be true about the quantity of H_2 for N_2 to be the limiting reactant?

At least 0.3 mol of H_2 must be provided.

4. **75%** If a reaction's theoretical yield is 8.0 g and the actual yield is 6.0 g, what is the percentage yield?

5. Joseph Priestley generated oxygen gas by strongly heating mercury(II) oxide according to the following equation:

$$2HgO(s) \rightarrow 2Hg(l) + O_2(g)$$

0.0693 mol **a.** If 15.0 g HgO decompose, how many moles of HgO does this represent?

0.0346 mol **b.** How many moles of O_2 are theoretically produced?

1.11 g **c.** How many grams of O_2 is this?

0.786 L **d.** If the density of O_2 gas is 1.41 g/L, how many liters of O_2 are produced?

1.05 g **e.** If the percentage yield is 95.0%, how many grams of O_2 are actually collected?

Name _____ Date _____ Class _____

CHAPTER 9 REVIEW

Stoichiometry

SECTION 2

PROBLEMS **Write the answer on the line to the left. Show all your work in the space provided.**

1. 4.5 mol

The following equation represents a laboratory preparation for oxygen gas:

$2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$

How many moles of O_2 form if 3.0 mol of $KClO_3$ are totally consumed?

2. 200 g

Given the following equation: $H_2(g) + F_2(g) \rightarrow 2HF(g)$
How many grams of HF gas are produced as 5 mol of fluorine react?

3. 0.53 g

Water can be made to decompose into its elements by using electricity according to the following equation:

$2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$

How many grams of O_2 are produced when 0.033 mol of water decompose?

4. 34.8 g

Sodium metal reacts with water to produce NaOH according to the following equation:

$2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$

How many grams of NaOH are produced if 20.0 g of sodium metal react with excess oxygen?

Name _____ Date _____ Class _____

SECTION 2 continued

5. 60.2 g

a. What mass of oxygen gas is produced if 100. g of lithium perchlorate are heated and allowed to decompose according to the following equation?

$LiClO_4(s) \rightarrow LiCl(s) + 2O_2(g)$

42.1 L

b. The oxygen gas produced in part **a** has a density of 1.43 g/L. Calculate the volume of this gas.

6. A car air bag requires 70. L of nitrogen gas to inflate properly. The following equation represents the production of nitrogen gas:

$2NaN_3(s) \rightarrow 2Na(s) + 3N_2(g)$

81 g

a. The density of nitrogen gas is typically 1.16 g/L at room temperature. Calculate the number of grams of N_2 that are needed to inflate the air bag.

2.9 mol

b. Calculate the number of moles of N_2 that are needed.

1.3×10^2 g

c. Calculate the number of grams of NaN_3 that must be used to generate the amount of N_2 necessary to properly inflate the air bag.

Name _____ Date _____ Class _____

CHAPTER 9 REVIEW

Stoichiometry

SECTION 3

PROBLEMS **Write the answer on the line to the left. Show all your work in the space provided.**

1. 88% The actual yield of a reaction is 22 g and the theoretical yield is 25 g. Calculate the percentage yield.

2. 6.0 mol of N_2 are mixed with 12.0 mol of H_2 according to the following equation:

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

N_2; 2.0 mol **a.** Which chemical is in excess? What is the excess in moles?

8.0 mol **b.** Theoretically, how many moles of NH_3 will be produced?

6.4 mol **c.** If the percentage yield of NH_3 is 80%, how many moles of NH_3 are actually produced?

3. 0.050 mol of $Ca(OH)_2$ are combined with 0.080 mol of HCl according to the following equation:

$$Ca(OH)_2(aq) + 2HCl(aq) \rightarrow CaCl_2(aq) + 2H_2O(l)$$

0.10 mol **a.** How many moles of HCl are required to neutralize all 0.050 mol of $Ca(OH)_2$?

Name _____ Date _____ Class _____

SECTION 3 continued

HCl **b.** What is the limiting reactant in this neutralization reaction?

1.4 g **c.** How many grams of water will form in this reaction?

4. Acid rain can form in a two-step process, producing $HNO_3(aq)$.

$$N_2(g) + 2O_2(g) \rightarrow 2NO_2(g)$$

$$3NO_2(g) + H_2O(g) \rightarrow 2HNO_3(aq) + NO(g)$$

1.26×10^3 g **a.** A car burns 420. g of N_2 according to the above equations. How many grams of HNO_3 will be produced?

960. g **b.** For the above reactions to occur, O_2 must be in excess in the first step. What is the minimum amount of O_2 needed in grams?

6.9×10^2 L **c.** What volume does the amount of O_2 in part **b** occupy if its density is 1.4 g/L?

Name _____ Date _____ Class _____

CHAPTER 9 REVIEW

Stoichiometry

MIXED REVIEW

SHORT ANSWER **Answer the following questions in the space provided.**

1. Given the following equation: $C_3H_4(g) + xO_2(g) \rightarrow 3CO_2(g) + 2H_2O(g)$

4 **a.** What is the value of the coefficient x in this equation?

40.07 g/mol **b.** What is the molar mass of C_3H_4?

2 mol O_2:1 mol H_2O **c.** What is the mole ratio of O_2 to H_2O in the above equation?

0.20 mol **d.** How many moles are in an 8.0 g sample of C_3H_4?

3z **e.** If z mol of C_3H_4 react, how many moles of CO_2 are produced, in terms of z?

2. a. What is meant by *ideal conditions* relative to stoichiometric calculations?

The limiting reactant is completely converted to product with no losses, as dictated by the ratio of coefficients.

b. What function do ideal stoichiometric calculations serve?

They determine the theoretical yield of the products of the reaction.

c. Are actual yields typically larger or smaller than theoretical yields?

smaller

PROBLEMS **Write the answer on the line to the left. Show all your work in the space provided.**

3. Assume the reaction represented by the following equation goes all the way to completion:

$$N_2 + 3H_2 \rightarrow 2NH_3$$

4 mol **a.** If 6 mol of H_2 are consumed, how many moles of NH_3 are produced?

8.5 g **b.** How many grams are in a sample of NH_3 that contains 3.0×10^{23} molecules?

5 The Perdioc Law

Section: History of the Periodic Table

1. d	**2.** a
3. d	**4.** a
5. b	**6.** c
7. c	**8.** b
9. b	**10.** d

Section: Electron Configuration and the Periodic Table

1. b	**2.** d
3. b	**4.** a
5. b	**6.** b
7. b	**8.** d
9. c	**10.** c

Section: Electron Configuration and Periodic Properties

1. a	**2.** c
3. c	**4.** a
5. b	**6.** a
7. c	**8.** a
9. a	**10.** d

6 Chemical Bonding

Section: Introduction to Chemical Bonding

1. c	**2.** b
3. b	**4.** a
5. a	**6.** b
7. d	**8.** c
9. a	**10.** b

Section: Covalent Bonding and Molecular Compounds

1. c	**2.** c
3. c	**4.** b
5. a	**6.** b
7. d	**8.** d
9. a	**10.** a

Section: Ionic Bonding and Ionic Compounds

1. d	**2.** c
3. c	**4.** a
5. d	**6.** d
7. d	**8.** b
9. a	**10.** b

Section: Metallic Bonding

1. d	**2.** a
3. c	**4.** c
5. b	**6.** a
7. d	**8.** b
9. c	**10.** b

Section: Molecular Geometry

1. d	**2.** a
3. b	**4.** d
5. b	**6.** c
7. b	**8.** c
9. a	**10.** d

7 Chemical Formulas and Chemical Compounds

Section: Chemical Names and Formulas

1. b	**2.** c
3. c	**4.** a
5. d	**6.** c
7. b	**8.** a
9. d	**10.** c

Section: Oxidation Numbers

1. c	**2.** b
3. a	**4.** c
5. b	**6.** d
7. d	**8.** b
9. c	**10.** a

Section: Using Chemical Formulas

1. a	**2.** a
3. d	**4.** b
5. d	**6.** c
7. a	**8.** c
9. b	**10.** b

Section: Determining Chemical Formulas

1. c	**2.** a
3. b	**4.** d
5. c	**6.** c
7. a	**8.** c
9. b	**10.** b

8 Chemical Equations and Reactions

Section: Describing Chemical Reactions

1. b	**2.** d
3. d	**4.** c
5. c	**6.** d
7. d	**8.** c
9. d	**10.** d

Section: Types of Chemical Reactions

1. b	**2.** d
3. d	**4.** a
5. b	**6.** b
7. a	**8.** a
9. a	**10.** c

Section: Activity Series of the Elements

1. c	**2.** a
3. a	**4.** b
5. b	**6.** d
7. a	**8.** c
9. b	**10.** d

9 Stoichiometry

Section: Introduction to Stoichiometry

1. c	**2.** a
3. c	**4.** d
5. c	**6.** d
7. d	**8.** b
9. c	**10.** a

Section: Ideal Stoichiometric Calculations

1. b	**2.** d
3. b	**4.** b
5. a	**6.** c
7. d	**8.** c
9. d	**10.** a

Section: Limiting Reactants and Percentage Yield

1. b	**2.** d
3. c	**4.** c
5. b	**6.** c
7. c	**8.** d
9. d	**10.** b

10 States of Matter

Section: The Kinetic-Molecular Theory of Matter

1. b	**2.** c
3. d	**4.** a
5. c	**6.** b
7. b	**8.** c
9. a	**10.** b

Section: Liquids

1. a	**2.** c
3. c	**4.** c
5. d	**6.** b
7. c	**8.** a
9. a	**10.** a

Section: Solids

1. a	**2.** c
3. d	**4.** d
5. b	**6.** c
7. d	**8.** b
9. a	**10.** a

Section: Changes of State

1. a	**2.** b
3. b	**4.** c
5. b	**6.** b
7. a	**8.** a
9. c	**10.** c

Section: Water

1. c	**2.** c
3. b	**4.** d
5. c	**6.** a
7. a	**8.** b
9. c	**10.** a

11 Gases

Section: Gases and Pressure

1. a	**2.** c
3. d	**4.** a
5. b	**6.** c
7. a	**8.** c
9. c	**10.** a

Section: The Gas Laws

1. c	**2.** c
3. b	**4.** c
5. d	**6.** c
7. d	**8.** c
9. b	**10.** c

Section: Gas Volumes and the Ideal Gas Law

1. b	**2.** b
3. a	**4.** d
5. c	**6.** a
7. c	**8.** b
9. a	**10.** d

Section: Diffusion and Effusion

1. d	**2.** b
3. d	**4.** a
5. c	**6.** c
7. d	**8.** a
9. b	**10.** c