Name _____ Date _____ Class _____

CHAPTER 10 STUDY GUIDE FOR CONTENT MASTERY

Chemical Reactions

Section 10.1 Reactions and Equations

In your textbook, read about evidence of chemical reactions.

For each statement, write *yes* if evidence of a chemical reaction is present. Write *no* if there is no evidence of a chemical reaction.

yes **1.** A tomato smells rotten.

no **2.** A drinking glass breaks into smaller pieces.

no **3.** A piece of ice melts.

yes **4.** Drain cleaner is mixed with water and the solution becomes warm.

yes **5.** Candle wax burns.

no **6.** Molten candle wax solidifies.

yes **7.** Green leaves turn yellow and red as the seasons change.

yes **8.** Baking powder produces a gas that makes a cake rise.

In your textbook, read about how to represent chemical reactions and how to balance chemical equations.

Use the terms below to complete the passage. Each term may be used once, more than once, or not at all.

arrow	plus sign	(s)	(l)
reactant	product	(g)	(aq)

The fuel for the space shuttle is hydrogen, which burns in oxygen to produce water vapor and energy. In this chemical reaction, hydrogen is a(n) **(9)** reactant, oxygen is a(n) **(10)** reactant, and water vapor is a(n) **(11)** product. In a chemical equation for this reaction, a(n) **(12)** arrow is used to separate hydrogen and oxygen from water vapor and energy. A(n) **(13)** plus sign is used to separate the symbols for hydrogen and oxygen. A(n) **(14)** (g) symbol is used to tell the state of hydrogen in the reaction, a(n) **(15)** (g) symbol is used for the state of oxygen, and a(n) **(16)** (g) symbol is used for the state of water vapor.

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Section 10.1 *continued*

For each of the following chemical reactions, write a word equation, a skeleton equation, and a balanced chemical equation. Be sure to show the state of each reactant and product. If you need more help writing formulas or determining the state of a substance, refer to Chapters 8 and 9 and the periodic table on pages 156–157.

17. Solid mercury(II) oxide breaks down when heated, forming the elements mercury and oxygen.
mercury(II) oxide(s) → mercury(l) + oxygen(g); $HgO(s) \rightarrow Hg(l) + O_2(g)$; $2HgO(s) \rightarrow 2Hg(l) + O_2(g)$

18. Sodium metal reacts with water vapor in air to form solid sodium hydroxide and hydrogen.
sodium(s) + water(g) → sodium hydroxide(s) + hydrogen(g); $Na(s) + H_2O(g) \rightarrow NaOH(s) + H_2(g)$; $2Na(s) + 2H_2O(g) \rightarrow 2NaOH(s) + H_2(g)$

19. In the first step of refining zinc metal from its zinc sulfide ore, the ore is heated in the presence of oxygen. The products are solid zinc oxide and sulfur dioxide gas.
zinc sulfide(s) + oxygen(g) → zinc oxide(s) + sulfur dioxide(g); $ZnS(s) + O_2(g) \rightarrow ZnO(s) + SO_2(g)$; $2ZnS(s) + 3O_2(g) \rightarrow 2ZnO(s) + 2SO_2(g)$

20. The next step of refining zinc involves heating the zinc oxide in the presence of carbon. This reaction produces zinc vapor and carbon monoxide gas.
zinc oxide(s) + carbon(s) → zinc(g) + carbon monoxide(g); $ZnO(s) + C(s) \rightarrow Zn(g) + CO(g)$; $ZnO(s) + C(s) \rightarrow Zn(g) + CO(g)$

21. Certain pollutants in the air react with water vapor to form acids. For example, sulfur trioxide reacts with water vapor to form sulfuric acid.
sulfur trioxide(g) + water(g) → sulfuric acid(aq); $SO_3(g) + H_2O(g) \rightarrow H_2SO_4(aq)$; $SO_3(g) + H_2O(g) \rightarrow H_2SO_4(aq)$

22. Solid calcium carbonate is commonly used in antacids because it reacts with the hydrochloric acid found in the stomach. The products of this reaction are aqueous calcium chloride, carbon dioxide, and water.
calcium carbonate(s) + hydrochloric acid(aq) → calcium chloride(aq) + carbon dioxide(g) + water(l); $CaCO_3(s) + HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$; $CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$