Chapter 6.1: Types of Chemical Reactions

Name: _____ Date: _____ Block: _____

Warm-Up

1) ___ N_2 + ___ F_2 → ___ NF_3
2) ___ $KClO_3$ → ___ KCl + ___ O_2
3) ___ $C_{12}H_{22}O_{11}$ + ___ O_2 → ___ CO_2 + ___ H_2O
4) ___ $CuSO_4$ + ___ Fe → ___ $Fe_2(SO_4)_3$ + ___ Cu
5) ___ MgF_2 + ___ Li_2CO_3 → ___ $MgCO_3$ + ___ LiF
6) ___ H_3PO_4 + ___ NH_4OH → ___ H_2O + ___$(NH_4)_3PO_4$

Synthesis and Decomposition

Synthesis reactions are chemical reactions in which two or more substances react to form a new product. The general form of a synthesis reaction is written as: A + B → AB

Decomposition reactions are chemical reactions in which a reactant breaks down into two or more products. The general form of a decomposition reaction is written as: AB → A + B

Balance the following reactions and identify whether the reactions are synthesis or decomposition reactions.

	Balance the Reactions	Synthesis or Decomposition?
1.	__H_2SO_4 → __H_2O + __SO_3	
2.	__Cu + __S_8 → __Cu_2S	
3.	__$Zn(OH)_2$ → __ZnO + __H_2O	

Identify the following reaction types and predict the products. Then, balance the equations.

	Predict and Balance the Reactions	Synthesis or Decomposition?
4.	__Na + __I_2 → _____	
5.	hydrogen + chlorine ____ + _____ → _____	
6.	__Ag_2O → _____	

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SINGLE AND DOUBLE REPLACEMENT

Single replacement reactions are chemical reactions in which a metal or non-metal element replaces the corresponding metal or non-metal in an ionic compound. The general form of a single replacement reaction is written as A + BC → AC + B (A is a metal) or A + BC → C + BA (A is a non-metal).

Double replacement reactions are chemical reactions in which the positive ions in two ionic compounds 'switch places' to form two new ionic compounds. The general form of a double replacement reaction is written as AB + CD → AD + CB.

Balance the following reactions and identify whether they are single replacement or double replacement.

	Balance the Reactions	Single or Double Replacement?
7.	___KI + ___Br_2 → ___KBr + ___I_2	
8.	___$BaCl_2$ + $Al_2(SO_4)_3$ → ___$BaSO_4$ + ___$AlCl_3$	
9.	___$AgNO_3$ + Cu → ___$Cu(NO_3)_2$ + ___Ag	

Identify the following reaction types and predict the products. Then, balance the equations.

	Predict and Balance the Reactions	Single or Double Replacement?
10.	___$CuCl_2$ + ___F_2 → _____	
11.	___K_2CO_3 + ___$BaCl_2$ → _____	
12.	calcium + aluminum nitride _____ + _____ → _____	

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NEUTRALISATION

Neutralisation is a special example of a double replacement reaction where an acid and base react to form water and a salt. The general form of a neutralisation is HA + BOH → H_2O + BA.

Identify the following reaction types and predict the products. Then, balance the equations.

	Predict and Balance the Reactions
13.	___HCl + ___$Ba(OH)_2$ → _____
14.	___NaOH + ___CH_3COOH → _____
15.	___$Ca(OH)_2$ + ___H_3PO_4 → _____

COMBUSTION

Combustion is a reaction of an element or compound (often a hydrocarbon or alcohol) with oxygen to produce carbon dioxide and water. The general form of a hydrocarbon combustion reaction is C_xH_y + O_2 → CO_2 + H_2O. Alcohol combustion leads to the same products (carbon dioxide and water).

(Note: Both neutralisation and combustion reactions produce water as a product.)

Predict the products of the following combustion reactions. Then, balance the equations.

	Predict and Balance the Reactions
16.	___C_2H_6 + ___O_2 → _____
17.	___C_8H_{18} + ___O_2 → _____

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6.1 Important Vocabulary

Combustion: the rapid reaction of an element or compound (usually a hydrocarbon or alcohol) with oxygen to form an oxide and to produce heat

Decomposition: the breaking down of a compound into smaller compounds or separate elements

Double Replacement: when two ionic solutions react to produce two other ionic compounds, one of which can be a precipitate

Neutralisation: an example of a double replacement reaction where an acid and base react to form water and a salt

Precipitate: an insoluble (does not dissolve) solid ionic compound that often forms in double replacement reactions

Single Replacement: when a reactive element (metal or non-metal) and compound react to produce another element and another compound

Synthesis (Combination): where two or more reactants combine to produce a single product

It may help you to review:

- Ionic bonding (Ch. 4.1)
- Diatomic molecules (Ch. 4.1)
- Naming Compounds (Ch. 4.2)
- Balancing Equations (Ch. 4.3)
- Acid-Base Neutralization (Pg. 236 in textbook)