Balancing Chemical Equations Study Guide

Effects of chemical reactions:

- Chemical reactions rearrange atoms in the reactants to form new products.
- The identities and properties of the products are completely different from that of the reactants.
- Production of gases and color changes are signs of chemical reactions.

Energy and Reactions

Energy must be _____ to _____ bonds.

Energy is _____ when bonds are _____.

Chemical energy is _____ in chemical reactions.

EXOTHERMIC REACTIONS: release energy (More energy is released as the products form bonds than is absorbed to break the bonds in the reactants.)

ENDOTHERMIC REACTIONS:

Chemical equations are used to represent or describe chemical reactions. An equation shows:

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  - The "+" means "reacts with"
  - The "➔" means "yields" or "reacts to produce"

To show physical states of each substance:

• Consider the reaction of iron with oxygen to form iron (III) oxide, or rust.

COEFFICIENTS: numbers in front of compound that represents the number of molecules of that compound

SUBSCRIPTS: small numbers that help define the compound.

Ex:

H_2O: $2H_2O$: H_2O_2:

• During a chem. rxn.; atoms are rearranged (NOT created or destroyed!)
• Chemical equations must be balanced to show the relative amounts of all substances.
• Balanced means: each side of the equations has the same # of atoms of each element.

RULES to follow in balancing:

1. Correct formulas for all reactants & products.
2. Reactants ➔ Products
3. Count the # of atoms of each element in reactants & products.
4. Balance one at a time using coefficients.
5. Check for balance.
6. Are the coefficients in the lowest possible ratio?

___Fe + ____O_2 ➔ ____Fe_2O_3

Examples:

$CuCl_{2(aq)}$ + $Al_{(s)}$ ➔ $Cu_{(s)}$ + $AlCl_{3(aq)}$

Propane, C_3H_8, burns in oxygen, O_2, to form carbon dioxide and water.

Pentane, C_5H_{12}, burns in oxygen, O_2, to form carbon dioxide and water.

C_7H_{14} + O_2 ➔ CO_2 + H_2O

Types of Chemical Reactions

In chemistry, there are 5 general types of reactions:

1) Synthesis or Combination: 2 or more reactants combine to form 1 product.

2) Decomposition: 1 reactant decomposes to form 2 or more products.

3) Single Replacement: One metal replaces another metal in an ionic compound, producing a new ionic compound and a metal.

4) Double Replacement: Two positive ions "switch places" forming 2 new ionic compounds:

5) Combustion: a hydrocarbon (containing C and H) or other substance burns in the presence of oxygen gas (O_2) to produce CO_2 and H_2O.