Chemical Reaction Basics

Physical versus Chemical Change

A. **Physical** change affects the *size, shape, color, or the state of matter***.** This type of change contains the same substance throughout and is reversible.

B. **Chemical** change is the rearrangement of atoms resulting in the formation of a new substance that involves a change in energy.

Indicators for a chemical change/ chemical reaction:

1. Color change: unpredicted
2. Energy: light, heat, fire, electricity
3. Gas production: bubbles, fizzing, smoke, odor change
4. Precipitate: solid formation from mixing two solutions

Practice: Identify each of the changes below as either being chemical or physical. Explain why.

_____1. An ice cube is placed in the sun resulting in a puddle of water.

_____2. Two substances are mixed together and a plume of gas is produced.

_____3. A mortar and pestle is used to crush an antacid tablet into a powder.

_____4. A pot of water boils on the stove.

_____5. A marshmallow is burned over a campfire.

_____6. Chocolate syrup is dissolved in milk.

More Basics: The chemical reaction/change starts with reactants and ends with the products.

- general formula: reactant A + reactant B $\rightarrow$ product X + product Y (there are different variations)
- **(s)** can be placed by a reactant or product signifying the reactant or product is in the **solid** state.
- **(g)** can be placed by a reactant or product signifying the reactant or product is in the **gas** state.
- **(l)** can be placed by a reactant or product signifying the reactant or product is in the **liquid** state.
- **(**aq**)** can be placed by a reactant or product signifying the reactant or product is **aqueous.**
- $\xrightarrow{\Delta}$ or $\xrightarrow{heat}$ signifies that **heat** is being supplied to the reaction.
- $\xrightarrow{chemical\ formula}$ signifies that a **catalyst** is being used in the reaction.
- A number/a coefficient, can be placed in **front** of the chemical formula in order to balance the reaction.
- Subscripts are used after elemental symbols to represent how many atoms of that element are in the compound.

Practice: On the line next to each of the questions, place the letter of the explanation that matches.

a. Liquid carbon dioxide

b. Manganese (IV) oxide is a reactant

c. A compound containing 2 atoms of aluminum & 3 atoms of sulfur

d. Manganese (IV) oxide is the catalyst

e. Solid carbon dioxide

f. Manganese (IV) oxide is a product

g. Heat is being supplied to the reaction

h. Gas carbon dioxide

i. A compound containing 3 atoms of aluminum and 2 atoms of sulfur

_____1. $CO_2(s)$ _____2. $\xrightarrow{MnO2}$ _____3.$CO_2(g)$ _____4. $\xrightarrow{\Delta}$ _____5. Al_2S_3