Name_____

Chapter 7 Notes: Chemical Reactions

Read pgs. 148-153

1. **Chemical Reaction occurs when substances <u>undergos</u> chemical changes to form <u>new</u> substances.**
   A. **Usually you can <u>see</u> these <u>changes</u>.**
   B. **Signs of a chemical reaction:**
      a. **<u>Gas</u> given off**
      b. **<u>Precipitate</u> formed**
      c. **Change of <u>color</u>**
      d. **New <u>substance</u>**
      e. **<u>Heat</u> given off**
      f. **<u>Light</u> given off**
      g. **<u>Electricity</u> produced**
      h. **<u>Sound</u>**

2. **The <u>Reactants</u> is those substances that <u>undergo</u> a chemical change.**
3. **The <u>Products</u> is the <u>result</u> of the chemical change.**
4. **The products and reactants contain the <u>same type</u> of atoms, but the bonds are <u>broken</u> and <u>reformed</u> into new ones.**
   A. **Mass and Energy are <u>ALWAYS</u> conserved.**

5. **<u>Energy</u> is required to break a bond.**
   A. **Energy is <u>released</u> when new bonds are formed.**

Example of a Chemical Reaction:

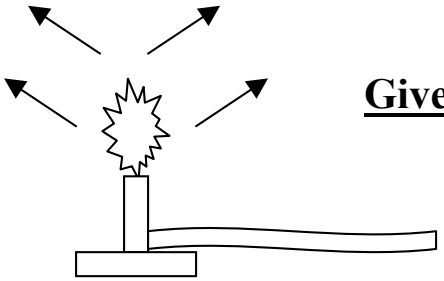
Wood + Oxygen + Energy → Ashes + Gases + Smoke + Heat

<u>Reactants</u> **<u>Products</u>**

6. **Reactions are either <u>Exothermic</u> or <u>Endothermic</u>.**

7. **In Exothermic Reactions, the <u>energy</u> required to break bonds in the reactants is <u>less</u> than that in the product, so energy is <u>released.</u>**

Example: Gas burning, gives heat off to environment.

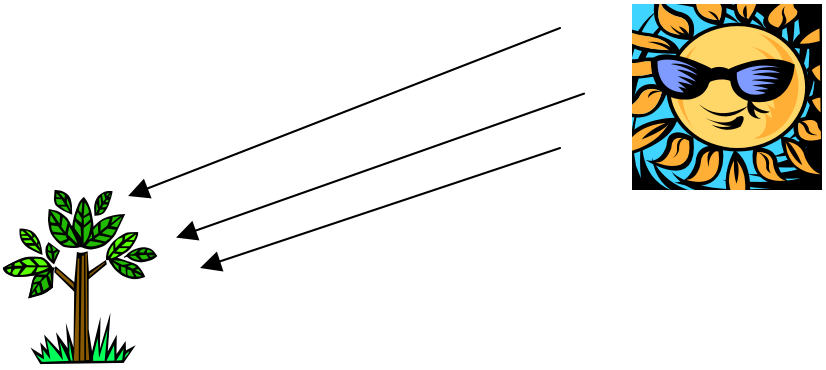


<u>Gives off heat</u>

Gas goes through hose, <u>burns</u>

8. **Endothermic Reactions involves so much <u>energy</u> from the surrounding to <u>break</u> the bonds of the reactants, energy is <u>absorbed.</u>**

Example: Plants need the <u>energy</u> (heat) from the sun for chemical reactions.



5.3: Read pgs. 161-168.

9. **Chemical <u>Equation</u> uses chemical <u>formulas</u> and <u>symbols</u> to show the reactants and products in a reaction.**
   - **A. Reactants are written on the <u>LEFT</u> side.**
   - **B. Products are written on the <u>RIGHT</u> side.**
   - **C. An <u>arrow</u> separates the reactant/product and means "<u>gives</u>" or "yields".**

Example:

$$CH_4 + O_2 \rightarrow CO_2 + H_2O$$

Methane + Oxygen "yields" Carbon Dioxide and Water

10. **An equation must balance.**
    - **A. It must have the same number of atoms of each element on each side.**

      5 atoms = 5 atoms

    - **B. This follows the conservation of mass.**
11. **Rules for balancing equations.**
    - **A. The subscript can't be changed since this would change the formula.**
    - **B. A Coefficient in front of the formulas is used to balance.**
    - **C. Atoms on Left = Atoms on Right**

Example:

$$\_\_\_CH_4 + \_\_\_O_2 \rightarrow \_\_\_CO_2 + \_\_\_H_2O$$

$$\_\_\_\_FeS + \_\_\_HCl \rightarrow \_\_\_FeCl_2 + \_\_\_\_H_2S$$

5.4: Read pgs. 169-176.

12. **A chemical reaction happen at different SPEEDS or RATES.**

13. **For a reaction to occur, the particles of the reactants must collide with one another.**
    - **a. More energy = particles move faster.**
    - **b. Particles move faster = more chance to collide.**
    - **c. This follows the Kinetic Theory.**

***Ways to Increase Chemical Reactions*:**

14. **Increase the Surface Area (smash sugar cube to help dissolve).**
15. **Increase the Concentration (more particles = more to collide).**
16. **Increase the Pressure (Less space = more chance to collide).**

17. Add a Catalysts.

- **a. These are not a reactant or a product.**
- **b. Speed up or slow down (inhibitor) a reaction.**
- **c. Enzymes are catalyst in our body, speed up a specific biochemical reaction by breaking down large molecules.**
- **d. The enzyme is written above the arrow in the equation.**

18. Equilibrium is the state in which a chemical reaction and its reverse occur at the same time and at the same rate.

Example: Soda with CO_2 ⟵⟶ Soda without CO_2 (flat soda)

19. Types of reactions:

- **a. Synthesis- two or more substances react to from a single substance**
  - **i. A + B → AB**
- **b. Decomposition- compound breaks down into 2 compounds**
  - **i. AB → A + B**
- **c. Combustion-substance reacts rapidly with oxygen, makes heat/light.**
  - **i. A + oxygen → Water + Heat and new compound**
  - **ii. Example: CH4 + 202 → CO2 + 2H20**
- **d. Single Replacement-one element takes the place of another element**
  - **i. A + BC → B + AC**
- **e. Double Replacement-two different compounds exchange positive ions and form two new compounds.**
  - **i. AB + CD → AD + CB**