Lesson 9

Chemistry 0

Fall 2021, L. Tracey Gao

Naming Compounds

- Binary compounds
  - A binary compound is a compound that consists of two elements.
  - The second element almost always ends with -*ide*.
  - The second element of a binary element is always a non-mental, regardless of whether the bond is ionic or covalent.

Naming Compounds

- Binary compound endings

H- hydride	N- nitride	O- oxide
F- fluoride	S- sulfide	Cl- chloride

Al_2O_3	**Aluminum Oxide**	KCl	**Potassium Chloride**
NaF	**Sodium Fluoride**	Li_2S	**Lithium Sulfide**
Mg_3N_2	**Magnesium Nitride**		

Ionic Binary Compounds

Naming Compounds

- Prefixes for binary covalent compounds
  - Use prefixes when **two non-metals** form a **covalent bond**.

one	mono-
two	di-
three	tri-
four	tetra-
five	penta-

Naming Compounds

- Prefixes for binary covalent compounds

CO	**Carbon Monoxide**	CO_2	**Carbon Dioxide**
N_2O_3	**Dinitrogen Trioxide**	N_2O_4	**Dinitrogen Tetroxide**
PCl_5	**Phosphorus Pentachloride**		

Note: we do not include prefix mono- with the first non-metal.

Naming Compounds

- Special Names- This is the case with many compounds that include hydrogen (H) or carbon (C).

H_2O	**Water**	NH_3	**Ammonia**
CH_4	**Methane**	C_6H_6	**Benzene**
HCl	**Hydrochloric Acid**		

Note: We will discuss acids and organic compounds in our future lessons.

Physical Change

- When atoms and molecules speed up or slow down, that is a **physical change**.
- When they change state from liquid to solid or from gas to liquid, that is a physical change.
- When a substance is dissolved by water or some other solvent, a new substance has not really been formed. The ions or molecules can still come back together to form the original substance.

Chemical Change

- In a chemical change, the atoms in the reactants rearrange themselves and bond together differently to form one or more new products with different characteristics than the reactants.
- When a new substance is formed, the change is called a **chemical change**.

Week 9 HW Review

- Determine if each is a physical or chemical change.
  a. glass breaking
  b. hammering wood together to build a playhouse
  c. a rusting bicycle
  d. separating sand from gravel
  e. mixing lemonade powder into water
  f. corroding metal
  g. bleaching your hair
  h. fireworks exploding
  i. squeezing oranges to make orange juice
  j. burning leaves

What is a Chemical Reaction?

What is a Chemical Reaction?

- In a chemical reaction, the atoms and molecules that interact with each other are called **reactants**.
- In a chemical reaction, the atoms and molecules produced by the reaction are called **products**.

Questions about Candle Burning Experiment

- What do you think are the reactants in this chemical reaction?
  - **Wax** and **oxygen** from the air are the reactants.
  - The string or wick is burning. It is true that the string of the wick does burn but it's the wax on the string and not so much the string itself that burns and keeps the candle burning.
  - The molecules that make up the wax react with oxygen from the air.

Questions about Candle Burning Experiment

- What do you think are the products in this chemical reaction?
  - The molecules that make up the wax combine with oxygen from the air to make the products **carbon dioxide** and **water** vapor.
  - In a chemical reaction, atoms in the reactants combine in new and different ways to form the molecules of the products.

Questions about Jar over Candle Burning Experiment

- Why do you think the flame goes out when we put a jar over the candle?
  - Placing a jar over the candle limits the amount of oxygen in the air around the candle. Without enough oxygen to react with the wax, the chemical reaction cannot take place and the candle cannot burn.

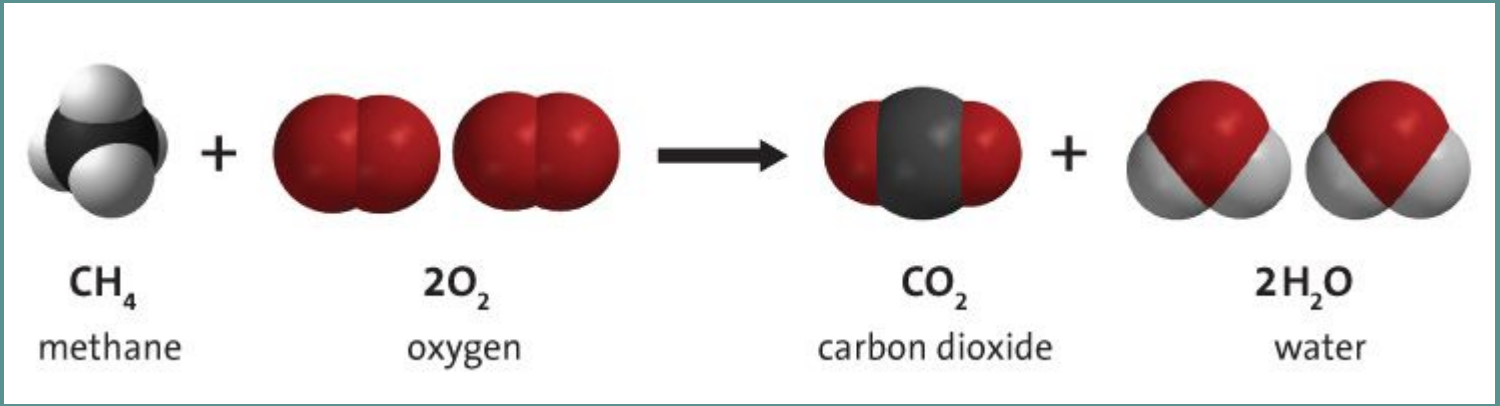
Questions about Jar over Candle Burning Experiment

- When a candle burns for a while, it eventually gets smaller and smaller. Where does the candle wax go?
  - When a candle burns, the candle wax seems to “disappear.” It doesn’t really disappear, though: It reacts chemically, and the new products go into the air.

Chemical Equation of Candle Burning

- Wax: Long molecules called paraffin
- Paraffin is made up of only carbon atoms and hydrogen atoms bonded together.
- Molecules made of only carbon and hydrogen are called hydrocarbons.
- We will use the simplest hydrocarbon (methane, CH_4) as a model to show how the wax, or any other hydrocarbon, burns.

Chemical Equation of Candle Burning



- In the reaction, the bonds in the methane and oxygen come apart, the atoms rearrange and then re-bond to form water and carbon dioxide.
- The little number written at the lower right after an atom (subscript) tells how many of that atom are in the molecule.
- The big number written in front of a molecule (coefficient) shows how many of that molecule there are.
- All the atoms in the products come from the atoms in the reactants.