Science 1206

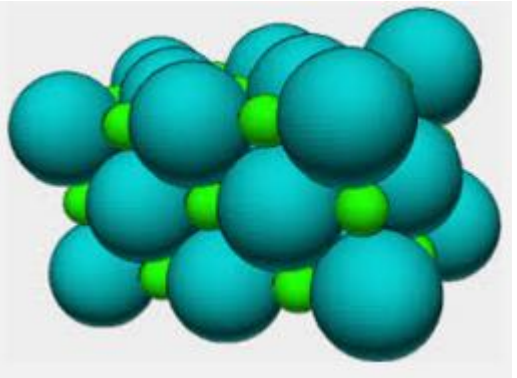
Unit 2:Chemistry

Topic 9 :
Properties of Molecular and Ionic Compounds

The two major classes of compounds

1) Molecular compounds are formed when nonmetallic atoms **share** attractions for each other's electrons

2)Ionic compounds are formed by the attractions between oppositely charged ions. (metal + nonmetal or complex ion)



Question

- Imagine that you are cleaning up tiny white crystals that have been spilled on your kitchen counter. How can you tell whether the crystals are table salt (an ionic compound), sugar (a molecular compound), or something else? One option is to taste the crystals, but that is not advisable - why not?

Because you want to develop safe habits! The substance might be biologically toxic, causing disease, or highly poisonous!

Properties

- Due to their different ways of bonding, each class of compounds has its own unique properties.

It is possible to classify a compound as either ionic or molecular by considering the following:

- **state of matter**
- **melting point**
- **solubility in water**
- **electrical conductivity**.

1. State of Matter

State of Matter refers to matter as either solid, liquid, or gas.

Ionic compounds are solids at room temperature

molecular substances as a group are variable in their states of matter - some are solids, but many are liquids or gases.

Since all ionic compounds are solids, you can classify any pure liquid or gas substance as molecular.

Question

Alcohol (a liquid at room temperature) has the formula CH_3CH_2OH. Is alcohol ionic or molecular? How do you know?

Alcohol is a molecular compound because alcohol is a liquid. Ionic compounds are always solids (never liquids or gases) at room temperature.

2. Melting Point

Melting point is the temperature at which a substance changes from solid to liquid state

Molecular substances melt at temperatures below 300°C,

Ionic substances tend to have melting points above 300°C.

However, melting point data alone is usually insufficient evidence to classify a substance as ionic or molecular.

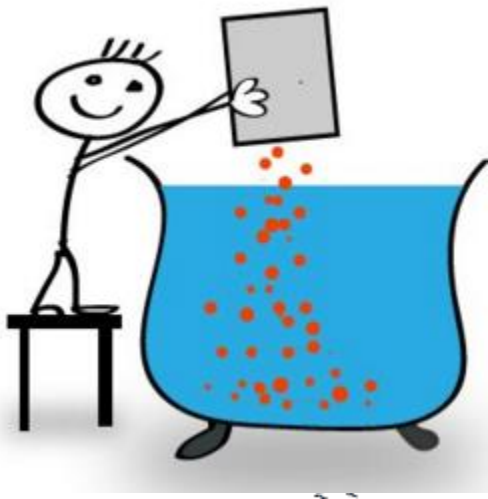
3. Solubility

Solubility of a substance is the maximum amount of a material (called the solute) that can be dissolved in given quantity of solvent at a given temperature

Aqueous Solution - a solution in which water is the solvent. Chemists use the symbol (aq) to the lower right of the symbol or formula to represent an aqueous solution.

NaCl(aq) - sodium chloride dissolved in water.

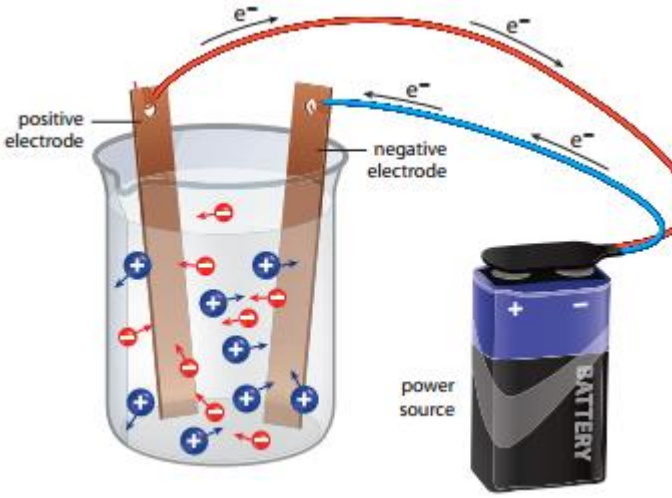
Both ionic and molecular compounds may or may not dissolve in water, so this evidence alone cannot be used to classify a solid compound.



4. Electrical Conductivity

When solubility in water is combined with an electrical conductivity test we have an excellent way of classifying solids as either ionic or molecular

Ionic compounds are composed of ions. When dissolved in water the ionic compounds break up into its ions to form electrically conductive solutions (**electrolytic solutions**).

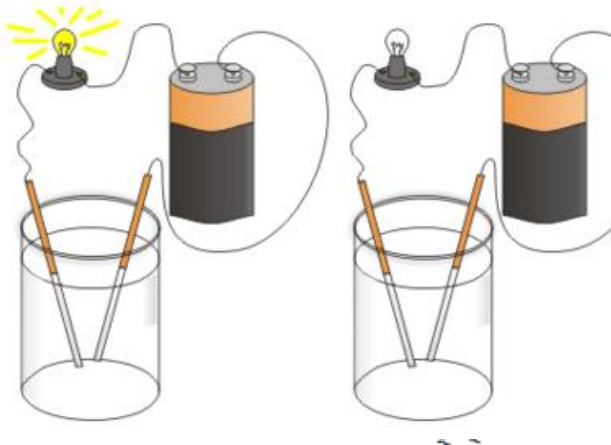


Molecular compounds are composed of neutral molecules. When dissolved in water they stay as neutral molecules. Molecules do not allow the movement of electrons, thus do not conduct electricity. (**nonelectrolytic solutions**),

Question

Below is an image showing two beakers, each being tested using our home made conductivity tester. One beaker contains an aqueous solution of table salt. The second beaker contains an aqueous solution of table sugar. Examine the image and identify which beaker contains the salt (an ionic compound) and which beaker contains the sugar (a molecular compound). (Is it the beaker on the left, or the beaker on the right? How do you know?)

The beaker on the left (as indicated by the light on) contains salt.
The beaker on the right (light off) contains sugar since it is a molecular compound and does not conduct electricity



All known ionic compounds which dissolve in water to form aqueous solutions will conduct electricity!

Molecular compounds that dissolve in water to form aqueous solutions do not conduct electricity.

Summary Ionic versus Covalent

	IONIC	COVALENT
Example	Salt	Sugar
Bonding Type	Transfer e^-	Share e^-
Types of Elements	Metal & Nonmetal	Nonmetals
Physical State	Solid	Solid, Liquid, or Gas
Melting Point	High (above 300ºC)	Low (below 300 ºC)
Solubility	Dissolves in Water	Varies
Conductivity	Good	Poor

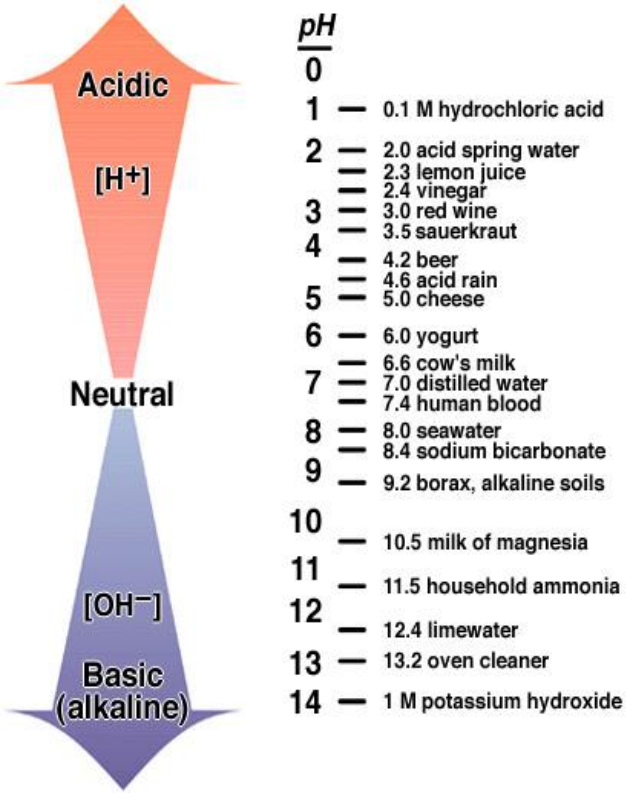
Science 1206

Unit 2:Chemistry

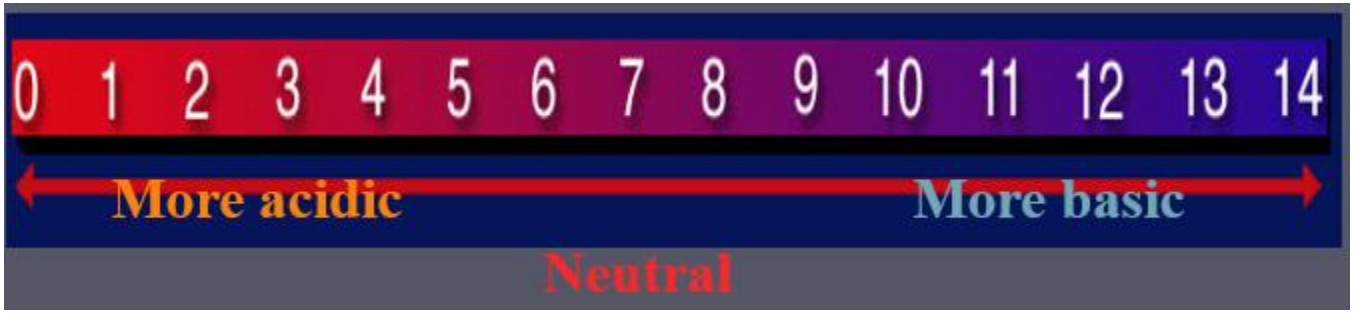
Topic 10 :
Acid and Bases

What is the pH scale?

The pH scale measures how *acidic* or *basic* a solution is



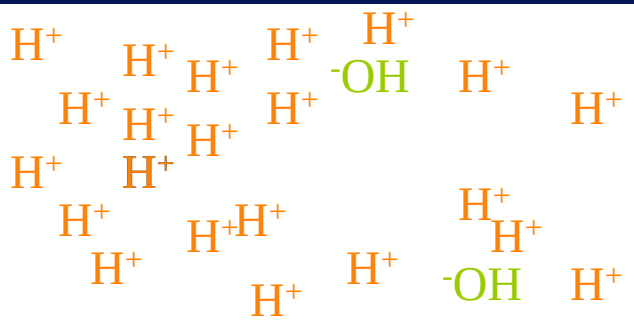
A scale with values ranging from below 0 to14 is used to measure pH.



Acids are substance with a pH of below 7. Lower pH value indicates a stronger acid.

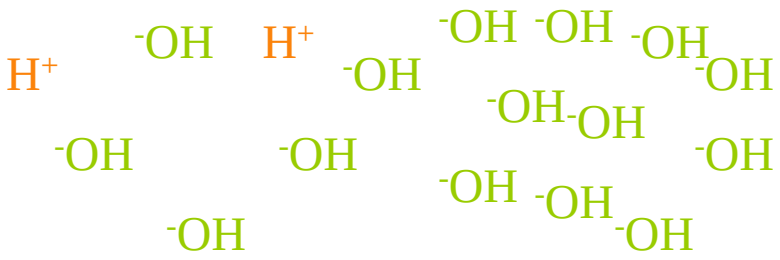
Bases are substances with a pH above 7. Higher pH value indicates a stronger base

A solution is neutral (water) if its pH equals seven.



Neutral

$(H^+) + (^-OH) = H_2O$



Acids have a lot of Hydrogen ions (H^+)

Bases have a lot of Hydroxide ions (-OH).

Characteristics Of Acids

Acids can be characterized by:

1. A sour taste.

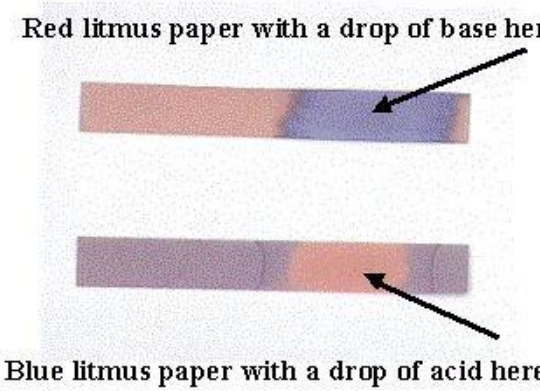
2. It turns blue litmus paper red

3. It tastes sour. Try drinking lemon juice (citric acid)

Examples of Acids

Characteristics of Bases

A Base is characterized by:



1. A bitter taste. (Milk of Magnesia)
2. It feels slippery. (Soapy Water)
3. It turns Red Litmus Blue.

Examples of Bases

Learning Check AB1

Describe the solution in each of the following as: 1) acid 2) base or 3)neutral.

A. ____soda

B. ____soap

C. ____Milk

D. ____ wine

E. ____ water

F. ____ grapefruit

Solution AB1

Describe each solution as:

1) acid 2) base or 3) neutral.

A. _1_ soda

B. _2_ soap

C. _2_ Milk

D. _1_ wine

E. _3_ water

F. _1_ grapefruit

Acids are…

- Compounds that give off hydrogen ions when dissolved in water(aqueous solution).

- Usually will start the formula with H.

- There will always be some Hydrogen next to an anion.
- The **anion** determines the name.

Rules for Naming acids

Type 1: The -ide ending rule:

If the aqueous hydrogen compound has the **-ide** ending, then:

- drop the -gen ending of hydrogen
- replace the -ide ending of the anion with –ic add the word acid

Example: $HCl_{(aq)}$

Hydrogen chloride → hydrochloric acid

Type 2: The -ate ending rule:

If the aqueous hydrogen compound has the **-ate** ending, then:

- drop the name hydrogen
- replace the -ate ending of the anion with –ic
- add the word acid

Example: $HClO_3(aq)$

hydrogen chlorate → chloric acid

Type 3: The -ite ending rule:

If the aqueous hydrogen compound has the **-ite** ending, then:

- drop the name hydrogen
- replace the -ite ending of the anion with –ous
- add the word acid

Example: $HClO_{2(aq)}$

hydrogen chlorite → chlorous acid

Name the following acids:

1) $HBr_{(aq)}$ **hydrobromic acid**

2) $HNO_{3(aq)}$ **nitric acid**

3) $HNO_{2(aq)}$ **nitrous acid.**

4) $HCN_{(aq)}$ **hydrocyanic acid.**

5) $H_2CrO_{4(aq)}$ **chromic acid.**

6) $HClO_{(aq)}$ **hypochlorous acid.**

Rules for Writing Chemical Formulas for Acids:

convert the acid name to an ionic name

hydro ___ic acid → hydrogen ___ide
_____ ic acid → hydrogen ___ate
_____ous acid → hydrogen ___ite

- Identify the two ions from the ionic name and write their symbols with their charges
- determine the number of hydrogen ions required to cancel the negative charge on the anion
- add the **(aq)** state of matter subscript to the end of the formula

Example 1:

Write the chemical formula for **hydroiodic acid**.

hydroiodic acid → hydrogen iodide

$H^+ I^-$

$HI_{(aq)}$

Example 2:

Write the chemical formula for **boric acid**.

Boric acid → Hydrogen borate

$H^+ BO_3^{3-}$

$H_3BO_{3(aq)}$

Example 3:

Write the chemical formula for **nitrous acid**

Nitrous acid → hydrogen nitrite

H^+ and NO_2^-

$HNO_{2(aq)}$

Write chemical formulas for the following acids:

1. hydrofluoric acid — $HF_{(aq)}$
2. carbonic acid — $H_2CO_{3\ (aq)}$
3. sulfurous acid — $H_2SO_{3\ (aq)}$
4. hydrosulfuric acid — $H_2S_{(aq)}$
5. perchloric acid — $HClO_{4\ (aq)}$

Summary for Acids

- Acids generally begin with "H“
- |Acids are molecular compounds, but differ from other molecular compounds because they form conducting solutions.
- They are molecular but act as ionic in solution, thus we study separately and given different naming.

Steps for Naming Acids

a) Name the hydrogen compound as if it were ionic

b) Convert it to the acid name using the rules below

Rule 1:

hydrogen _____ide becomes hydro_____ic acid

Rule 2:

hydrogen _____ate becomes _____ic acid

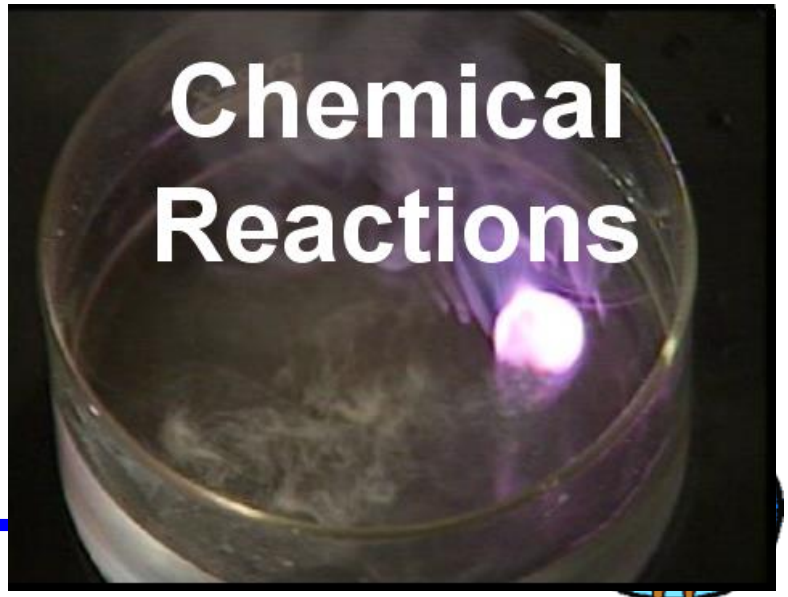
Rule 3:

hydrogen _____ite becomes _____ous acid

Science 9

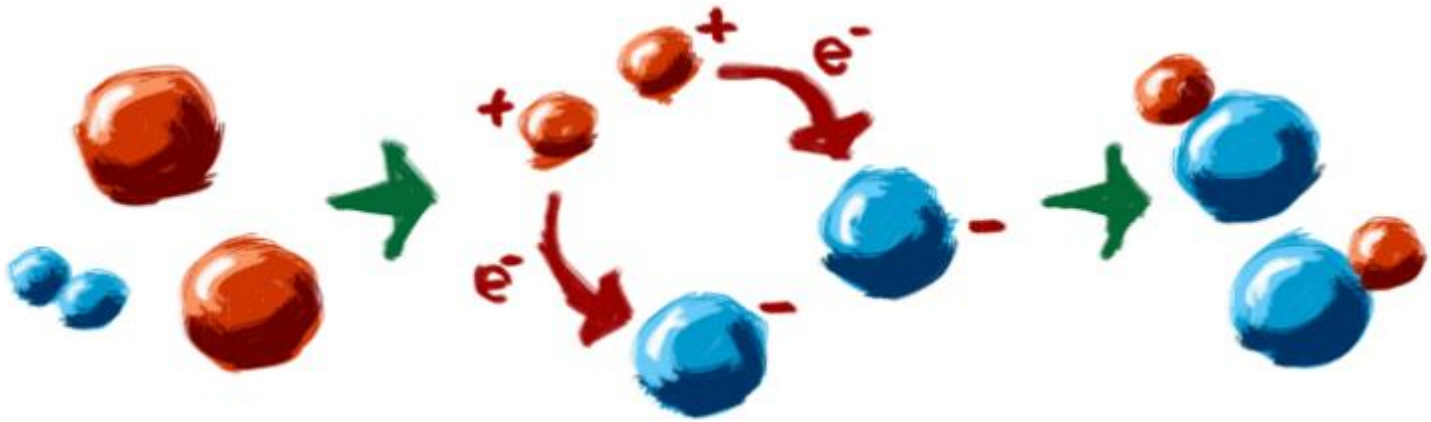
Unit 2:Chemistry

Topic 11 : Identifying Chemical Reactions



Chemical Reactions

- Chemical Reactions occur when two or more molecules interact and the molecules change. Bonds between atoms are broken and created to form new molecules.

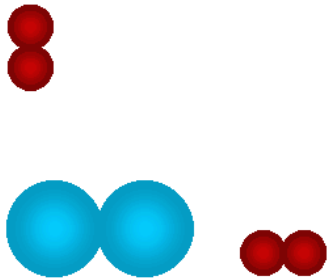


You need to be able to identify each type.

Evidence that a chemical reaction has taken place?

- Colour / Odour Change
- Formation of a gas or solid
- Gas Formation(effervescent)
- Release/Absorption of Energy (heat)

All chemical reactions:



- have two parts

- **Reactants** - the substances you start with
- **Products-** the substances you end up with

- The reactants turn into the products.

Example:

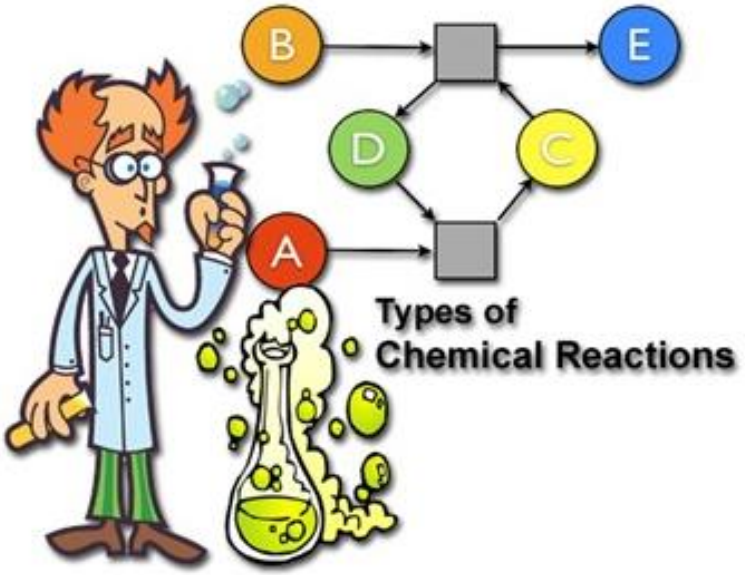
All the reactants --------> All the products

Reactant 1 + Reactant 2 ---------> Product 1 + Product 2

Reaction Types

- There are 5 main reaction types which we will discuss in detail.

- 1.) Synthesis
- 2.) Decomposition
- 3.) Single Displacement
- 4.) Double Displacement
- 5) Combustion

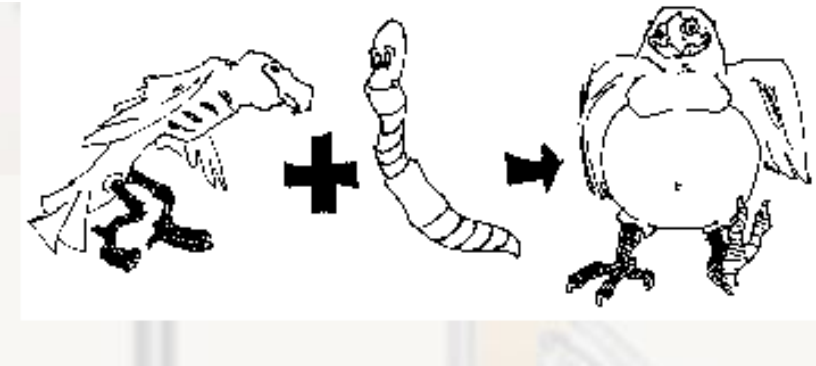


You can usually identify the reaction type by looking at the reactants. Once the type of reaction is identified, we can predict the products

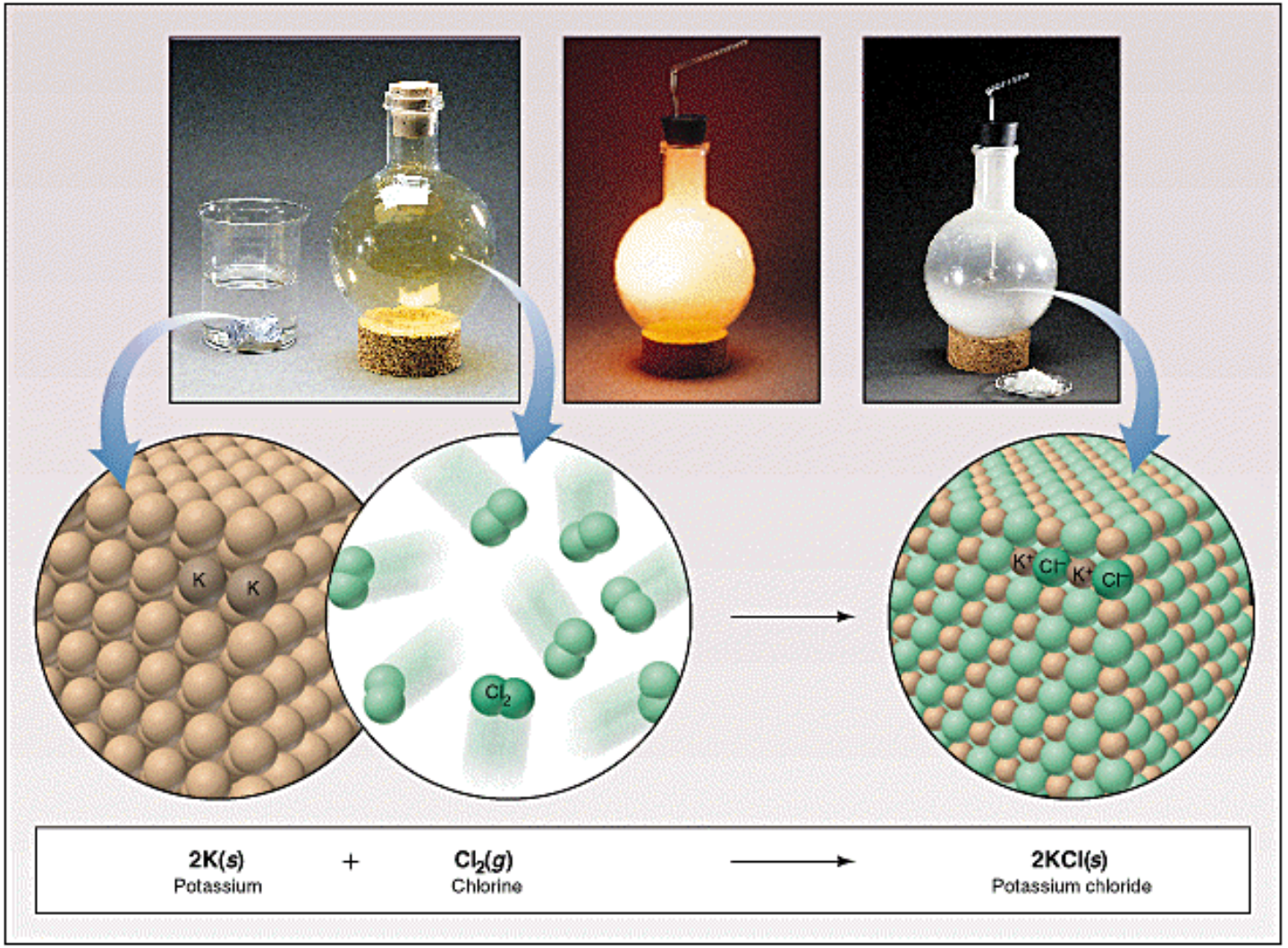
1. Synthesis Reactions

- **Synthesis reaction** is when two smaller elements or molecules combine to produce a larger molecule. They are also known as combination reactions. The general formula is:

A + B --------> AB



Ex. Synthesis Reaction



An example of a synthetic reaction is between hydrogen and oxygen when they combine.

EX. Hydrogen + Oxygen ---------> Water

Equation: H_2 (g) + O_2 (g) ----------> H_2O(g)

Synthesis reactions can also involve combinations of smaller molecules. An example is when ammonia and hydrogen chloride vapors combine; they form solid particles of ammonium chloride.

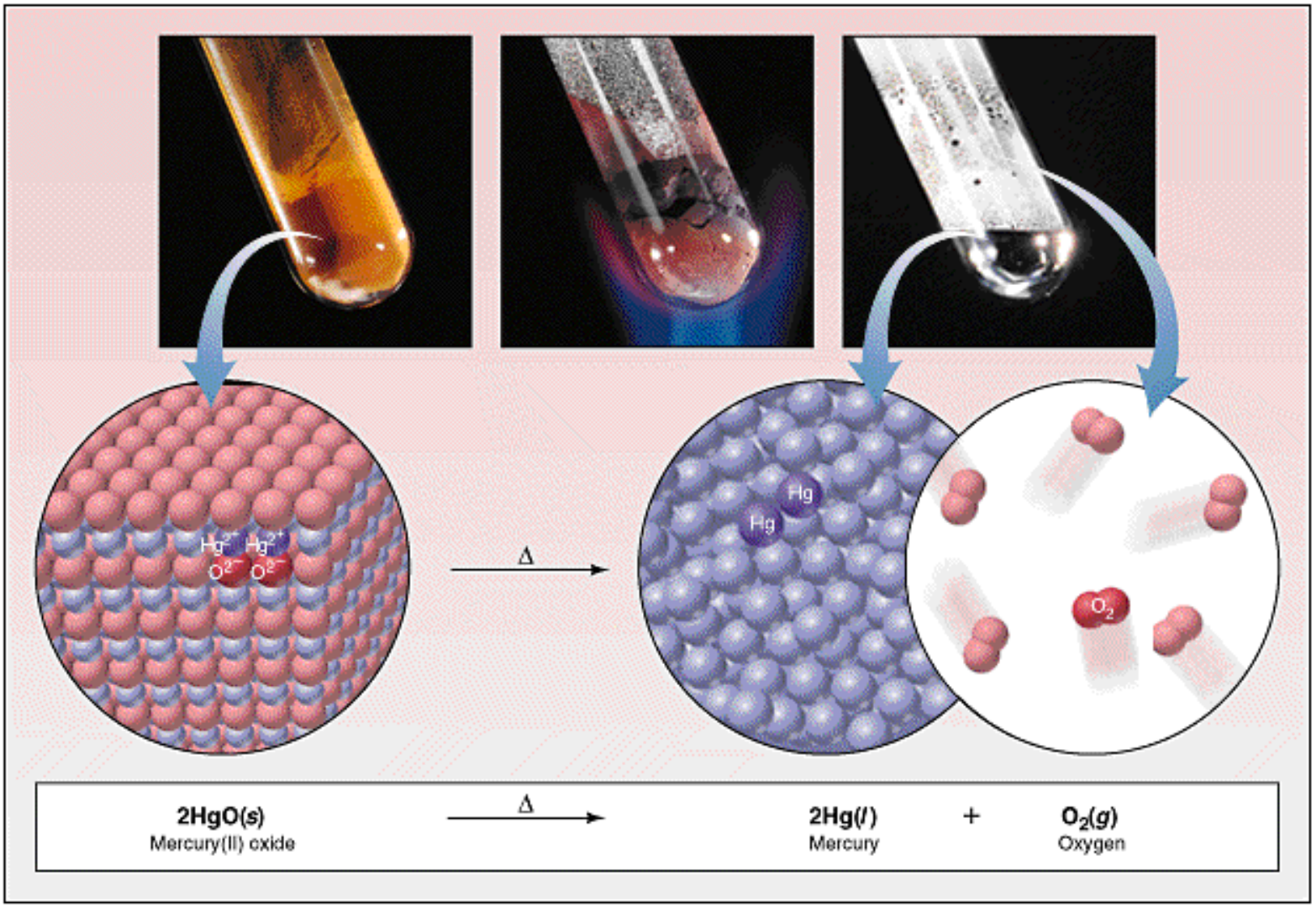
$$HCl + NH_3 \text{ ----------> } NH_4Cl$$

2. Decomposition Reactions

- Decomposition reactions involve the splitting of a large molecule into elements or smaller molecules. Decomposition reactions have the following general formula:

AB ----------> A + B

Ex. Decomposition Reaction



Decomposition reactions can also involve the production of two small molecules from a large molecule.

Ex. Ammonium nitrate is heated to the point where it decomposes to form nitrous oxide and water molecules. Write the written, skeleton and balanced equation for the above example.

Written –> Ammonium nitrate --------> Nitrous oxide + Water

skeleton –> NH_4NO_3 (aq) ----------> N_2O (g) + H_2O (l)

If you see a binary compound (a compound made up of only two elements) as the reactant, you will know the reaction will produce two elements as the products.

Ex. The electrolysis of water uses electricity to split water molecules into its two elements.

Word Eqn: Water ----------> Hydrogen + Oxygen

Skeleton Eqn: $H_2O(g)$ ----------> H_2 (g) + O_2 (g)

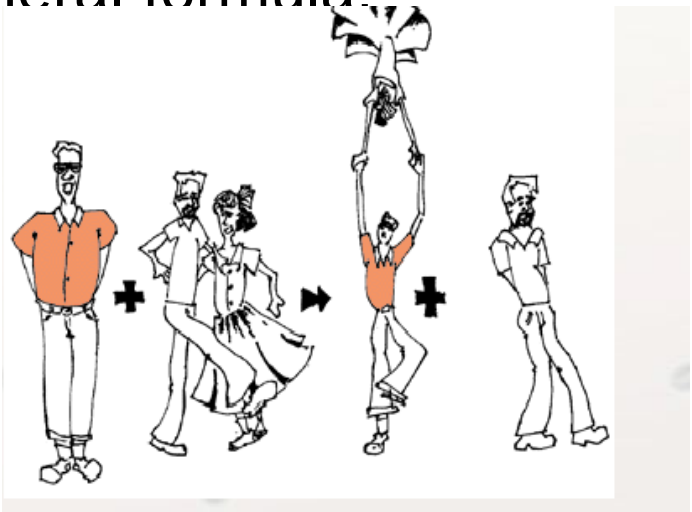
3.Single Displacement Reactions

- Single Displacement (Single Replacement) reactions are chemical changes that involve an element and compound as reactants. One element displaces another element from a compound. Single displacement reactions have the following general formula:

Z + AB -------> ZB + A

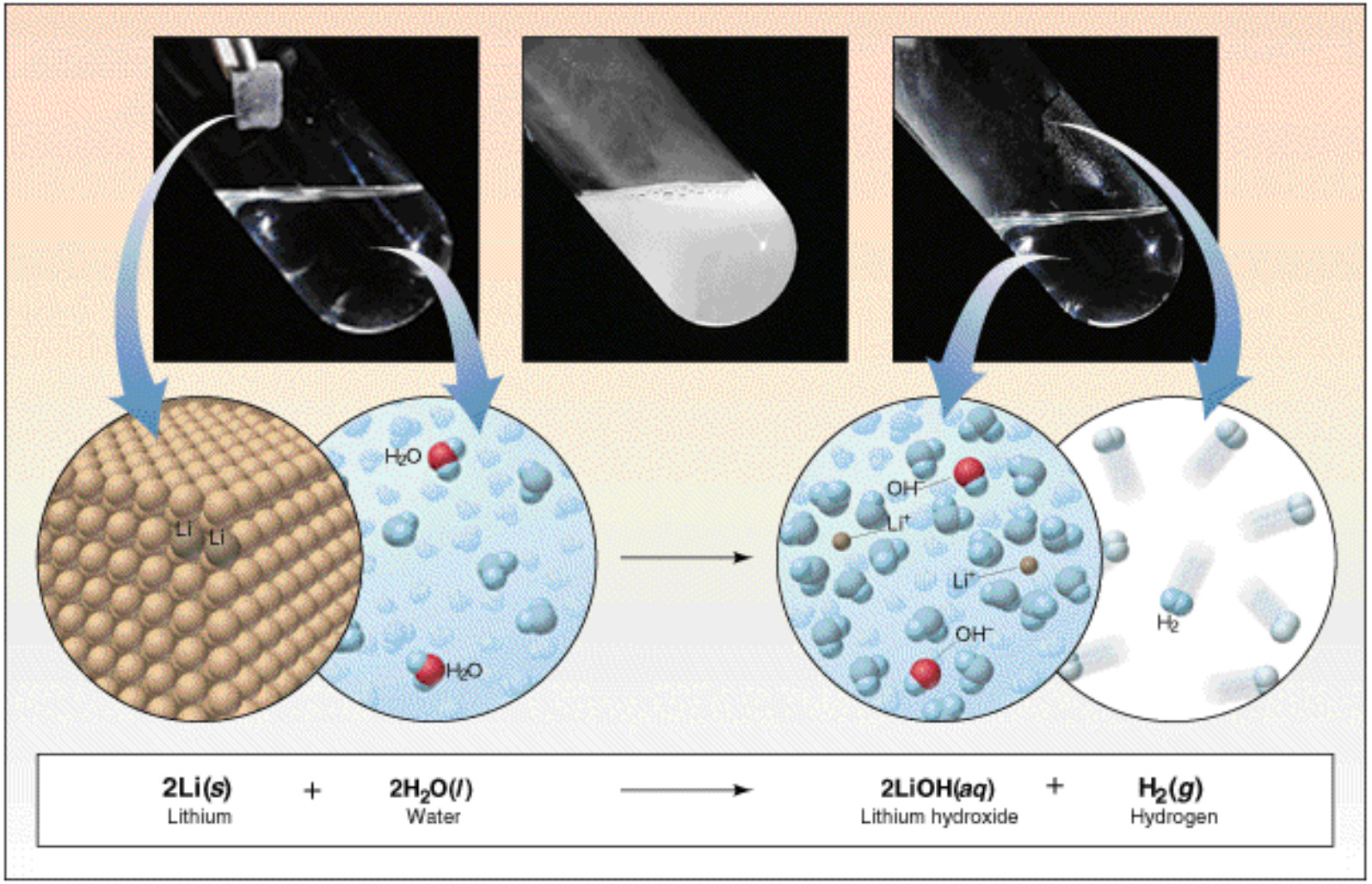
OR

Y + AB -------> AY + B



Notice, the guy in the orange shirt steals the date of the other guy. So, a part of one of the reactants trades places and is in a different place among the products.

Ex. Single Replacement Reaction



Ex. 1 Calcium metal is placed in a solution of lead (III) nitrate.

$$3\ Ca(s) + 2\ Pb(NO_3)_3(aq) \longrightarrow 2\ Pb(s) + 3\ Ca(NO_3)_2(aq)$$

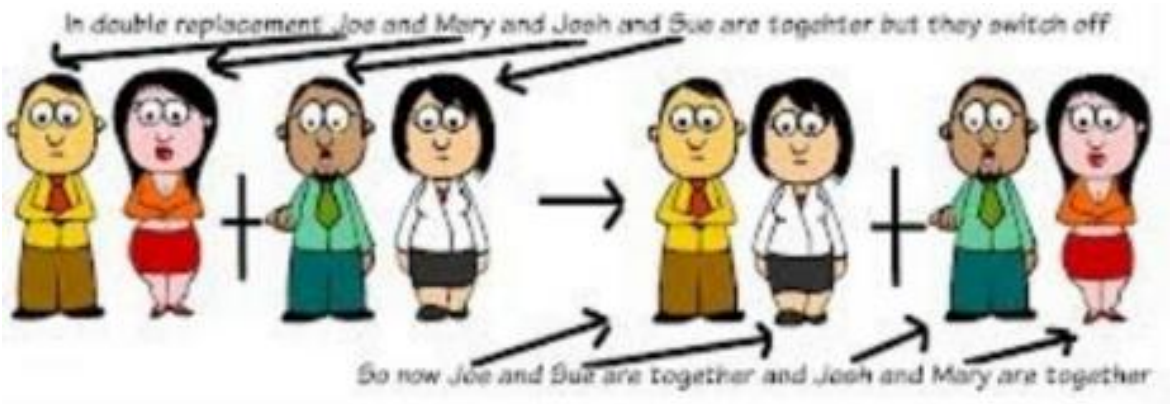
Ex. 2 Iodine reacts with Barium fluoride

$$I_2(g) + BaF_2(aq) \longrightarrow F_2(g) + BaI_2(aq)$$

4. Double Displacement Reactions

- Double displacement reactions (double replacement reaction)occur when elements in different compounds displace each other or exchange places.. Double displacement reactions have the general formula:

AB + XY --------> AY + XB



$$\mathrm{Pb(NO_3)_{2(aq)} + 2KI_{(aq)} \rightarrow PbI_{2(s)} + 2KNO_{3(aq)}}$$

Double Replacement Reactions

- Think about it like “foil”ing in algebra, first and last ions go together + inside ions go together
- Example:

$$AgNO_{3(aq)} + NaCl_{(s)} \rightarrow AgCl_{(s)} + NaNO_{3(aq)}$$

- Another example:

$$K_2SO_{4(aq)} + Ba(NO_3)_{2(aq)} \rightarrow 2\,KNO_{3(aq)} + BaSO_{4(s)}$$

Ex. Write the written, skeleton and balanced equation for the following reaction.

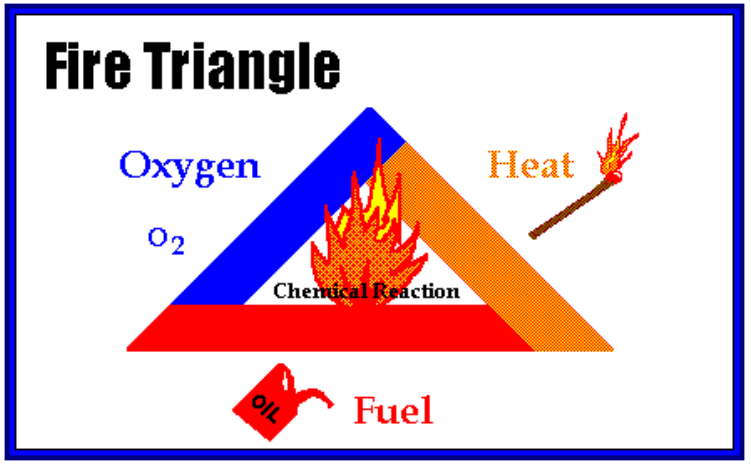
Silver Nitrate reacts with Calcium Iodide

silver nitrate + calcium iodide -------> silver iodide + calcium nitrate

$AgNO_3$ + CaI_2 ---------> AgI + $Ca(NO_3)_2$

5. Combustion Reactions

- **Combustion reactions -** a hydrocarbon reacts with oxygen gas.
- This is also called burning!!!
- In order to burn something you need the 3 things in the “fire triangle”:

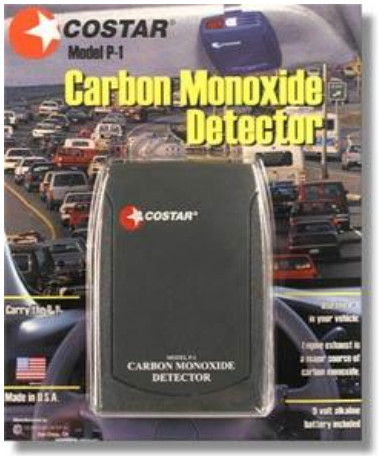


1) Fuel (hydrocarbon): consist of hydrogen and carbon
2) Oxygen
3) Something to ignite the reaction (spark)

Combustion Reactions

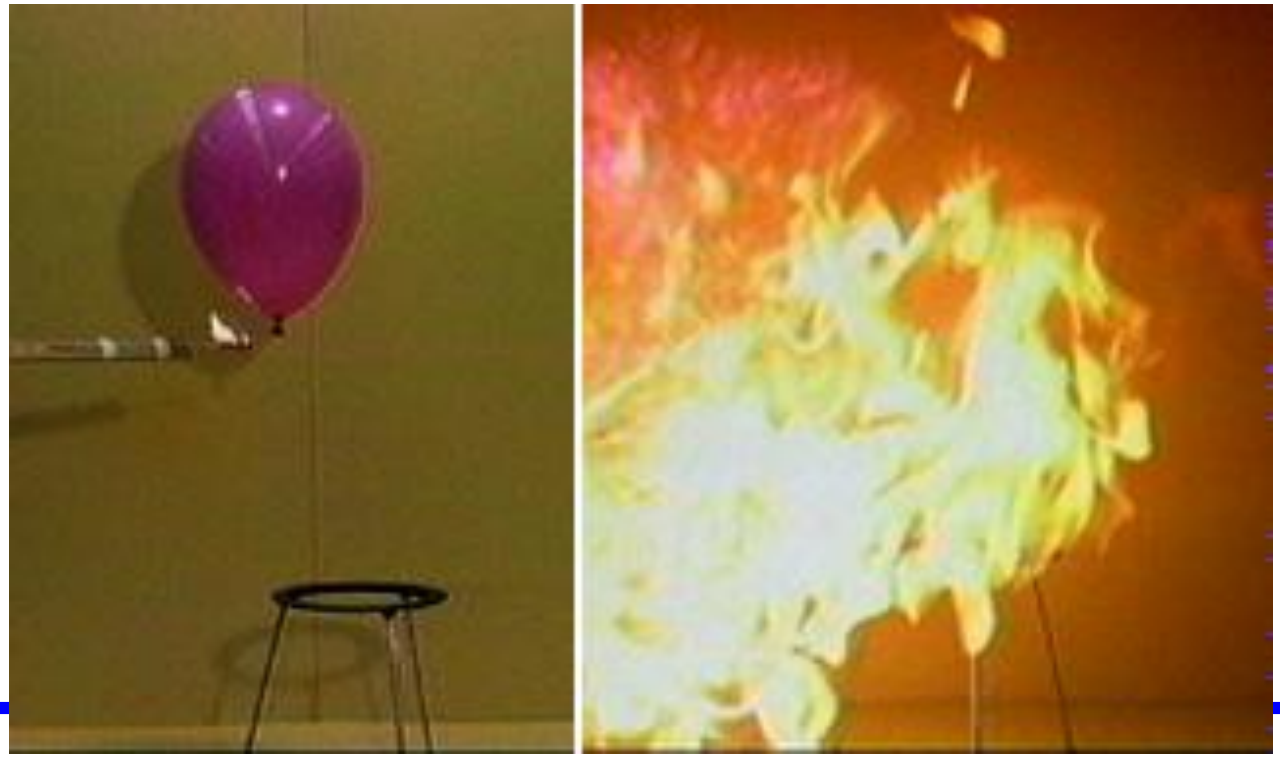
- In general:
  $C_xH_y + O_2 \rightarrow CO_2 + H_2O$
- Products are ALWAYS

  carbon dioxide and *water*.
  (although incomplete burning does cause some by-products like carbon monoxide)
- Combustion is used to heat homes and run automobiles (octane, as in gasoline, is C_8H_{18})



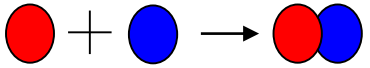
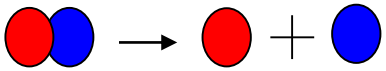
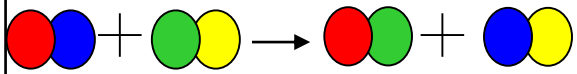
Example:

$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$



Combustion

- Example
  - $C_5H_{12} + 8O_2 \rightarrow 5CO_2 + 6H_2O$
- Write the products and balance the following combustion reaction:
  - $C_{10}H_{22} + O_2 \rightarrow$

Type of Reaction	Definition	★ Equation
Synthesis	Two or more elements or compounds combine to make a more complex substance	 A + B → AB
Decomposition	Compounds break down into simpler substances	 AB → A + B
Single Replacement	Occurs when one element replaces another one in a compound	 AB + C → AC + B
Double Replacement	Occurs when different atoms in two different compounds trade places	 AB + CD → AC + BD
Combustion	- a hydrocarbon reacts with oxygen gas to produce heat carbon dioxide and water.	

A = Red B = Blue C = Green D = Yellow

Summary of Reaction Types

Use with Chapter 9, Section 9.2

Predicting Products of Chemical Reactions		
Class of reaction	**Reactants**	**Probable products**
Synthesis	Two or more substances	One compound
Combustion	A metal and oxygen	The oxide of the metal
	A nonmetal and oxygen	The oxide of the nonmetal
	A compound and oxygen	Two or more oxides
Decomposition	One compound	Two or more elements and/or compounds
Single-replacement	A metal and a compound	A new compound and the replaced metal
	A nonmetal and a compound	A new compound and the replaced nonmetal
Double-replacement	Two compounds	Two different compounds, one of which is often a solid, water, or a gas

Identifying Chemical Reactions

2. Use colored pencils to circle the common atoms or compounds in each equation to help you determine the type of reaction it illustrates. Use the code below to classify each reaction.

S = Synthesis D = Decomposition SR = Single Replacement DR = Double Replacement

____ $P + O_2 \rightarrow P_4O_{10}$

____ $Mg + O_2 \rightarrow MgO$

____ $HgO \rightarrow Hg + O_2$

____ $Al_2O_3 \rightarrow Al + O_2$

____ $Cl_2 + NaBr \rightarrow NaCl + Br_2$

____ $H_2 + N_2 \rightarrow NH_3$

____ $Na + Br_2 \rightarrow NaBr$

____ $CuCl_2 + H_2S \rightarrow CuS + HCl$

____ $HgO + Cl_2 \rightarrow HgCl + O_2$

____ $C + H_2 \rightarrow CH_4$

____ $KClO_3 \rightarrow KCl + O_2$

____ $S_8 + F_2 \rightarrow SF_6$

____ $BaCl_2 + Na_2SO_4 \rightarrow NaCl + BaSO_4$

Science 9

Unit 2:Chemistry

Topic 12 :
Balancing Chemical Reaction

Subscripts and Coefficients

- **Subscript** - shows how many atoms of an element are in a molecule.
  - EX: H_2O
    - 2 atoms of hydrogen (H)
    - 1 atom of oxygen (O)
- **Coefficient** - shows how many molecules there are of a particular chemical.
  - EX: 3 H_2O
    - Means there are 3 water molecules.

Conservation of Matter

The conservation of matter: **states that matter can not be created nor destroyed in any chemical reaction.**

$4\ Al(s) + 3\ O_2(g) \rightarrow 2\ Al_2O_3(s)$

A chemical equation is balanced when the ions or atoms found on the reactant side of the equation equals that found on the product side.

The arrow can be considered the balance point.

When balancing a chemical reaction you may add coefficients in front of the compounds to balance the reaction, but you may <u>not</u> change the subscripts. Changing the subscript changes the compound

NEVER CHANGE THE CHEMICAL FORMULA!!!

You can <u>ONLY</u> add coefficients!

$3PO_4$

coefficient

chemical formula

If a chemical equation does not obey the law of conservation of mass the equation is said to be what?

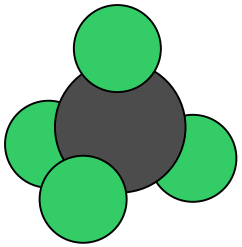
NOT BALANCED

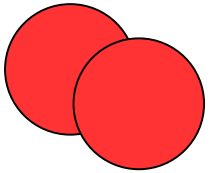
So Let's look at the steps we need to take to BALANCE chemical equations

An Unbalanced Equation

- $CH_4 + O_2 \rightarrow CO_2 + H_2O$

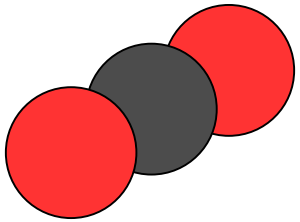
Reactant Side

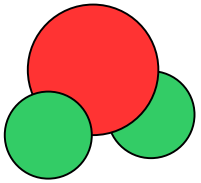




1 carbon atom
4 hydrogen atoms
2 oxygen atoms

Product Side



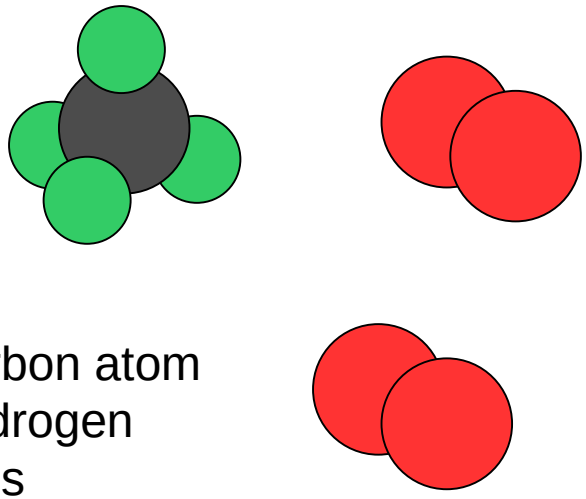


1 carbon atom
2 hydrogen atoms
3 oxygen atoms

A Balanced Equation

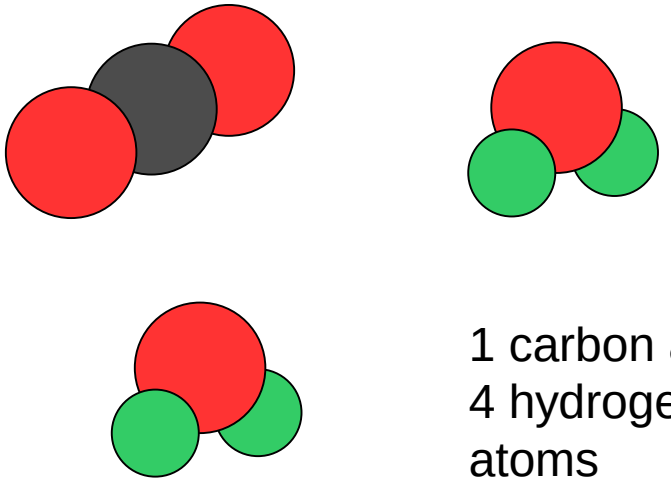
- $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

Reactant Side



1 carbon atom
4 hydrogen atoms
4 oxygen atoms

Product Side



1 carbon atom
4 hydrogen atoms
4 oxygen atoms

Steps to Balancing Equations

There are four basic steps to balancing a chemical equation.

1. **Write the correct formula for the reactants and the products. DO NOT TRY TO BALANCE IT YET! You must write the correct formulas first.**
   - ****And most importantly, once you write them correctly DO NOT CHANGE THE FORMULAS!**
2. **Find the number of atoms for each element on the left side. Compare those against the number of the atoms of the same element on the right side.**
3. **Determine where to place coefficients in front of formulas so that the left side has the same number of atoms as the right side for EACH element in order to balance the equation.**
4. **Check your answer to see if:**
   - **The numbers of atoms on both sides of the equation are now balanced.**
   - **The coefficients are in the lowest possible whole number ratios. (reduced)**

Some Suggestions to Help You

Some helpful hints for balancing equations:

- Take one element at a time, working left to right except for H and O. Metals, then nonmetals are a good way, too. **Save H for next to last, and O until last.**
- **IF** everything balances except for O, and there is no way to balance O with a whole number, **double all the coefficients and try again.** (Because O is diatomic as an element)
- **(Shortcut)** Polyatomic ions that appear on both sides of the equation should be balanced as independent units

How to write a balanced equation?

STEP 1. we must be given a reaction. Then, we can begin with writing the word equation for that reaction.

Iron reacts with oxygen to form magnetic Iron Oxide (Fe_3O_4)

Step 2:

Write the skeleton equation by replacing each name with a correct formula. A skeleton equation is a representation of a chemical reaction in which the formulae of the reactants are connected by an arrow to the formula(e) of the product(s).

$$Fe + O_2 \text{ --------> } Fe_3O_4$$

Step 3: Count the numbers of atoms of each type in the reactants and products. The number of atoms can be recorded in a table. Use a RAP Table

$$Fe + O_2 \text{ --------> } Fe_3O_4$$

Reactants	Atom	Products
1	Fe	3
2	O	4

Step 4: Multiply each of the formulas by the appropriate coefficients to balance the number of atoms.

$$3\ Fe + 2\ O_2 \text{ ----------> } Fe_3O_4$$

Again, check to see if the number of atoms for each element on the reactants side equals the number of atoms for the appropriate element on the product side. You may use a table if you wish.

Step 5: We use the following subscripts in brackets at the end of each element or compound to indicate the state.

(s) indicates solid
(l) indicates liquid
(g) indicates gas
(aq) indicates aqueous

$$3\ Fe_{(s)} + 2\ O_{2\ (g)} \text{ ----------> } Fe_3O_{4\ (s)}$$

Example 2:

$$Fe + O_2 \rightarrow Fe_2O_3$$

Step 1. Create a RAP table

(what's a RAP table ??)

A table that shows us what atoms are present in this reaction, how many there are and are they reactants or products?

#R	atom	#P
1	Fe	2
2	O	3

For example:

$Fe + O_2 \rightarrow Fe_2O_3$

Rule 2. Go to the first atom that's not balanced and balance it!

Since Fe atoms are not balanced what do we need to do to balance it?

Right! Multiply it by 2 (Only multiply)

	#R	atom	#P
2x	1	Fe	2
	2	O	3

In step 2 we balanced the number of Fe atoms by multiplying the reactant side by 2. This now becomes the new coefficient in the chemical equation.

#R	atom	#P
2x1	Fe	2
2	O	3

Modify the equation to reflect the change

$2Fe + O_2 \rightarrow Fe_2O_3$

Are all atoms balanced?

3. Move to the next unbalanced atom. What is it?

#R	atom	#P
2	Fe	2
2	O	3

How can we balance the Oxygen?

Multiply Reactants by 3 and Products by 2

#R	atom	#P
2	Fe	2
3x2	O	3x2

Adjust the equation to reflect your changes

$$2Fe + 3O_2 \rightarrow 2Fe_2O_3$$

But notice that by changing Oxygen we also Changed Iron. We need to go back and fix this.

4. Write out the updated RAP table. How can we Balance the Iron?

	#R	atom	#P
2x	2	Fe	4
	6	O	6

Sure! Multiply the # of Reactant Fe atoms by 2 !

Re-write the equation reflecting The new changes you've made.

↓

$4Fe + 3O_2 \rightarrow 2Fe_2O_3$

Do we have a balanced Chemical Equation now?

Yes we do!

Polyatomics

When an equation has Polyatomics in it, such as in this Balanced chemical equation

$2AgNO_3 + MgCl_2 \rightarrow 2AgCl + Mg(NO_3)_2$

And the polyatomic appears on **BOTH** the reactant and product Side of the equation Count the polyatomic as an "ATOM"

So the above reactant atoms would be:

R	atom	#
2	NO_3	2
1	Mg	1
2	Cl	2

If the same polyatomic does not Appear on both sides break the Polyatomic down into atoms!

Is this equation balanced?

$$NaOH + CaBr_2 \rightarrow Ca(OH)_2 + NaBr$$

What atoms do we have in This equation?

#R	atom	#P
1	NA	1
1	OH	2
1	Ca	1
2	Br	1

1) Count atoms & Start the RAP table

2) Do the #Reactant atoms = the # of Product atoms?

3) So pick the 1st unbalanced atom & begin balancing

We'll start with balancing Hydroxide

$$NaOH + CaBr_2 \rightarrow Ca(OH)_2 + NaBr$$

How can we make both Hydroxides equal?

Sure we'll multiply #R OH by 2

#R	atom	#P
1	Na	1
2x 1	OH	2
1	Ca	1
2	Br	1

Next step> rewrite the modified eqn.

$$2NaOH + CaBr_2 \rightarrow Ca(OH)_2 + NaBr$$

Hydroxide is now balanced so let's move to the next Unbalanced atom, which is? …

What can we do to balance the Bromine?

Sure! Multiply the #P Bromine by 2

Now adjust the table to reflect The changes and then rewrite the Eqn.

#R	atom	#P	
2	Na	1	
2	OH	2	
1	Ca	1	
2	Br	1	x2

$2NaOH + CaBr_2 \rightarrow Ca(OH)_2 + 2NaBr$

Let's update the RAP table with the new #'s Based on our updated equation.

$2NaOH + CaBr_2 \rightarrow Ca(OH)_2 + 2NaBr$

Are we now balanced?

Sure!

#R	atom	#P
2	Na	2
2	OH	2
1	Ca	1
2	Br	2

Your Turn

For each of the following (i) Identify reaction type and

(ii) balance

1.

$Na\ (s) + Cl_2\ (g) \Rightarrow NaCl\ (s)$

Synthesis Reaction

$2\ Na\ (s) + Cl_2\ (g) \Rightarrow 2\ NaCl\ (s)$

2.

$NCl_3\ (s) \Rightarrow N_2\ (g) + Cl_2\ (g)$

Decomposition Reaction

$2\ NCl_3\ (s) \Rightarrow N_2\ (g) + 3\ Cl_2\ (g)$