

## SUMMING UP CHEMICAL NOMENCLATURE

- You need to be able to tell, by looking at a name OR a formula, what kind of compound you are working with!

DON'T GET THE NAMING SYSTEMS MIXED UP! EACH KIND OF COMPOUND IS NAMED WITH ITS OWN SYSTEM!

### FROM A CHEMICAL NAME

- If the name has a Roman numeral, the name of a metal, or "ammonium", the compound is likely IONIC

- If the name has a Greek prefix, the compound is BINARY MOLECULAR

- If the name contains the word "acid":

... and starts with "hydro-", then the compound is a BINARY ACID

... and does not start with "hydro-", the compound is an OXYACID

## FROM A CHEMICAL FORMULA

- if the formula contains a metal or the  $\text{NH}_4^+$  ion, it is likely IONIC

- If the formula starts with H and is not either water or hydrogen peroxide, the compound is likely an ACID. Which kind?

- BINARY ACIDS contain only two elements

- OXYACIDS contains oxygen

- If the formula contains only nonmetals (and is not an ammonium compound or an acid), the compound is likely MOLECULAR

Examples:

$\text{PCl}_3$  : BINARY MOLECULAR  
Name: phosphorus trichloride

$\text{NH}_4\text{Cl}$  : IONIC (ammonium ion)  
Name: ammonium chloride

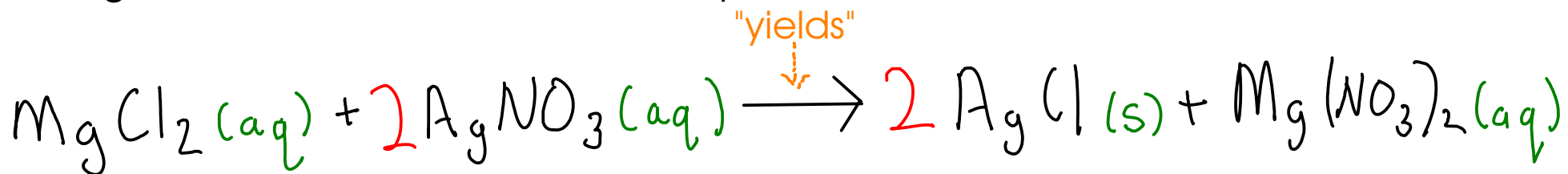
$\text{H}_3\text{PO}_4$  : OXYACID (hydrogen, phosphate)  
Name: phosphoric acid

$\text{Fe}_2(\text{SO}_4)_3$  : IONIC (iron - metal!)  
Name: iron(III) sulfate

$\text{Fe}^{3+}$   $\text{SO}_4^{2-}$   
 $\text{Fe}^{3+}$   $\text{SO}_4^{2-}$   
 $\text{SO}_4^{2-}$

## CHEMICAL EQUATIONS

- are the "recipes" in chemistry
- show the substances going into a reaction, substances coming out of the reaction, and give other information about the process



REACTANTS - materials that are needed for a reaction

PRODUCTS - materials that are formed in a reaction

COEFFICIENTS - give the ratio of molecules/atoms of one substance to the others

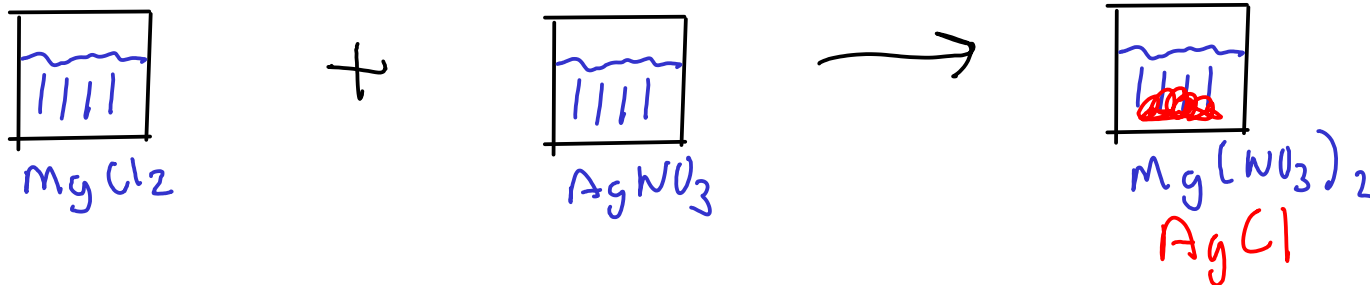
PHASE LABELS - give the physical state of a substance:

(s) - solid

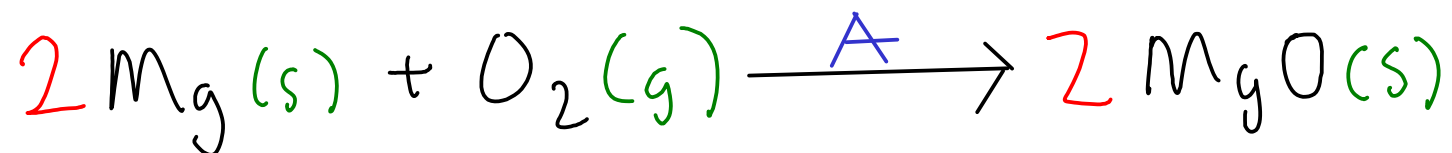
(l) - liquid

(g) - gas

(aq) - aqueous. In other words, dissolved in water



## CHEMICAL EQUATIONS



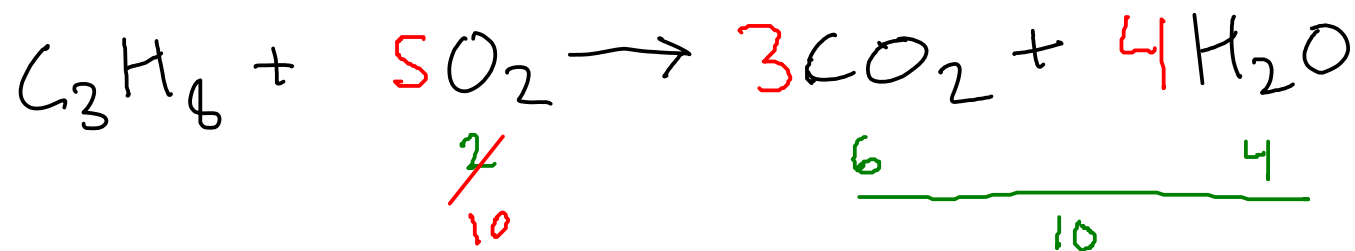
REACTION CONDITIONS - give conditions necessary for chemical reaction to occur. May be:

- $\Delta$  apply heat
  - catalysts - substances that will help reaction proceed faster
  - other conditions, such as required temperatures
- Reaction conditions are usually written above the arrow, but may also be written below if the reaction requires several steps or several different conditions

## COEFFICIENTS

- Experimentally, we can usually determine the reactants and products of a reaction
- We can determine the proper ratios of reactants and products WITHOUT further experiments, using a process called BALANCING
- BALANCING a chemical equation is making sure the same number of atoms of each element go into a reaction as come out of it.
- A properly balanced chemical equation has the smallest whole number ratio of reactants and products.
- There are several ways to do this, but we will use a modified trial-and-error procedure.

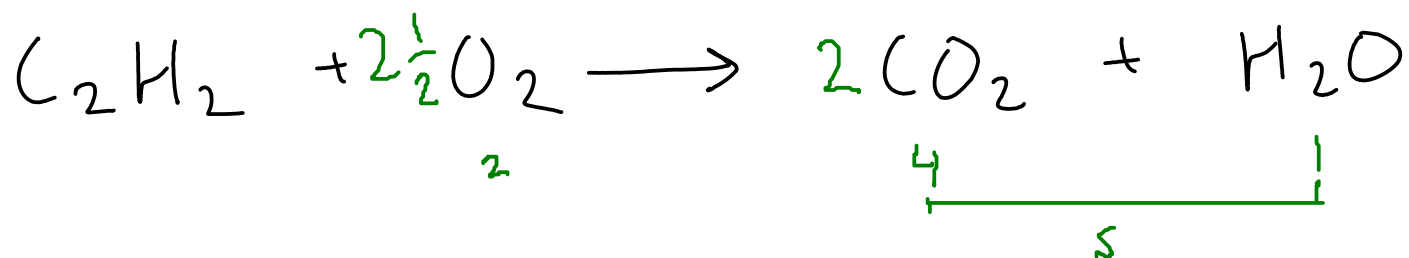
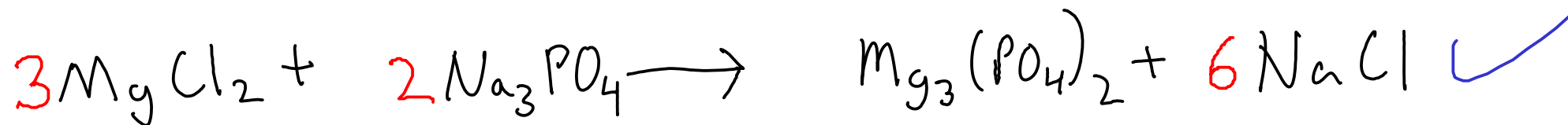
## BALANCING



- ① Pick an element. Avoid (if possible) elements that appear in more than one substance on each side of the equation.
- ② Change the coefficients on substances containing this element so that the same number of atoms of the element are present on each side. **CHANGE AS LITTLE AS POSSIBLE!**
- ③ Repeat 1-2 until all elements are done.
- ④ Go back and quickly VERIFY that you have the same number of atoms of each element on each side. If you used any fractional coefficients, multiply each coefficient by the **DENOMINATOR** of your fraction.

**Use SMALLEST WHOLE NUMBER RATIOS!**

## BALANCING



To get FIVE oxygen atoms going in, we need 2 1/2 oxygen MOLECULES (5/2). But, we can't leave the equation this way. We want the smallest WHOLE NUMBER coefficients! How do we get there?

To get rid of the fraction, MULTIPLY the coefficients (all of them) by the denominator of the fraction! (in this case, 2)



- 1) Avoid H initially, since it's in three of the four compounds. Start with S.
- 2) After S, avoid O (shows up in all four compounds). Do Na next.
- 3) After Na, balance H.
- 4) Finally, balance O (it's already done)

## IDENTIFYING REACTIONS

You may see one or more of these signs when a chemical reaction occurs

- ① - A change in temperature that can't be explained in another way.
- ② - Emission of light that can't be explained in another way
- ③ - The formation of a solid - or PRECIPITATION - in a previously liquid solution. (Not a simple phase change!) *or gas formation!*
- ④ - Color change (not simply lightening of color caused by diluting a solution!)



END OF MATERIAL FOR TEST #2

Test #2 will be given on July 12, 2012 (Thursday)

Test #2 will cover chapters 4, 5, and 6 in the textbook.