

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 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:

PCl_3 : BINARY MOLECULAR
Name: phosphorus trichloride

NH_4Cl : IONIC (ammonium ion)
Name: ammonium chloride

H_3PO_4 : OXYACID (hydrogen, phosphate)
Name: phosphoric acid

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

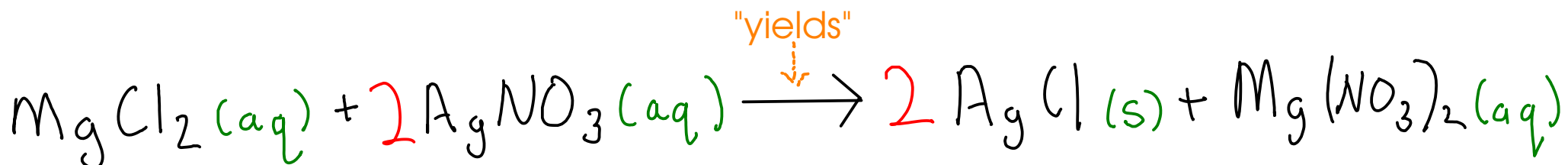
Fe^{3+} SO_4^{2-}
 Fe^{3+} SO_4^{2-}
 SO_4^{2-}

99

END OF MATERIAL FOR TEST #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

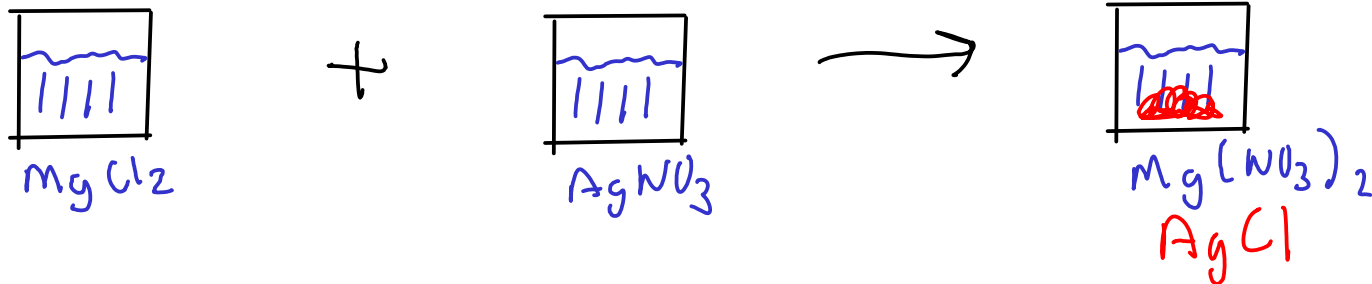
PHASE LABELS - give the physical state of a substance:

(s) - solid

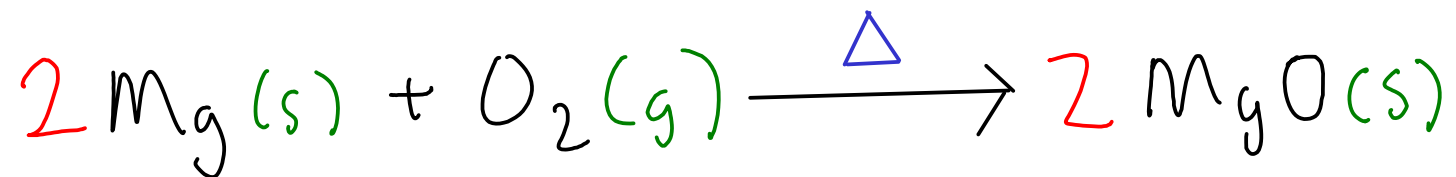
(l) - liquid

(g) - gas

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



CHEMICAL EQUATIONS



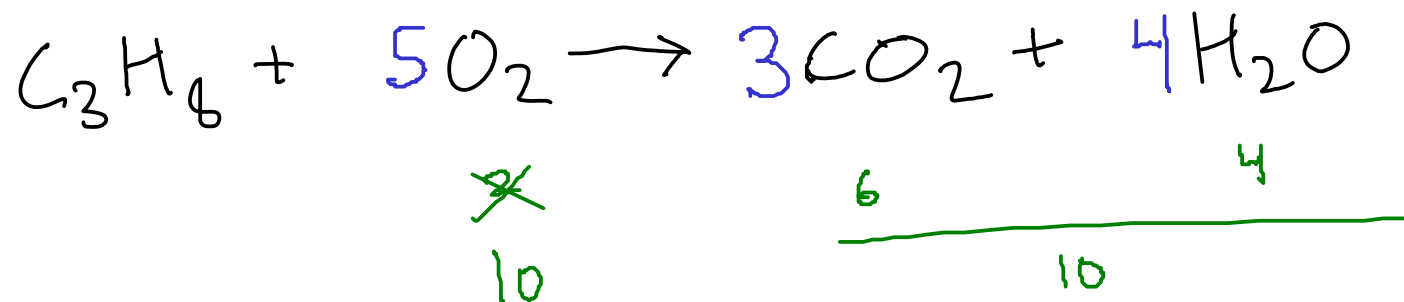
REACTION CONDITIONS - give conditions necessary for chemical reaction to occur. May be:

- Δ 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

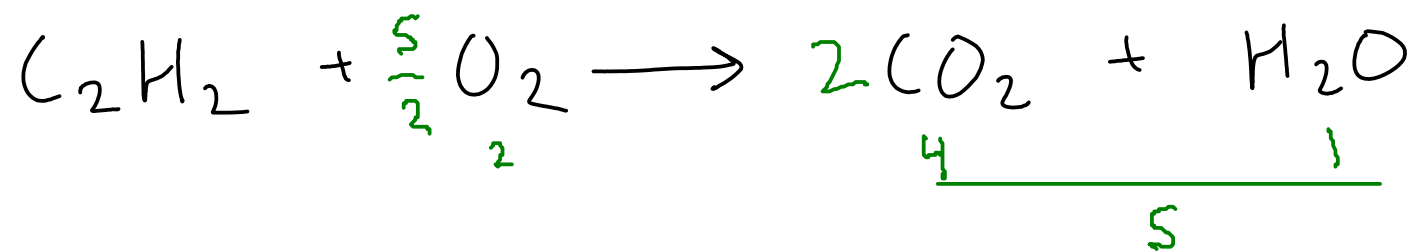
- Experimentally, we can usually determine the reactants and products of a reaction
- We can determine the proper ratios of reactants and products WITHOUT further experiments, using a process called BALANCING
- BALANCING a chemical equation is making sure the same number of atoms of each element go into 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



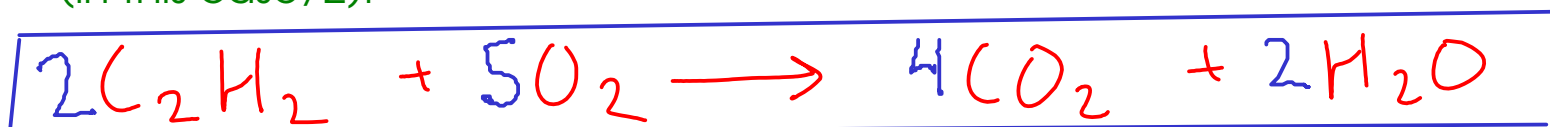
- ① Pick an element. Avoid (if possible) elements that appear in more than one substance on each side of the equation.
- ② Change the coefficients on substances containing this element so that the same number of atoms of the element are present on each side. **CHANGE AS LITTLE AS POSSIBLE!**
- ③ Repeat 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!



To get a SINGLE oxygen atom from molecular oxygen, we need HALF of an oxygen molecule. So, to get FIVE oxygen atoms to go in, we need 5/2 oxygen molecules! (Or, 2 1/2 molecules)

To get rid of the fraction, multiply ALL THE COEFFICIENTS by the denominator of the fraction (in this case, 2).



- 1) Initially, avoid H (shows up in 2 reactants), start with S.
- 2) After S, avoid O (shows up in all substances), balance Na.
- 3) After Na, balance H.
- 4) Finally, balance O. (It's already done!)