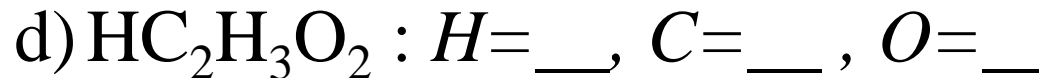
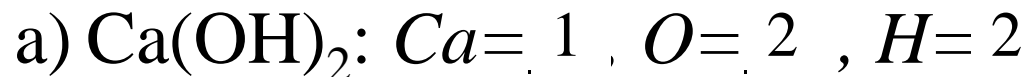


Review Practice Problems:

(1) How many atoms of each element are there in each compound?



Review Notes 10.1

Balancing Chemical Equations

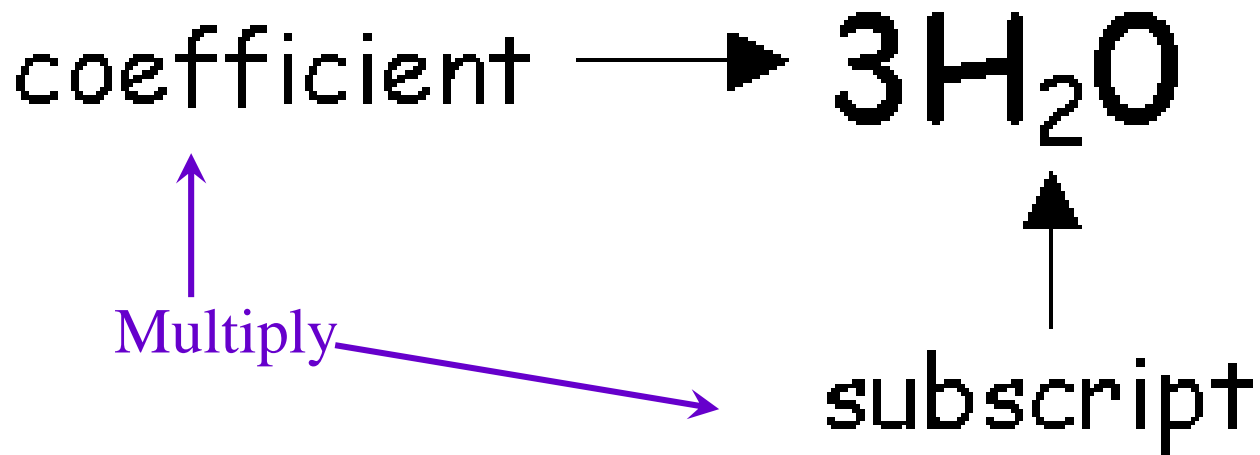
Why balance a chemical equation?

- Law of Conservation of Matter: “Matter is neither created nor destroyed in chemical reactions...”
 - During a chemical reaction, atoms are either:
 - ✓ joined,
 - ✓ separated,
 - ✓ or rearranged.
- The number and type of each atom stays the same.

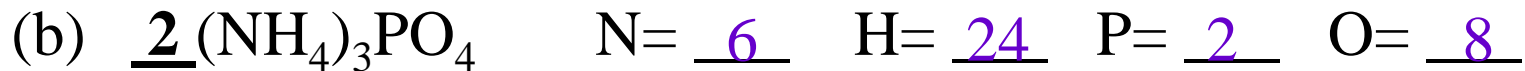
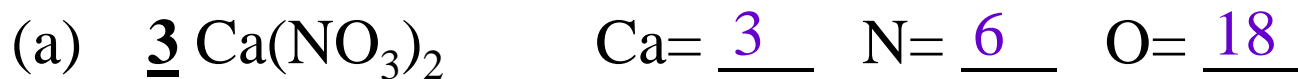
How do you balance a chemical equation?

Use **COEFFICIENTS!!**

Coefficients go in front of a formula.



Practice Problems: Count the atoms:



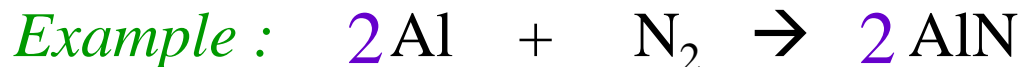
Rules for Balancing Chemical Equations

(1) **NEVER** change a subscript!!



To balance oxygen, you cannot change water's formula to ~~H_2O_2~~ !

(2) **NEVER** place the coefficient in the middle !!



To balance nitrogen, you cannot put a 2 in the middle to make ~~Al_2N~~ .

(3) **REDUCE** coefficients!!

Example: $4\text{H}_2 + 2\text{O}_2 \rightarrow 4\text{H}_2\text{O}$ can be reduced to...



Balancing Equations: Step-by-Step

1. List elements.
2. Count atoms.
3. Balance using **coefficients!**
 - Go left to right.
 - Do oxygen and hydrogen last.

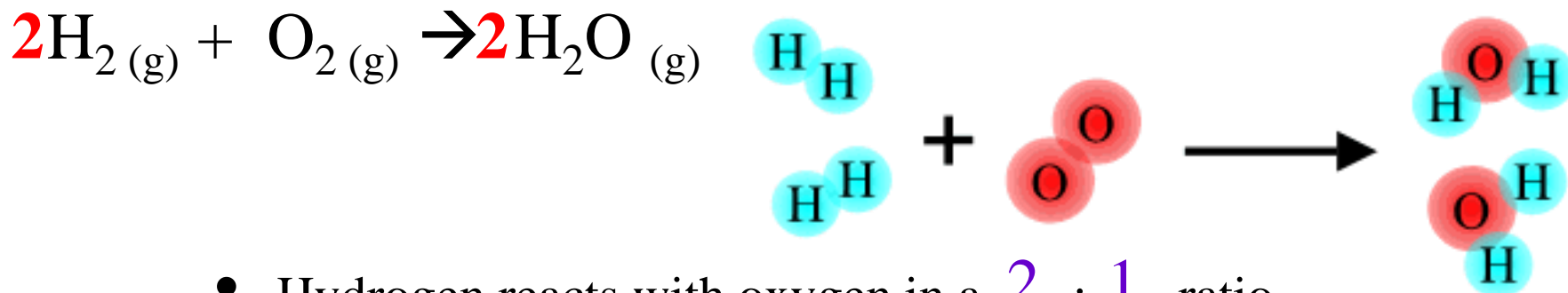
DO NOT CHANGE THE FORMULAS!!!
NO subscripts can be altered!!

Review Notes 10.1 pt.2

Ch 10.1 Review Notes

- Chemical equations give information in two major areas:
 1. **Reactants** **Products**
 2. **Amounts** ...if it is a *balanced* equation!

*Example of a **Balanced** Chemical Equation:*



Coefficients are **RATIOS** of particles:

*molecules, formula units, atoms, ions
or... moles*

Common Symbols used in Chemical Equations

+ = used to separate chemicals

→ = “yields” “forms” “produces”

⇌ = reversible reaction (like a rechargeable battery)

(s) (l) (g) (aq) = phase of matter: (solid, liquid, gas, or “aqueous”)

 = heat supplied to the reaction

 = a catalyst: speeds up the reaction.

↑ = gas given off as a product

↓ = solid precipitate produced

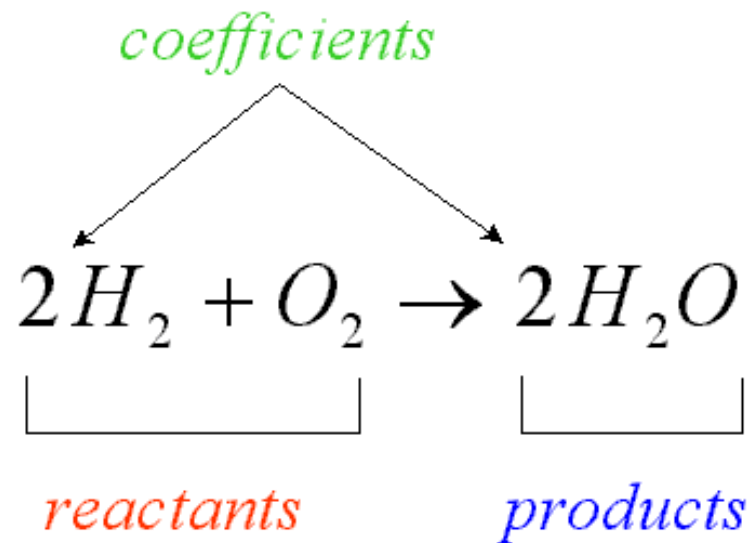
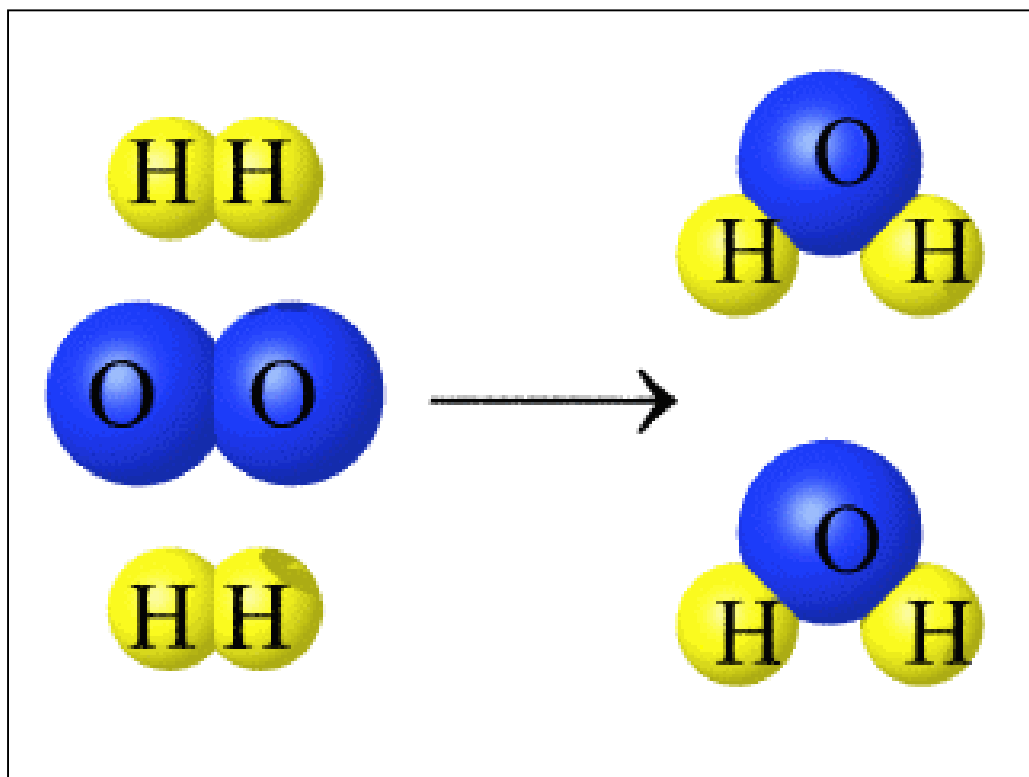
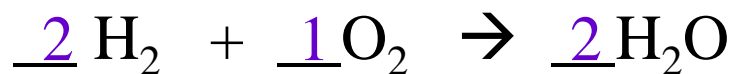
Balancing Equations: Practice!



Rules for Balancing Chemical Equations

(4) Get rid of any fractions !

Example: $2 \times (1\text{H}_2 + \frac{1}{2}\text{O}_2 \rightarrow 1\text{H}_2\text{O})$ changes to...

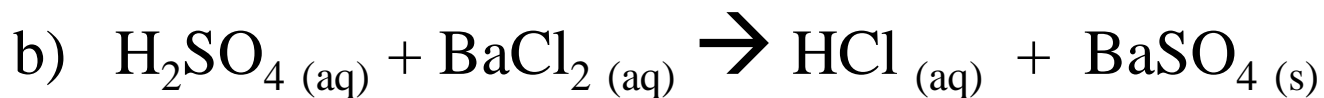


Decoding Common Chemical Equation Symbols

Practice Problems: Describe the following reactions using complete sentences.

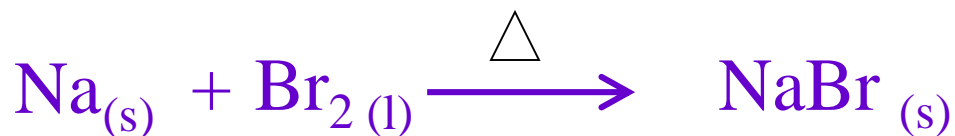


Solid sodium bicarbonate and aqueous hydrochloric acid react to yield aqueous sodium chloride plus water and carbon dioxide gas.



Aqueous sulfuric acid plus aqueous barium chloride react to yield aqueous hydrochloric acid plus solid barium sulfate.

c) Sodium plus bromine, when heated, reacts to produce solid sodium bromide.



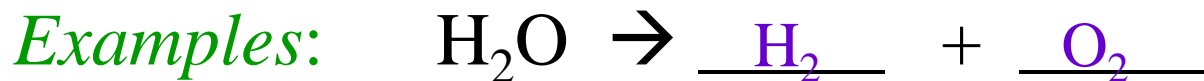
Review Notes 10.2 pt.1

Types of Reactions

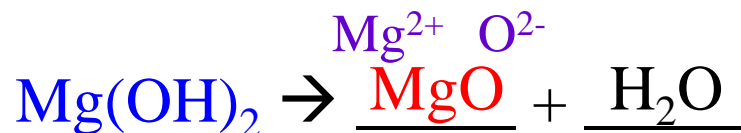
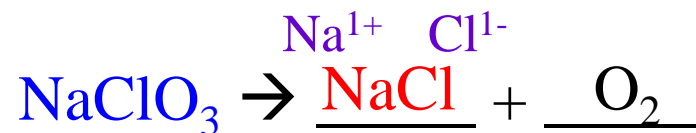
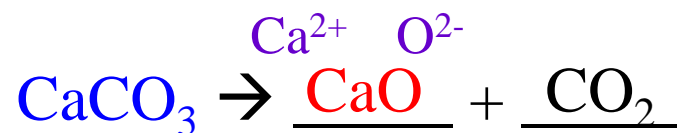
Five General Types of Reactions

1) Decomposition:

- **Breaks apart: ONE reactant** \rightarrow 2 or more products



Types of Decomposition



- To write the formulas:
 - Look up the charges of ions.
 - Make compound neutral!!
 - Balance LAST!!

Review Notes 10.2 pt.2

Types of Reactions

Five General Types of Reactions (*Continued*)

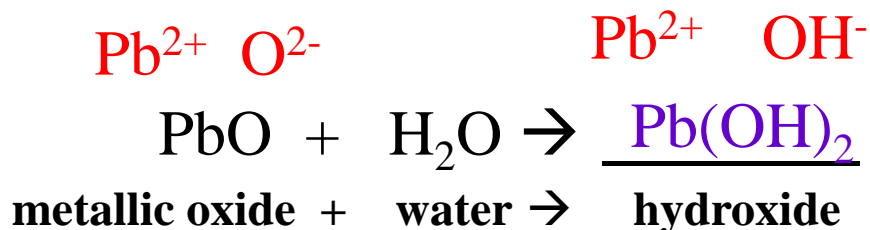
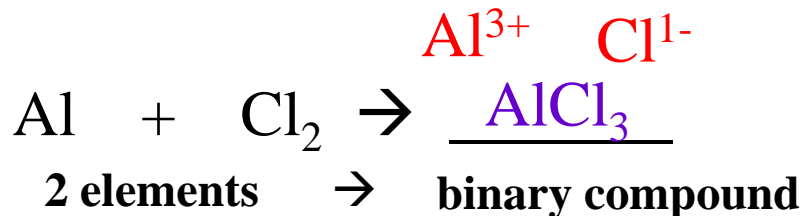
2) Synthesis

- **Combines:** 2 or more reactants → **ONE** product

– *Decomposition in reverse!*



Examples:



General Types of Reactions (*Continued*)

3) Combustion

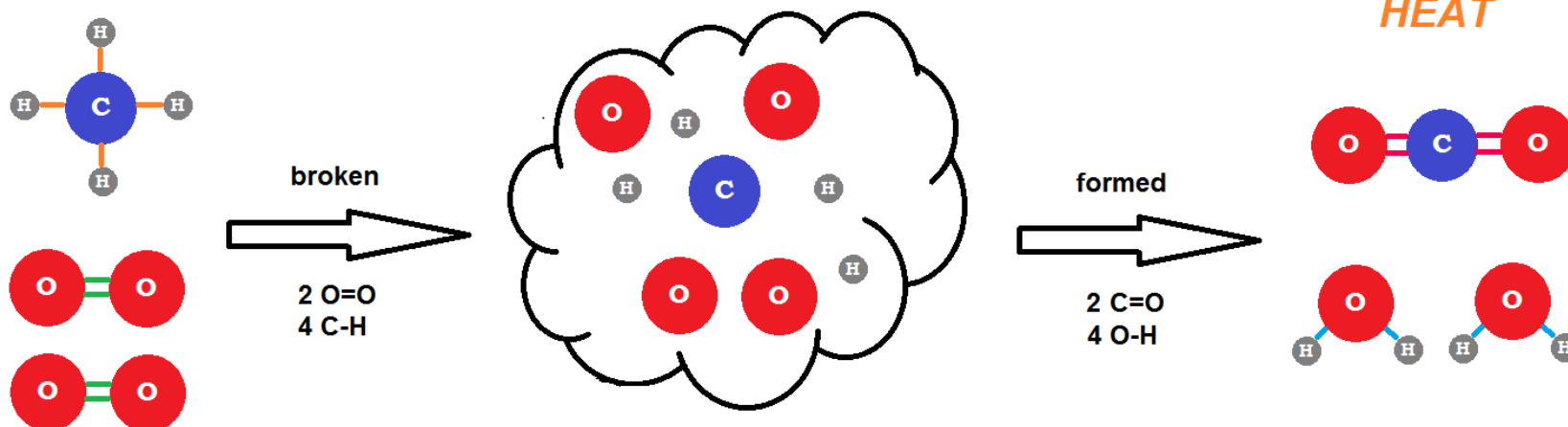
- A reaction with O₂ !!!

— General Form: A + O₂ → metallic oxide

- For **Carbon/Hydrogen** compound:

— The products are **always** ... CO₂ + H₂O

— This reaction is too easy!! Don't miss it!



Review Notes 10.2 pt.3

Types of Reactions

General Types of Reactions (*Continued*)

4) Single Replacement:

- A more reactive element “replaces” a less reactive element.

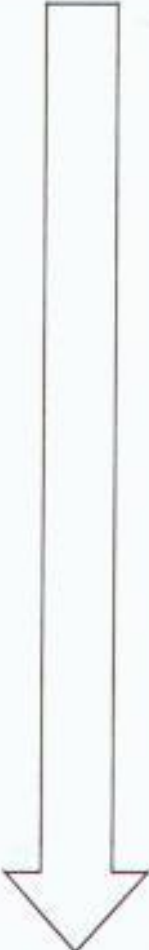
• **Comp**

— Us

Gener

• Eleme

— K

Two Activity Series		
Metals	Decreasing Activity	Halogens
lithium		fluorine
potassium		chlorine
calcium		bromine
sodium		iodine
magnesium		
aluminum		
zinc		
chromium		
iron		
nickel		
tin		
lead		
HYDROGEN*		
copper		
mercury		
silver		
platinum		
gold		

nt.

ogens

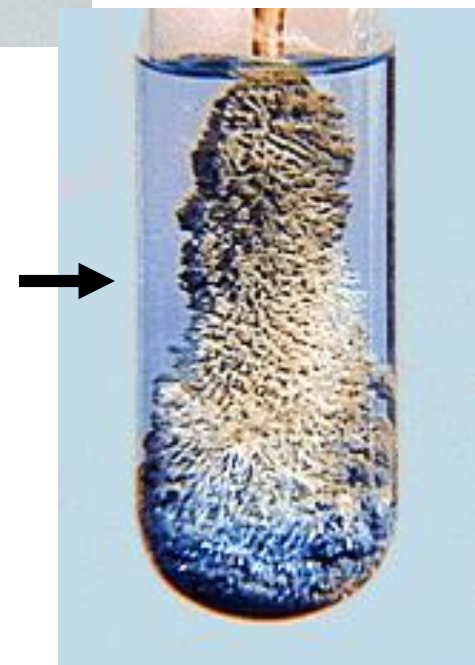
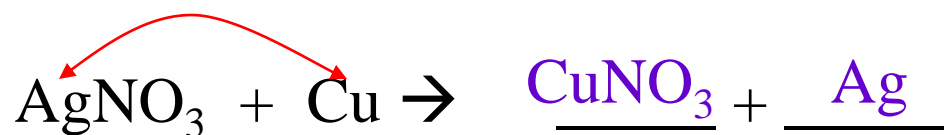
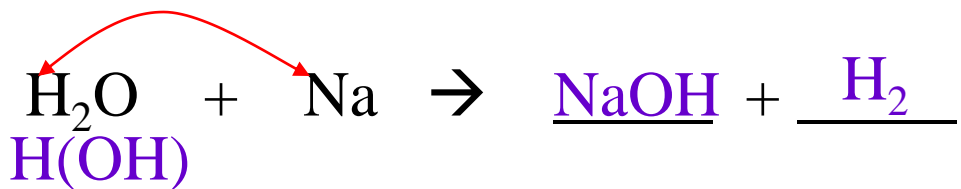
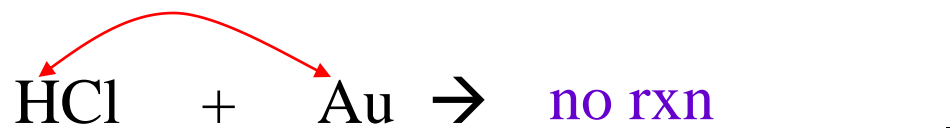
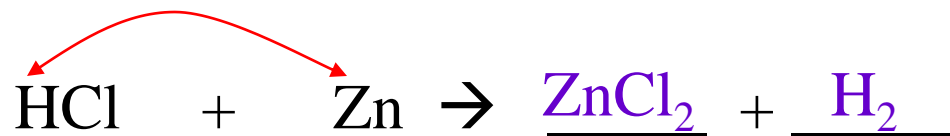
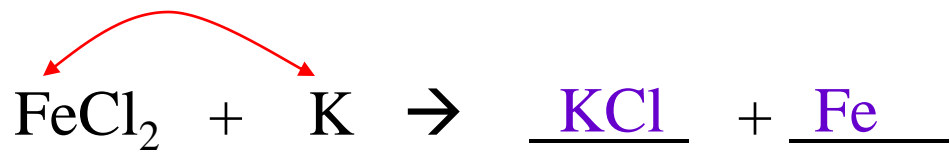
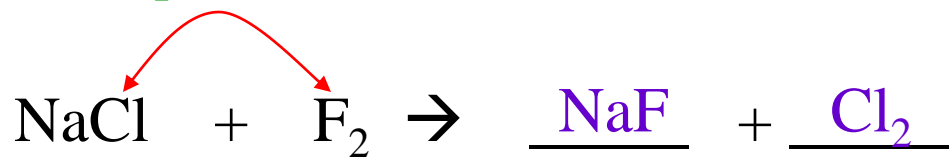
Halogens

metals

Metals

Single Replacement Reactions

Examples:



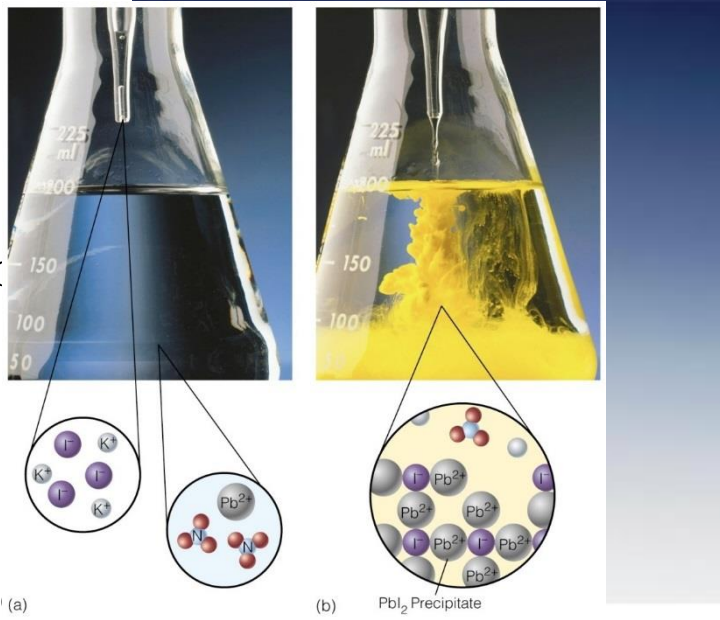
Review Notes 10.2 pt.4

Types of Reactions

General Types of Reactions (*Continued*)

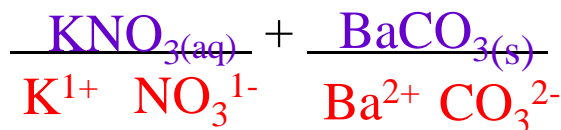
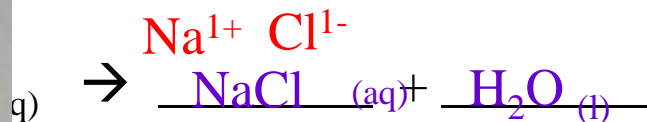
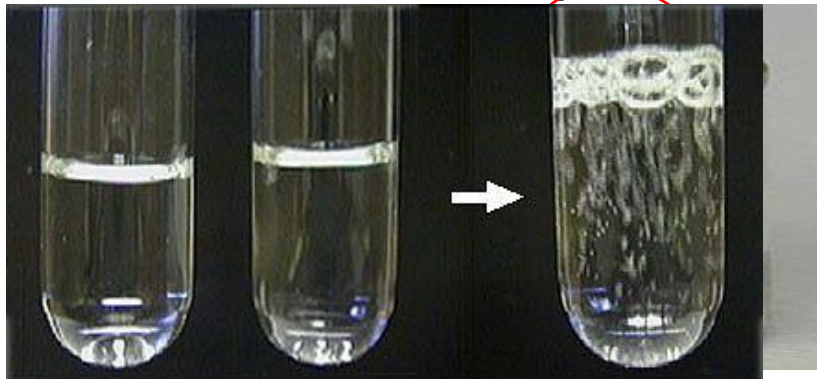
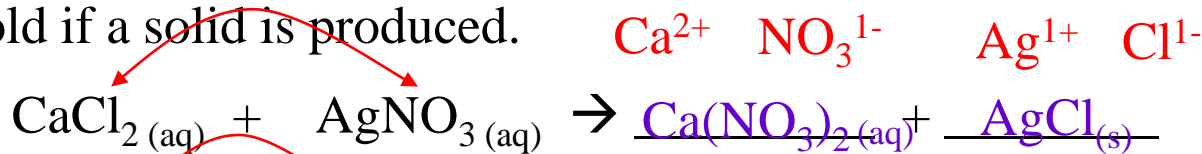
5) Double Replacement:

- **Anions** switch places!
- Two **aqueous ionic compounds** → two
 - Has a *driving force*:
 - **Insoluble = a solid** (precipitate)
 - **Water = a liquid**
 - **Gas** (low weight molecular comp)



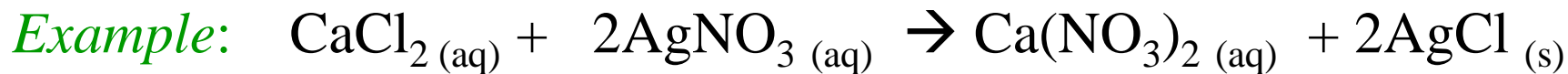
- You will be told if a solid is produced.

Examples:

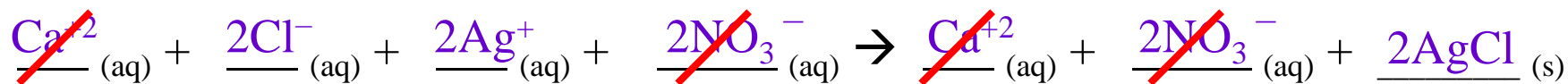


Writing Net Ionic Equations for Double Replacement Reactions

- A **“net ionic equation”** only shows the ions that were used to make the precipitate.
- Some ions were always dissolved in water. These are called “spectator ions”. (They don’t do anything, so we can ignore them.)



Ionic Equation Written as Ions Dissolved in Water:



- Cancel out the spectator ions, and you are left with the Net Ionic Equation!

