

# N24- Predicting Products

**Synthesis**

**Combustion**

**Decomposition**

**Double Replacement**

**Single Replacement**



# Steps

- 1) Given words? Turn into formulas**
  - Neutral compounds! Cross over!
  - Diatomics
- 2) Identify type of reaction**
  - Use flow chart to help!
- 3) Write products**
  - Neutral compounds! Cross over from scratch!
  - Diatomics!
- 4) Balance Equation**

# Does it happen?

*Not all reactions happen in real life!*

So many things factor  
into if it happens in real life  
For this class we will only care about:

**Activity Series**

**Solubility Rules**

# Activity Series of Metals

- Lithium
- Potassium
- Calcium
- Sodium
- Magnesium
- Aluminum
- Zinc
- Chromium
- Iron
- Nickel
- Lead
- Hydrogen
- Bismuth
- Copper
- Mercury
- Silver
- Platinum
- Gold

- Metals can replace other metals IF they are ABOVE the metal that they are trying to replace
- Metals above hydrogen can replace hydrogen in acids.
- Metals from sodium upward can replace hydrogen in water

# Activity Series of Halogens

- Fluorine
- Chlorine
- Bromine
- Iodine

• Halogens can replace other halogens in compounds IF they are ABOVE the halogen that they are trying to replace.



# Solubility Chart

- NaO

**SOLUBLE** b/c it has  $\text{Na}^+$  in it!

- MgOH

**INSOLUBLE** b/c  $\text{OH}^-$  insoluble and  $\text{Mg}^{2+}$  not one of the exceptions

Solubility of Some Ionic Compounds in Water		
<b><u>Always Soluble</u></b>		
Alkali metals =	$\text{Li}^+, \text{Na}^+, \text{K}^+, \text{Rb}^+, \text{Cs}^+$	AAA CNP
Ammonium =	$\text{NH}_4^+$	
Acetate =	$\text{C}_2\text{H}_3\text{O}_2^-$	
Chlorate =	$\text{ClO}_3^-$	
Nitrate =	$\text{NO}_3^-$	
Perchlorate =	$\text{ClO}_4^-$	
<b><u>Generally Soluble</u></b>		
$\text{Cl}^-, \text{Br}^-, \text{I}^-$	Soluble <u>except</u> : $\text{Ag}^+, \text{Pb}^{2+}, \text{Hg}_2^{2+}$	AP-H
$\text{F}^-$	Soluble <u>except</u> : $\text{Ca}^{2+}, \text{Ba}^{2+}, \text{Sr}^{2+}, \text{Pb}^{2+}, \text{Mg}^{2+}$	CBS-PM
Sulfate = $\text{SO}_4^{2-}$	Soluble <u>except</u> : $\text{Ca}^{2+}, \text{Ba}^{2+}, \text{Sr}^{2+}, \text{Pb}^{2+}$	CBS-P
<b><u>Generally Insoluble</u></b>		
$\text{O}^{2-}, \text{OH}^-$	Insoluble <u>except</u> : Alkali metals and $\text{NH}_4^+$	AA
	<u>Somewhat</u> soluble: $\text{Ca}^{2+}, \text{Ba}^{2+}, \text{Sr}^{2+}$	CBS
$\text{CO}_3^{2-}$ $\text{S}^{2-}, \text{SO}_3^{2-}$ $\text{PO}_4^{3-}$ $\text{CrO}_4^{2-}, \text{Cr}_2\text{O}_4^{2-}$	Insoluble <u>except</u> : Alkali metals and $\text{NH}_4^+$	AA

Not Soluble = forms precipitate

Soluble = dissolves in water (aqueous)

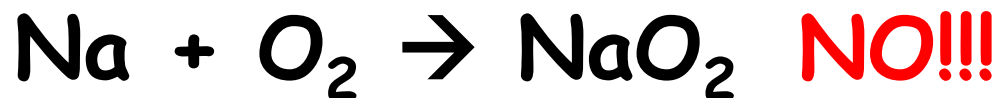
# Prediction Products Practice #1

Sodium plus Oxygen yields ???

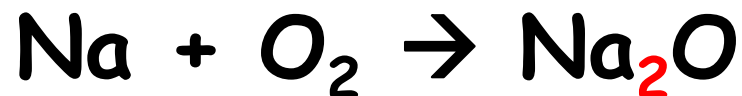


What type of reaction  
does this look like?

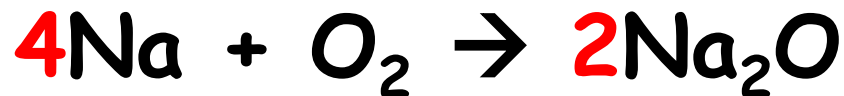
Synthesis



Ionic so cross over!  
Don't steal  
subscripts!



Fix numbers  
with balancing



# Prediction Products Practice #2

Sodium chloride breaks into its components



What type of reaction  
does this look like?

Decomposition



NO!!!

Diatomic



Balance





# Prediction Products Practice #3

Aluminum is added Lead(II) Nitrate



Is Al above Pb on Activity Series?

Yes!

What type of reaction does this look like?

Single Replacement

Does Al make cation or anion?

Cation

Ionic so cross over!



Balance



**NOT DONE!!!! NEED TO THINK ABOUT PHASES!**

# Prediction Products Practice #3

**NOT DONE!!!! NEED TO THINK ABOUT PHASES!**

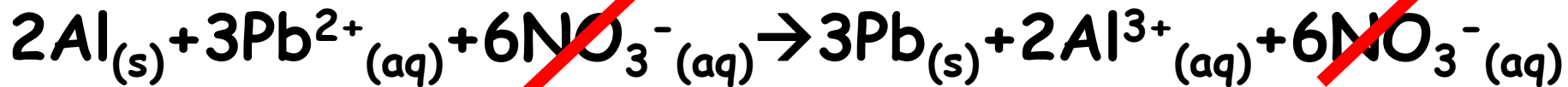
The Balanced Equation



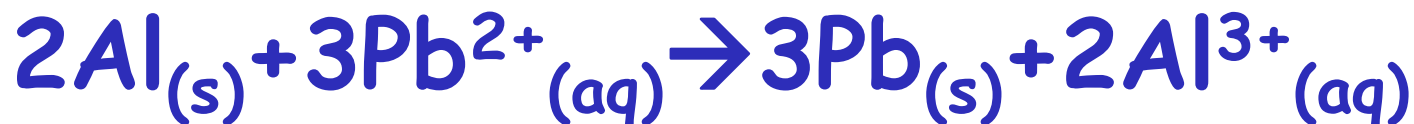
The Overall Equation



The Complete Ionic Equation



The Net Ionic Equation



Spectator  
Ions

# Prediction Products Practice #4



What type of reaction  
does this look like?

Double Replacement

Ionic so  
cross over!



Balance



**NOT DONE!!!! NEED TO  
THINK ABOUT PHASES!**

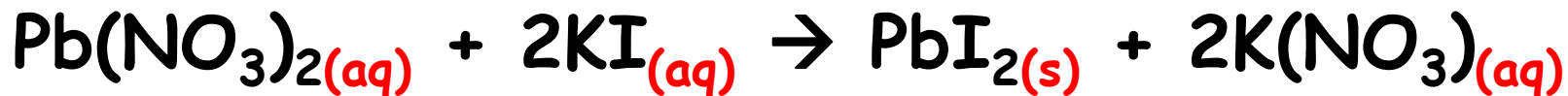
# Prediction Products Practice #4

**NOT DONE!!!! NEED TO THINK ABOUT PHASES!**

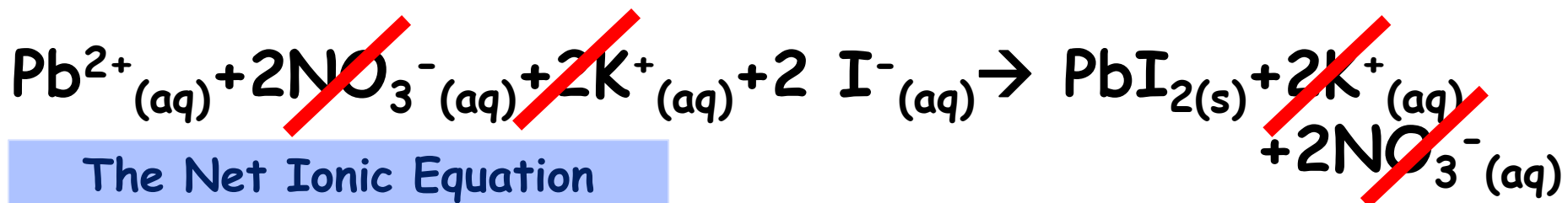
The Balanced Equation



The Overall Equation



The Complete Ionic Equation



The Net Ionic Equation



Spectator  
Ions

# Prediction Products Practice #5

A solution of Silver  
Nitrate with a solution  
of potassium chloride

What type of reaction  
does this look like?

Double Replacement

Already  
neutral!



Already  
Balanced!



**NOT DONE!!!! NEED TO  
THINK ABOUT PHASES!**

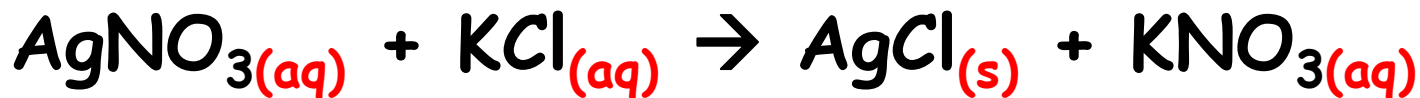
# Prediction Products Practice #5

**NOT DONE!!!! NEED TO THINK ABOUT PHASES!**

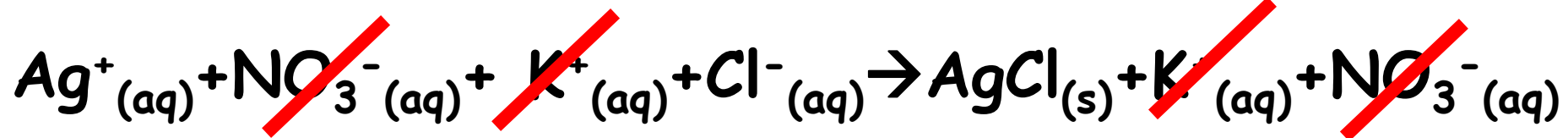
The Balanced Equation



The Overall Equation



The Complete Ionic Equation



The Net Ionic Equation



Spectator  
Ions

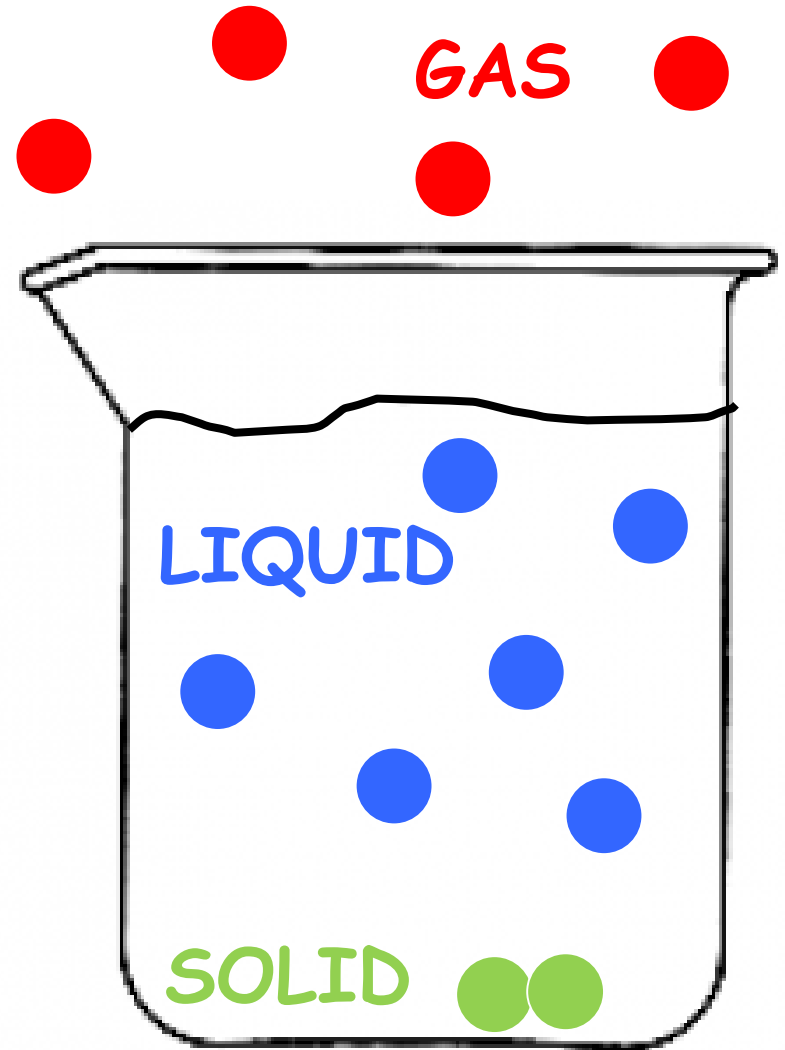
# Particulate Diagrams

Particulate Diagrams help our brains!

Use little color coded (or labeled) circles to represent particles

A "particle" can be an atom, an ion, a polyatomic ion, compound or molecule.

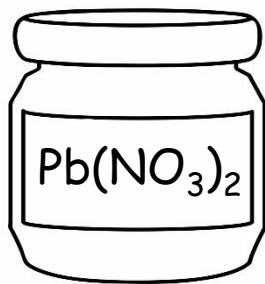
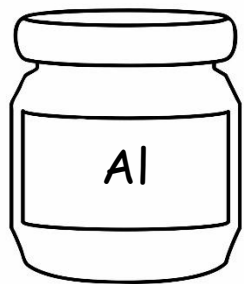
Use the right number of circles! Draw them to represent phases too!



# Prediction Products Practice #3

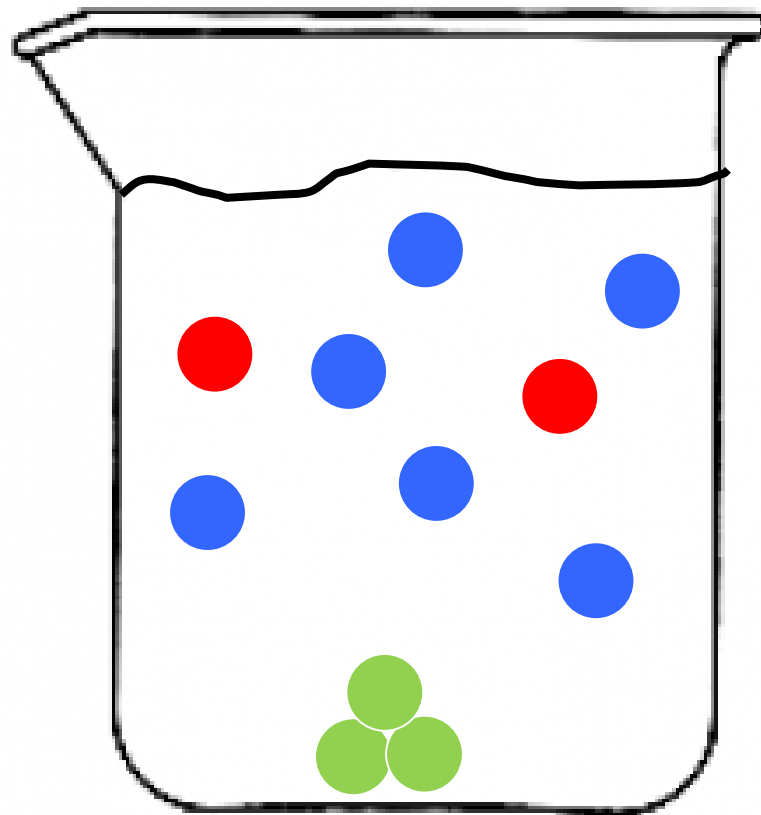
Particulate Diagrams help our brains!

## The Balanced Equation



Dump into beaker...

Jars of chemicals in  
stock room

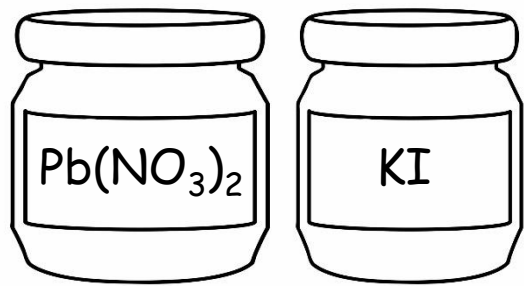




# Prediction Products Practice #4

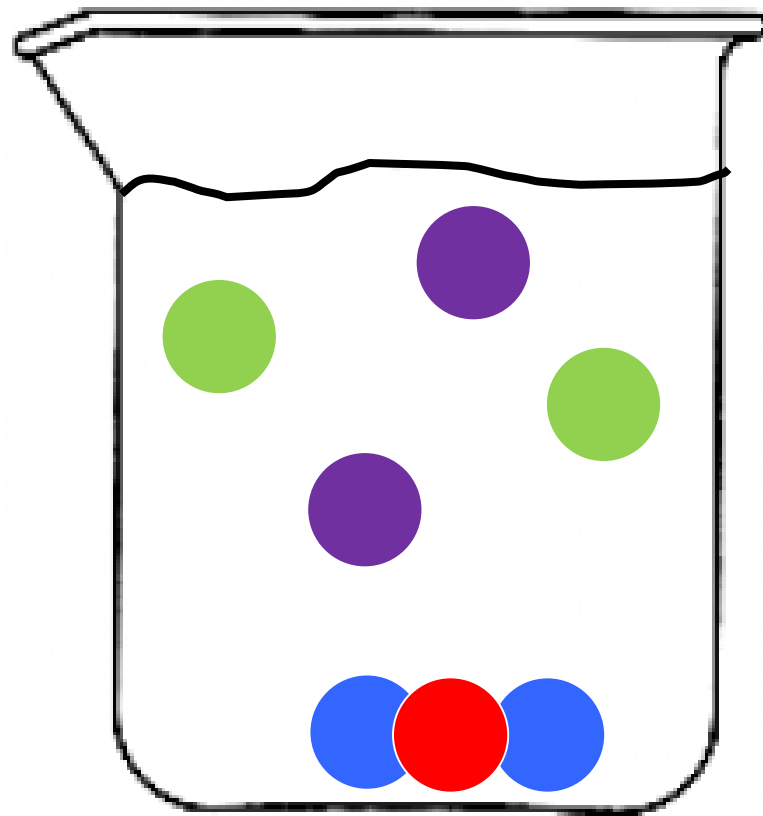
Particulate Diagrams help our brains!

## The Balanced Equation



Jars of chemicals in  
stock room

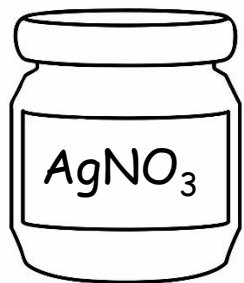
Dump into beaker...



# Prediction Products Practice #5

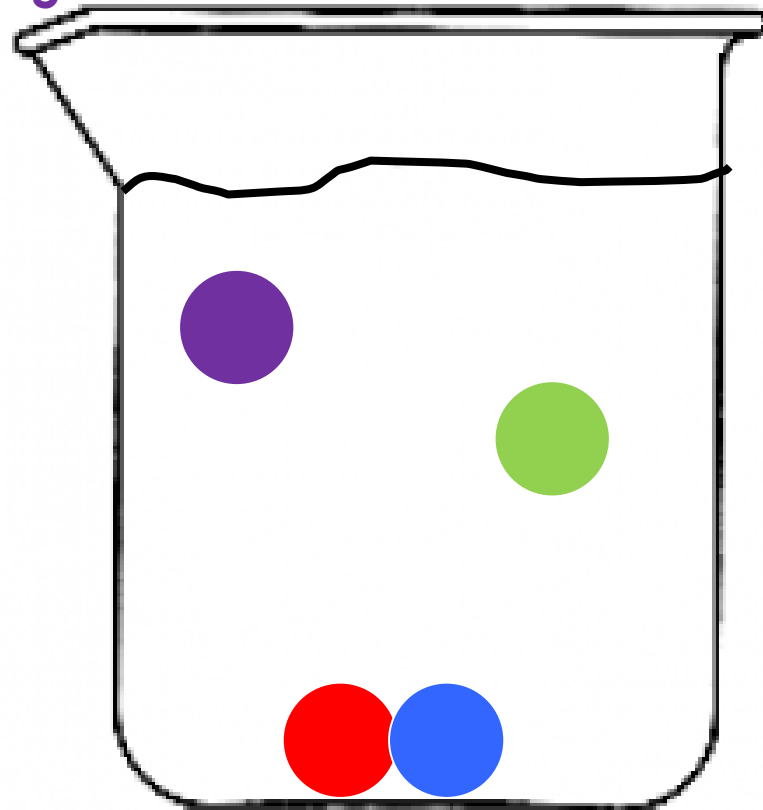
Particulate Diagrams help our brains!

The Balanced Equation



Dump into beaker...

Jars of chemicals in  
stock room



# You Try One!

Particulate Diagrams help our brains!

The Balanced Equation



Dump into beaker...

Jars of chemicals in  
stock room

