# Single Replacement Reactions

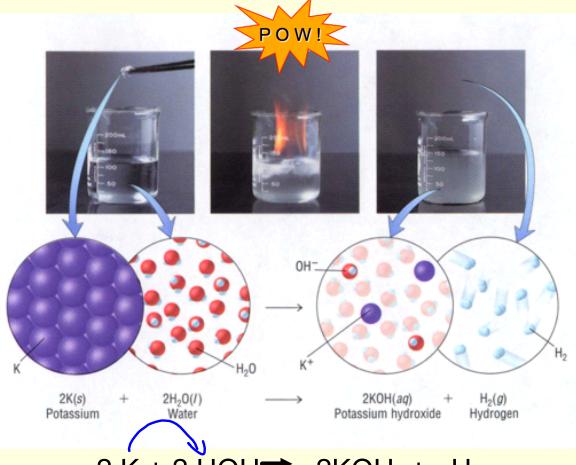
### Single Replacement Reactions

#### **General form:**

$$A + BC \rightarrow AC + B$$

$$Mg + CuSO_4 \rightarrow MgSO_4 + Cu$$

### Potassium reacts with Water



$$2K + 2HOH \rightarrow 2KOH + H_2$$

## Single Replacement Reactions

One <u>cation</u> replaces another <u>cation</u>. metal

$$Mg + Zn(NO_3)_2 \longrightarrow Mg(NO_3)_2 + Zn$$

$$\longrightarrow A + BC \longrightarrow AC + B$$

$$\swarrow MNM \longrightarrow M$$

One <u>anion</u> replaces another anion.

non-metal 
$$\rightarrow$$
 non-metal  $\rightarrow$  2NaBr + Cl<sub>2</sub>  $\rightarrow$  2NaCl + Br<sub>2</sub>  $\rightarrow$  AB + C  $\rightarrow$  AC + B

# **Activity Series**



Cations
Element Reactivity

H<sub>2</sub> Cu Hg Ag Pt Au

Li Anions Halogen Reactivity Rb K  $F_2$  $CI_2$ Na Br<sub>2</sub> Mg 2 Mn Zn Cr Fe Ni Sn Pb

Most reactive on periodic table:

How do you determine if a reaction will occur, or if one element will replace another?

Look at the activity series.

- A reactive cation will <u>replace</u> any <u>cation below it</u> on the activity series.
- A reactive halogen anion will **replace** any **halogen anion below it** on the activity series

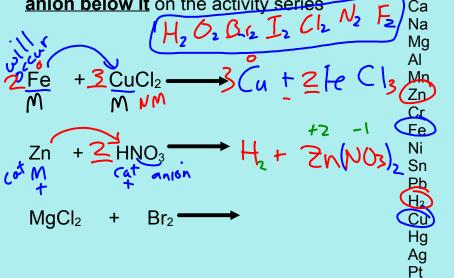
 $F_2$ 

Cl2

Br<sub>2</sub>

 $I_2$ 

Au



#### Predict if these reactions will occur:

$$Mg + AlCl_3 \longrightarrow$$
 $Al + MgCl_2 \longrightarrow$ 
 $MgCl_2 + Al \longrightarrow$ 

Order of reactants <u>DOES NOT</u> determine how they react.

The question we must ask is:

Can the <u>single element</u> replace its <u>counterpart</u>?

### More Practice:

Fe + HCl →

 $ZnSO_4 + Sn \rightarrow$ 

AI +  $H_2SO_4 \rightarrow$ 

 $I_2$  + NaF  $\rightarrow$ 

 $F_2$  + NaBr  $\rightarrow$ 

Li Rb  $F_2$ K Ba Ca Na Br<sub>2</sub> Mg  $I_2$ Αľ Mn Zn Cr Fe Ni Sn Pb  $H_2$ Cu Hg

Ag Pt Au

### More Practice:

Fe + 2 HCl 
$$\rightarrow$$
 FeCl<sub>2</sub> + H<sub>2</sub>

$$ZnSO_4 + Sn \rightarrow NR$$

$$2 AI + 3 H_2SO_4 \rightarrow AI_2(SO_4)_3 + 3 H_2$$

$$I_2$$
 + NaF  $\rightarrow$   $?$ 

$$F_2$$
 + 2NaBr  $\rightarrow$   $399$ 

Li Rb K  $F_2$  Ba  $Cl_2$  Na  $Br_2$  Mg  $l_2$  Mn Zn

Cr Fe

Ni Sn Pb H<sub>2</sub> Cu Hg Ag Pt Au The equation must contain the correct formulas for reactants and products

**Representing Chemical Equations: Formula and Word Equations:** 

**FORMULA EQUATIONS** represent the reactant and products of a chemical reaction by their <u>symbols or formulas</u>

example:

The equation must contain the correct formulas for reactants and products

# **WORD EQUATIONS** represent the reactant and products of a chemical reaction by their <u>names</u>

Write the word equation for the reaction of sodium bromide and chlorine to form sodium chloride and bromine

Example:

sodium bromide + chlorine ----- sodium chloride + bromine

Reactant

**Product** 

 $2NaBr + Cl_2 \longrightarrow 2NaCl + Br_2$ 

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Predict the products

(Write balanced formulas).

Write No Reaction if applies.

Balance the equation.

3) Write the symbols for the elements that exist as diatomics in their elemental state.

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Review	
Predict the products (balanced	
formulas).	
Write No Reaction if applies.	
Balance the equation.  1)Cu+CaCO <sub>3</sub> $\rightarrow$	
2)Al +CuSO <sub>4</sub> ->	
7) Write the symbols for the elements that exist as diatomics in their elemental state.	