

**Oxidation Numbers:** Give the oxidation numbers of ALL THE ELEMENTS or polyatomic ions in each compound:

1.  $\text{NF}_3$  *MMMF No charges = COVALENT*  
 2.  $\text{MgF}_2$   $\text{Mg}^{2+} \text{F}^-$   
 3.  $\text{NaOH}$   $\text{Na}^+ \text{OH}^-$   
 4.  $\text{HCl}$   $\text{H}^+ \text{Cl}^-$   
 5.  $\text{Mg(OH)}_2$   $\text{Mg}^{2+} \text{OH}^-$   
 6.  $\text{H}_2\text{SO}_4$   $\text{H}^+ \text{SO}_4^{2-}$   
 7.  $\text{Zn(NO}_2)_2$   $\text{Zn}^{2+} \text{NO}_2^-$   
 8.  $\text{HCN}$   $\text{H}^+ \text{CN}^-$   
 9.  $\text{NH}_4\text{OH}$   $\text{NH}_4^+ \text{OH}^-$   
 10.  $\text{HNO}_3$   $\text{H}^+ \text{NO}_3^-$

**Reaction Types:** Determine the specific reaction type for each of the following reactions (for example, "single replacement, active metal replaces H from water")

- Synthesis  $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{aq})$
- Single Replacement  $\text{Ca}(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow \text{Ca(OH)}_2(\text{s}) + \text{H}_2(\text{g})$  *Cation switch*
- Combustion  $\text{C}_2\text{H}_4(\text{g}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l})$
- decomposition  $2\text{KClO}_3(\text{aq}) \rightarrow 2\text{KCl}(\text{aq}) + 3\text{O}_2(\text{g})$
- Double Replacement  $\text{FeS}(\text{aq}) + 2\text{HCl}(\text{aq}) \rightarrow \text{FeCl}_2(\text{aq}) + \text{H}_2\text{S}(\text{g})$
- Decomposition  $\text{H}_2\text{CO}_3(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
- Single replacement  $2\text{KI}(\text{aq}) + \text{Br}_2(\text{g}) \rightarrow 2\text{KBr}(\text{aq}) + \text{I}_2(\text{g})$  *anion switch*
- Decomposition  $2\text{NaHCO}_3(\text{aq}) \rightarrow \text{Na}_2\text{O}(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$
- Synthesis  $\text{SO}_3(\text{s}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{SO}_4(\text{aq})$
- Decomposition  $\text{H}_2\text{CO}_3(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$

### Writing Compound Formulas

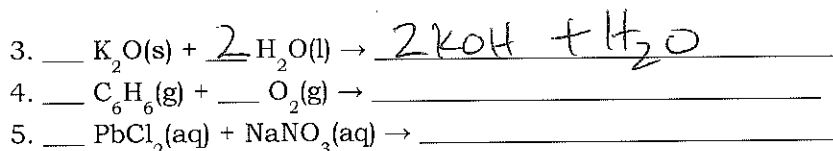
Write the following compounds as formulas.

- Silver(II) nitrate  $\text{Ag(NO}_3)_2$
- Iron (III) oxide  $\text{Fe}_2\text{O}_3$
- Sulfuric acid Skip
- Lead(II) chloride  $\text{PbCl}_2$
- Hydrofluoric acid Skip

### Predicting Reaction Outcomes

For each of the following reactions, predict the outcome. Start by determining the reaction type, then, if the reaction occurs, predict the products (don't forget the state of matter). Finally, balance the equation.

- 2  $\text{Li}(\text{s}) + \text{2 H}_2\text{O}(\text{l}) \rightarrow \text{2LiOH} + \text{H}_2$
- $\text{Na}_2\text{CO}_3(\text{aq}) \rightarrow \text{Skip}$



For each of the following reactions, transpose the reactants from word equation style to chemical equation style, then predict the reaction outcome as you did for the equations above.

6. Solid nickel reacts with aqueous hydrochloric acid

7. Aqueous lead(II) nitrate reacts with aqueous sodium hydroxide

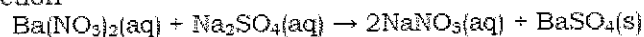
**Balancing Equations: Show your work on a separate sheet using the inventory checklist!**

B Choose the best answer for the following.

1. When  $\text{C}_3\text{H}_8$  burns completely in an excess of oxygen, the products formed are

- A)  $\text{CO}$  and  $\text{H}_2\text{O}$                       C)  $\text{CO}$  and  $\text{H}_2$   
B)  $\text{CO}_2$  and  $\text{H}_2\text{O}$                       D)  $\text{CO}_2$  and  $\text{H}_2$

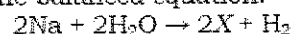
   2. The reaction



goes to completion because a

- A) Soluble salt is formed                      C) nonionized product is formed  
B) Gas is formed                                  D) precipitate is formed

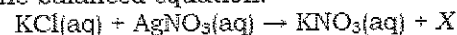
A 3. Given the balanced equation:



What is the correct formula for the product represented by the letter X?

- A)  $\text{NaOH}$     C)  $\text{NaO}$   
B)  $\text{Na}_2\text{O}$     D)  $\text{Na}_2\text{OH}$

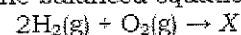
C 4. Given the balanced equation:



What is the correct formula for the product represented by the letter X?

- A)  $\text{AgCl}_2(\text{s})$                                       C)  $\text{AgCl}(\text{s})$   
B)  $\text{KCl}_2(\text{aq})$                                       D)  $\text{K}_2\text{Cl}(\text{aq})$

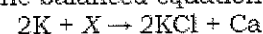
A 5. Given the balanced equation:



What represents the missing product X?

- A)  $2\text{H}_2\text{O}(\text{g})$                                       C)  $2\text{OH}^-(\text{aq})$   
B)  $\text{H}_2\text{O}_2(\text{l})$                                       D)  $\text{H}_3\text{O}^+(\text{aq})$

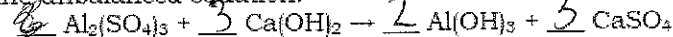
D 6. Given the balanced equation:



What represents the missing reactant X?

- A)  $2\text{Cl}^-$     C)  $\text{Cl}_2$   
B)  $2\text{CaCl}_2$     D)  $\text{CaCl}_2$

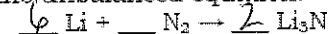
B 7. Given the unbalanced equation:



When the equation is completely balanced using the *smallest* whole-number coefficients, the sum of the coefficients is

- A) 5                      B) 9                      C) 4                      D) 3

unc 8. Given the unbalanced equation:



When the equation is correctly balanced using *smallest* whole numbers, the coefficient of the lithium is

- A) 6                      B) 3                      C) 1                      D) 2

   9. When the equation



is correctly balanced using the *smallest* whole number coefficients, the coefficient of  $\text{O}_2$  is

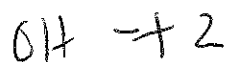
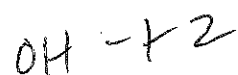
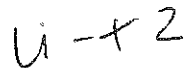
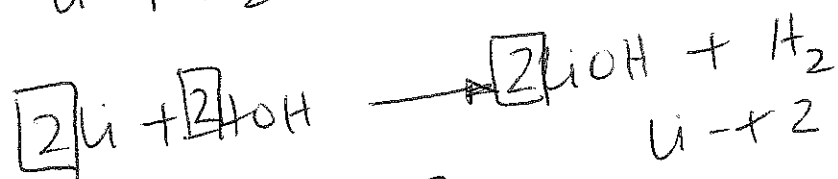
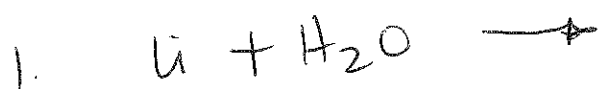
- A) 8                      B) 16                      C) 12                      D) 1

A 10. How many oxygen atoms are represented by  $2\text{Al}(\text{NO}_3)_3$ ?

- A) 6                      B) 9                      C) 12                      D) 18

E = 9

# Predicting Reaction Outcomes



3.

