

## Chapter 6 Practice

### 6.1 Chemical Equations

1. Balance each of the following:

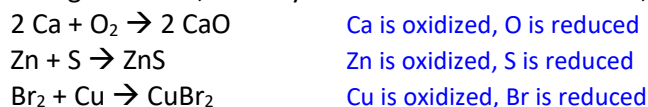
$2 \text{ K} + \text{Cl}_2 \rightarrow 2 \text{ KCl}$ S	$4 \text{ Li (s)} + \text{O}_2 \text{ (g)} \rightarrow 2 \text{ Li}_2\text{O (g)}$ S
$2 \text{ Al} + 3 \text{ S} \rightarrow \text{Al}_2\text{S}_3$ S	$\text{C}_2\text{H}_2 + 2 \text{ Br}_2 \rightarrow \text{C}_2\text{H}_2\text{Br}_4$ S
$2 \text{ Sr} + \text{O}_2 \rightarrow 2 \text{ SrO}$ S	$\text{Ca} + 2 \text{ H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{H}_2$ SD
$2 \text{ Al} + 6 \text{ HCl} \rightarrow 2 \text{ AlCl}_3 + 3 \text{ H}_2$ SD	$\text{Zn (s)} + 2 \text{ HCl (aq)} \rightarrow \text{ZnCl}_2 \text{ (aq)} + \text{H}_2 \text{ (g)}$ SD
$\text{U} + 3 \text{ F}_2 \rightarrow \text{UF}_6$ S	$\text{Ca(OH)}_2 \text{ (aq)} + 2 \text{ HCl (aq)} \rightarrow \text{CaCl}_2 \text{ (aq)} + 2 \text{ H}_2\text{O (l)}$ DD
$2 \text{ P} + 3 \text{ Cl}_2 \rightarrow 2 \text{ PCl}_3$ S	$2 \text{ NaOH} + \text{H}_2\text{SO}_4 \rightarrow 2 \text{ H}_2\text{O} + \text{Na}_2\text{SO}_4$ DD

### 6.2 Classifying Reactions

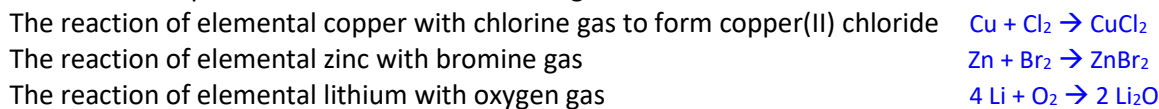
2. Label each reaction above as a synthesis (S), decomposition (D), single displacement (SD), or double displacement (DD) reaction. (in red above)

### 6.3 Reactions between Metals and Nonmetals

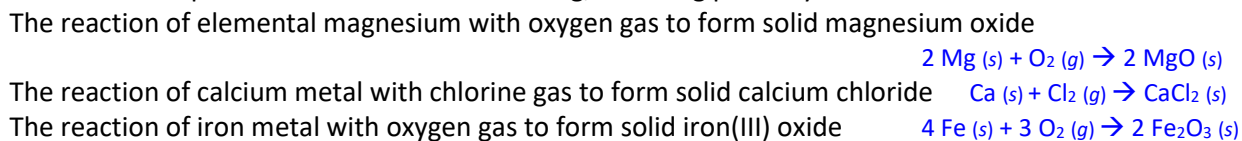
3. In the following reactions, identify the element that is oxidized, and the element that is reduced:



4. Write and balance equations for each of the following:



5. Write and balance equations for each of the following, including phase symbols:

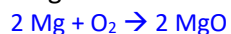


## 6.4 Combustion

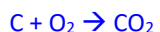
---

6. Write balanced equations for the combustion of each of the following:

magnesium



carbon



$\text{C}_4\text{H}_8$



$\text{C}_5\text{H}_{10}$



## 6.5 Reactions in Aqueous Solution

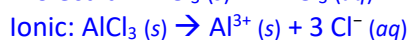
---

Write molecular and ionic equations for each of the following:

Sodium chloride dissolves in water.



Aluminum chloride dissolves in water.



8. Identify each compound as soluble or insoluble in water.

$\text{FeCl}_3$

soluble

$\text{Na}_2\text{SO}_4$

soluble

$(\text{NH}_4)_2\text{CO}_3$

soluble

$\text{BaSO}_3$

insoluble

$\text{ZnCO}_3$

insoluble

$\text{ZnCl}_2$

soluble

$\text{PbCl}_2$

insoluble

$\text{KBr}$

soluble

9. An aqueous mixture containing lead(II) and chloride ions is combined with another aqueous mixture containing ammonium and sulfate ions. Write the formula for the insoluble product that will be produced.

lead(II) sulfate:  $\text{PbSO}_4$

10. The equations below represent precipitation reactions. Rewrite these as complete ionic and net ionic equations.

Molecular Equation	$\text{AgNO}_3 (aq) + \text{KCl} (aq) \rightarrow \text{KNO}_3 (aq) + \text{AgCl} (s)$
Complete Ionic Equation	$\text{Ag}^+ (aq) + \text{NO}_3^- (aq) + \text{K}^+ (aq) + \text{Cl}^- (aq) \rightarrow \text{K}^+ (aq) + \text{NO}_3^- (aq) + \text{AgCl} (s)$
Net Ionic Equation	$\text{Ag}^+ (aq) + \text{Cl}^- (aq) \rightarrow \text{AgCl} (s)$

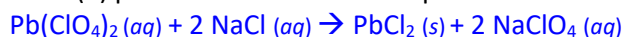
Molecular Equation	$\text{Ba}(\text{ClO}_4)_2 (aq) + \text{K}_2\text{SO}_4 (aq) \rightarrow \text{BaSO}_4 (s) + 2 \text{KClO}_4 (aq)$
Complete Ionic Equation	$\text{Ba}^{2+} (aq) + 2 \text{ClO}_4^- (aq) + 2 \text{K}^+ (aq) + \text{SO}_4^{2-} (aq) \rightarrow \text{BaSO}_4 (s) + 2 \text{K}^+ (aq) + 2 \text{ClO}_4^- (aq)$
Net Ionic Equation	$\text{Ba}^{2+} (aq) + \text{SO}_4^{2-} (aq) \rightarrow \text{BaSO}_4 (s)$

11. The equation below represents a neutralization reaction. Rewrite this as complete ionic equations and net ionic equations.

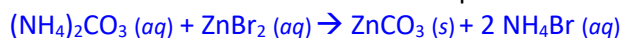
Molecular Equation	$2 \text{HCl} (aq) + \text{Ba}(\text{OH})_2 (aq) \rightarrow 2 \text{H}_2\text{O} (l) + \text{BaCl}_2 (aq)$
Complete Ionic Equation	$2 \text{H}^+ (aq) + 2 \text{Cl}^- (aq) + \text{Ba}^{2+} (aq) + 2 \text{OH}^- (aq) \rightarrow 2 \text{H}_2\text{O} (l) + \text{Ba}^{2+} (aq) + 2 \text{Cl}^- (aq)$
Net Ionic Equation	$2 \text{H}^+ (aq) + 2 \text{OH}^- (aq) \rightarrow 2 \text{H}_2\text{O} (l)$

12. Write balanced molecular equations for the following reactions. Include phase symbols.

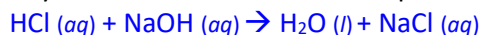
Aqueous lead(II) perchlorate reacts with aqueous sodium chloride.



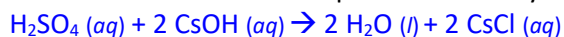
Aqueous ammonium carbonate reacts with aqueous zinc bromide.



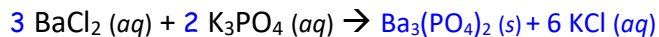
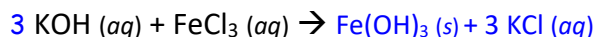
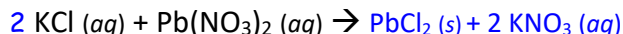
Aqueous hydrochloric acid reacts with aqueous sodium hydroxide.



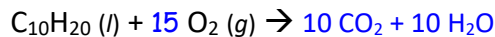
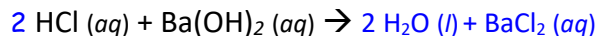
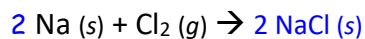
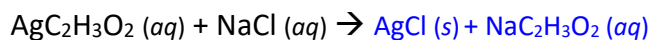
Aqueous sulfuric acid reacts with aqueous cesium hydroxide.



13. Each of the following reactions results in one water-soluble product and one precipitate. Complete and balance each reaction and show phases to indicate whether the products are aqueous or solid.



14. The reactions below draw from all of the reaction types introduced in this chapter. Predict the products and balance each equation.



### Solubility Rules

Compounds containing these ions are always soluble	
Alkali metals:	$\text{Li}^+$ , $\text{Na}^+$ , $\text{K}^+$ , $\text{Rb}^+$
Ammonium:	$\text{NH}_4^+$
Large -1 oxyanions	$\text{NO}_3^-$ , $\text{ClO}_3^-$ , $\text{ClO}_4^-$ , $\text{C}_2\text{H}_3\text{O}_2^-$
Compounds containing these ions are usually soluble	
Halides: (except $\text{Pb}^{2+}$ , $\text{Ag}^+$ )	$\text{F}^-$ , $\text{Cl}^-$ , $\text{Br}^-$ , $\text{I}^-$
Sulfate (except $\text{Ba}^{2+}$ , $\text{Ca}^{2+}$ , $\text{Pb}^{2+}$ , $\text{Ag}^+$ )	$\text{SO}_4^{2-}$
Not Soluble	
Most other ions	