

## Unit 6 Problem Set

- 1) a. Double displacement  
 b. Combination  
 c. Single displacement  
 d. Decomposition  
 e. Combination

2) In both reactions you have to have at least two reactants. In a combination reaction, the reactants react to form a more complex molecule. However, in a single displacement, a new molecule is formed that may not be complex. In addition, an element remains as a product.

- 3) a. Salt  
 b. Strong base  
 c. Weak base  
 d. Strong acid  
 e. Weak acid  
 f. Weak base

### 4) Strong acids

hydrochloric acid (HCl)  
 hydrobromic acid (HBr)  
 hydroiodic acid (HI)  
 Nitric acid (HNO<sub>3</sub>)  
 Perchloric acid (HClO<sub>4</sub>)  
 Sulfuric acid (H<sub>2</sub>SO<sub>4</sub>)

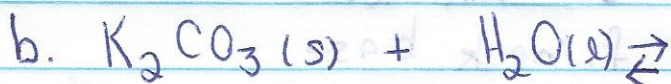
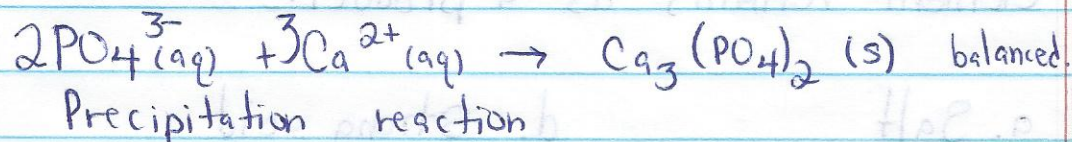
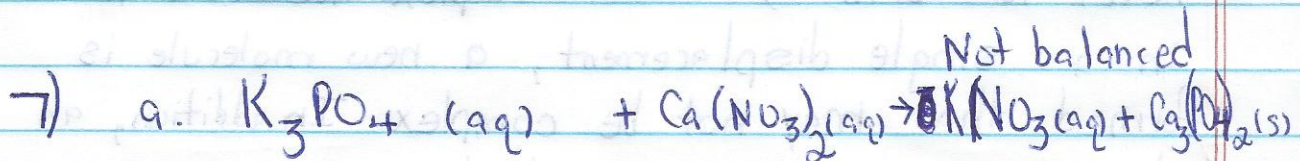
### Strong bases

lithium hydroxide	Li OH
sodium "	Na OH
potassium "	KOH
rubidium "	RbOH
cesium "	CsOH
magnesium "	Mg(OH) <sub>2</sub>
calcium "	Ca(OH) <sub>2</sub>
strontium "	Sr(OH) <sub>2</sub>
barium "	Ba(OH) <sub>2</sub>

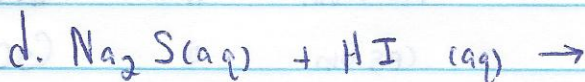
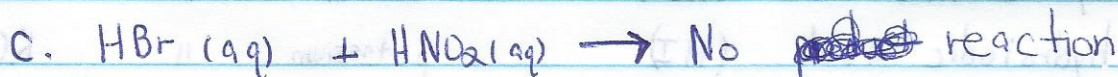
- 5) a.  $\text{Ag}^+$ ,  $\text{Hg}_2^{2+}$  or  $\text{Pb}^{2+}$   
 b.  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Ag}^+$  or  $\text{Ca}^{2+}$   
 c. None  
 d.  $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ , or  $\text{NH}_4^+$   
 e.  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ , or  $\text{Ba}^{2+}$   
 f.  $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ , or  $\text{NH}_4^+$

b)  $\rightarrow$  Reaction goes to completion to the formation of product.

$\rightleftharpoons$  Reaction goes in both directions



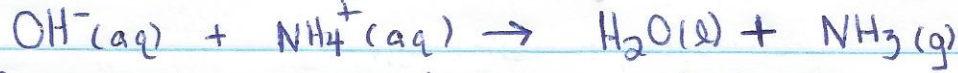
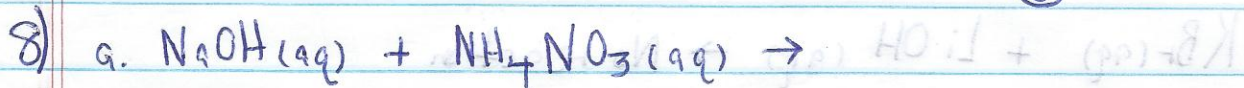
Neutralization reaction.



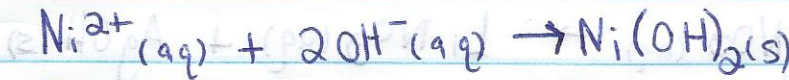
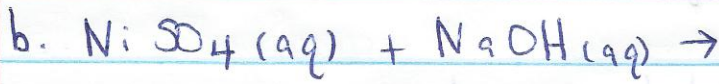
(+)

Σ r ↓ . b

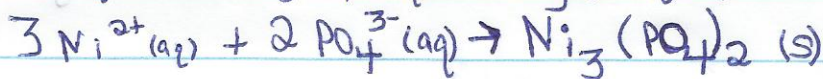
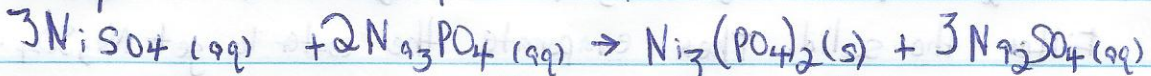
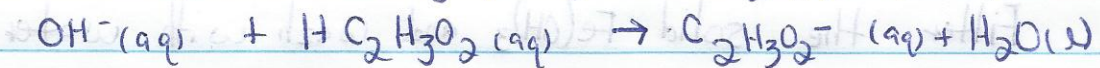
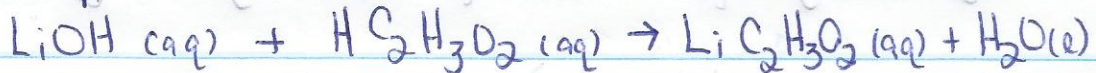
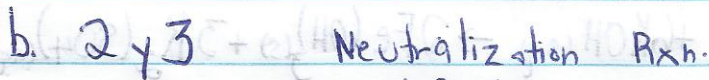
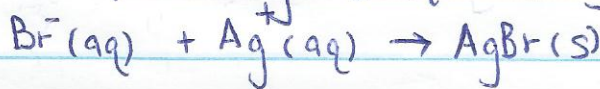
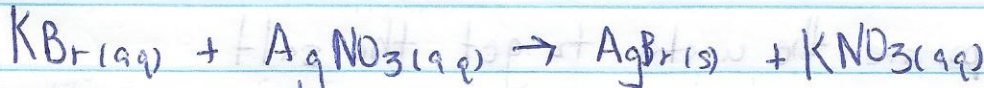
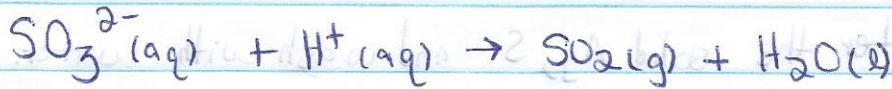
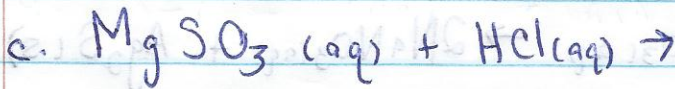
(3)



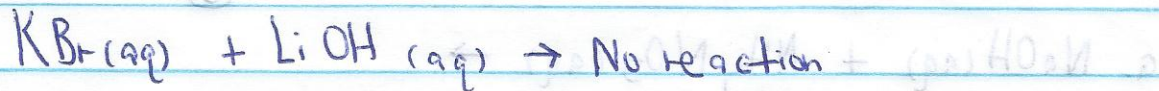
Gas evolving reaction + neutralization



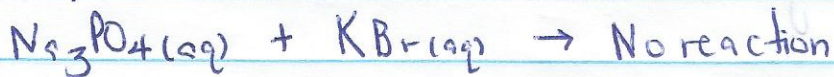
Precipitation reaction



d. 1 y 3

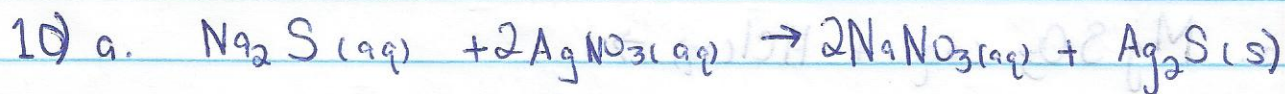
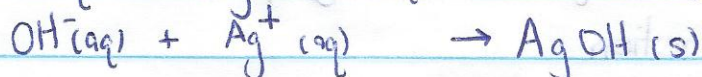


e. 6 y 1

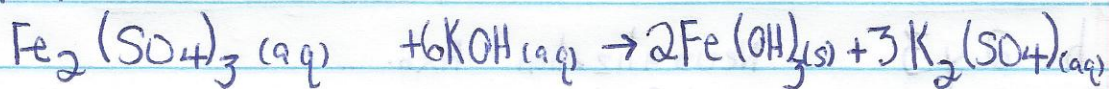
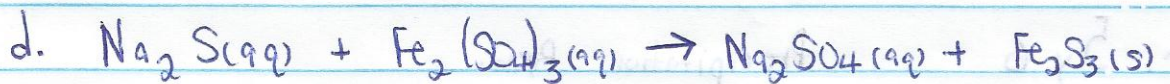


f. 3 y 4

Precipitation reaction

Filter the solid  $\text{Ag}_2\text{S}$  and wash with water.

Evaporate the water to get the salt.

c. ~~10~~Filter the solid  $\text{Fe(OH)}_3$  and wash with water.Filter the solid. Then evaporate the water to get  $\text{Na}_2\text{SO}_4$ .

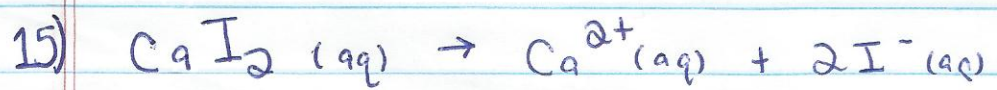
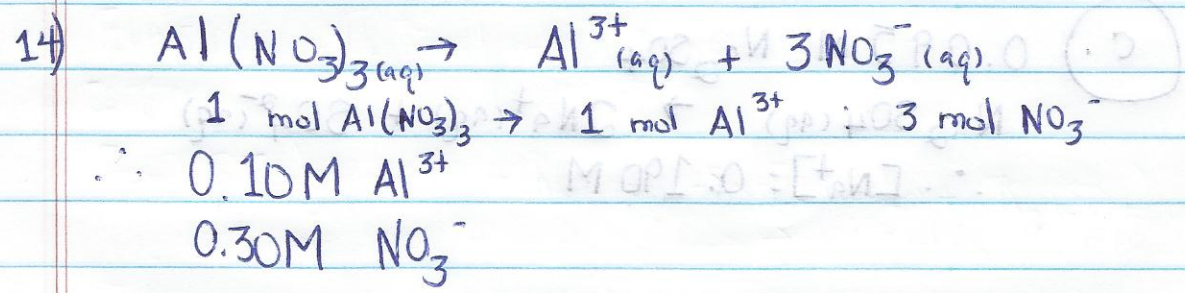
2)  $\text{Ca}^{2+} + \text{CO}_3^{2-} \rightarrow \text{CaCO}_3 \downarrow$  (5) total  
 e.  $\text{Fe}_2\text{S}_3$

Same as d. Filter the solid and wash with water.

- 11) 1. Precipitate formation. The solid product does not redissolve.  
 2. Gas formation. The gas product escapes.  
 3. Formation of a weak electrolyte. For instance, when water forms during a neutralization reaction it will not ionize.

- 12) a. Weak                      d. Nonelectrolyte  
 b. Strong                      e. Weak  
 c. Strong                      f. Nonelectrolyte

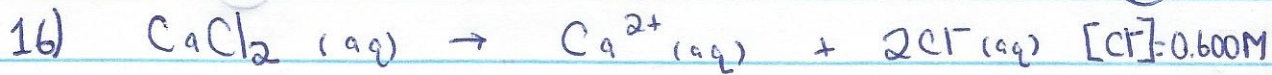
- 13) a. Nonelectrolyte              d. Strong  
 b. Weak                      e. Nonelectrolyte  
 c. Strong                      f. Strong



$$0.300 \cancel{\text{L}} \times \frac{0.170 \text{ mol CaI}_2}{\cancel{\text{L}}} \times \frac{2 \text{ mol I}^-}{1 \text{ mol CaI}_2} = 0.102 \text{ mol I}^-$$

Total volume: 400.0 mL

(6)

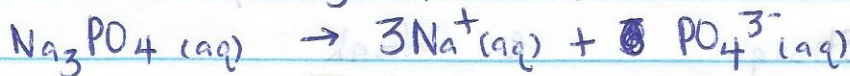


$$[\text{Cl}^-] = \frac{(0.150 \text{ L} \times 0.600 \frac{\text{mol}}{\text{L}} \text{Cl}^-) + (0.250 \text{ L} \times 0.400 \frac{\text{mol}}{\text{L}} \text{Cl}^-)}{0.400 \text{ L}}$$

$$= 0.475 \text{ M Cl}^-$$

17)

a. 0.060 M  $\text{Na}_3\text{PO}_4$



$$\therefore [\text{Na}^+] = 0.180 \text{ M}$$

b. 0.150 M  $\text{NaMnO}_4$



$$\therefore [\text{Na}^+] = 0.150 \text{ M}$$

c. 0.095 M  $\text{Na}_2\text{SO}_4$



$$\therefore [\text{Na}^+] = 0.190 \text{ M}$$