1. Balance and classify the following reactions: combination (C), decomposition (D), single replacement (SR), double replacement (DR) or combustion (CB).

Classification

a. 
$$_{1}C_{3}H_{8}(g) + _{5}O_{2}(g) \rightarrow _{3}CO_{2}(g) + _{4}H_{2}O(l)$$

b. 
$$2 \text{ K (s)} + 2 \text{ H}_2\text{O (l)} \rightarrow 2 \text{ KOH (aq)} + 1 \text{ H}_2\text{ (g)}$$

c. 
$$1 \text{ MgSO}_4 \text{ (aq)} + 1 \text{ Na}_2 \text{CO}_3 \text{ (aq)} \rightarrow 1 \text{ MgCO}_3 \text{ (s)} + 1 \text{ Na}_2 \text{SO}_4 \text{ (aq)}$$

d. 
$$\underline{\hspace{0.1cm}}$$
 Cl<sub>2</sub> (g) +  $\underline{\hspace{0.1cm}}$  NaI (s)  $\rightarrow$   $\underline{\hspace{0.1cm}}$  NaCl (s) +  $\underline{\hspace{0.1cm}}$  I<sub>2</sub> (s)

e. 
$$2$$
 NaNO<sub>3</sub> (s)  $\rightarrow$   $2$  NaNO<sub>2</sub> (s) +  $1$  O<sub>2</sub> (g)

f. 
$$\underline{1}$$
 H<sub>2</sub> (g) +  $\underline{1}$  Cl<sub>2</sub> (g)  $\rightarrow$   $\underline{2}$  HCl (g)

$$g. \quad \underline{\phantom{a}^{3}} Ca(C_{2}H_{3}O_{2})_{2} \ (aq) + \underline{\phantom{a}^{2}} H_{3}PO_{4} \ (aq) \rightarrow \underline{\phantom{a}^{1}} Ca_{3}(PO_{4})_{2} \ (s) + \underline{\phantom{a}^{6}} HC_{2}H_{3}O_{2} \ (aq)$$

h. 
$$2 \text{ H}_2\text{O}_2(l) \rightarrow 2 \text{ H}_2\text{O}(l) + 1 \text{ O}_2(g)$$

i. 
$$2 \text{ Na (s)} + 1 \text{ S (s)} \rightarrow 1 \text{ Na2S (s)}$$

j. 
$$\underline{1}$$
 BaCl<sub>2</sub> (aq) +  $\underline{1}$  K<sub>2</sub>CrO<sub>4</sub> (aq)  $\rightarrow$   $\underline{1}$  BaCrO<sub>4</sub> (s) +  $\underline{2}$  KCl (aq)

2. Balance each of the following equations. Then write the total (complete) ionic equation for each reaction. Finally write the net ionic equation for each reaction. *Remember: insoluble substances are not present as separate ions in solution.* 

a. 
$$\underline{\hspace{0.5cm}}^{\hspace{0.5cm}} Pb(NO_3)_2 (aq) + \underline{\hspace{0.5cm}}^{\hspace{0.5cm}} NaOH (aq) \rightarrow \underline{\hspace{0.5cm}}^{\hspace{0.5cm}} Pb(OH)_2 (s) + \underline{\hspace{0.5cm}}^{\hspace{0.5cm}} NaNO_3 (aq)$$

Complete Ionic equation: Pb+2(aq)+2NOs-(aq)+2O-2(aq)+2h+(aq) ---> Pb(OH2)(s)+ 2Na+ +2No-3

Net ionic equation: Pb+2(aq)+2O-2(aq)+2h+(aq)--->Pb(OH2)(s)

b. 
$$2 Na_3PO_4 (aq) + 1 Ca(NO_3)_2 (aq) \rightarrow 1 Ca_3(PO_4)_2 (s) + 1 NaNO_3 (aq)$$

Complete Ionic equation: 2Na+3+2PO-3 4+ 3Ca+2+3NO-3--->CA3(PO4)2+6Na+6NO3-

Net ionic equation: CI- + Ag +--> AgCI

c. 
$$\underline{\hspace{0.1cm}}^{1}$$
 NaCl (aq) +  $\underline{\hspace{0.1cm}}^{1}$  AgNO<sub>3</sub> (aq)  $\rightarrow$   $\underline{\hspace{0.1cm}}^{1}$  AgCl (s) +  $\underline{\hspace{0.1cm}}^{1}$  NaNO<sub>3</sub> (aq)

Complete Ionic equation: Na+ + Cl- + Ag+ + NP-3---> AgCl + Na+ + NO-3

Net ionic equation: CI- + Ag--> AgCI

d. 
$$_{1}$$
Na<sub>2</sub>SO<sub>4</sub> (aq) +  $_{2}$ AgNO<sub>3</sub> (aq)  $\rightarrow _{1}$ Ag<sub>2</sub>SO<sub>4</sub> (s) +  $_{2}$ NaNO<sub>3</sub> (aq)

Complete Ionic equation: Na2+ + SO4 -2 + 2Ag+ + 2NO3- --> AgCL+ NA+ + No3-

Net ionic equation: SO4 -2 + 2Ag+--> Ag SO4

e. 
$$\frac{1}{1}$$
 Na<sub>2</sub>CO<sub>3</sub> (aq) +  $\frac{1}{1}$  BaCl<sub>2</sub> (aq)  $\rightarrow$   $\frac{1}{1}$  BaCO<sub>3</sub> (s) +  $\frac{1}{1}$  NaCl (aq)

Complete Ionic equation: Na2+ + CO3-3 + Ba+2 + Cl2- ---> BCO3+ 2NA+ 2Cl-

Net ionic equation: Co-2 3 + Ba +2 --> BaCO3

f. 
$$^{1}$$
 Na<sub>2</sub>CO<sub>3</sub> (aq) +  $^{2}$  HCl (aq)  $\rightarrow$  2NaCl (aq) +  $^{1}$  H<sub>2</sub>O (l) +  $^{1}$  CO<sub>2</sub> (g)

Complete Ionic equation:

Net ionic equation: CO3-2 + 2H+ --> H2O+ CO2