Honor Chemistry Name _____

Chapter 13: Net Ionic Equations Worksheet II Date _____/_____/_____ Period _____

Write a balance equation and label the states of the reactants and products for each in each reaction. After writing the balanced equation, list the driving force and spectator ions, and write the net ionic equation(s) below the balanced equation. If there is no driving force for a reaction, write no reaction in place of the net ionic equation.

1. Silver acetate + sodium iodide $\longrightarrow$

$AgC_2H_3O_{2(aq)} + NaI_{(aq)} \rightarrow NaC_2H_3O_{2(aq)} + AgI_{(s)}$

TIE: $Ag^{+1}_{(aq)} + (C_2H_3O_2)^{-1}_{(aq)} + Na^{+1}_{(aq)} + I^{-1}_{(aq)} \rightarrow Na^{+1}_{(aq)} + (C_2H_3O_2)^{-1}_{(aq)} + AgI_{(s)}$

Net: $Ag^{+1}_{(aq)} + I^{-1}_{(aq)} \rightarrow AgI_{(s)}$

DF: $AgI_{(s)}$ SI: $Na^{+1}_{(aq)}$, $(C_2H_3O_2)^{-1}_{(aq)}$

2. Nitric acid + potassium $\longrightarrow$

$2\ HNO_{3(aq)} + 2\ K_{(s)} \rightarrow 2\ KNO_{3(aq)} + H_{2(g)}$

TIE: $2\ H^{+1}_{(aq)} + 2\ (NO_3)^{-1}_{(aq)} + 2\ K_{(s)} \rightarrow 2\ K^{+1}_{(aq)} + 2\ (NO_3)^{-1}_{(aq)} + H_{2(g)}$

Net: $H^{+1}_{(aq)} + H^{+1}_{(aq)} + 2\ e^{-1} \rightarrow H_{2(g)}$

DF: $H_{2(g)}$ SI: $(NO_3)^{-1}_{(aq)}$

3. Barium hydroxide + chloric acid $\longrightarrow$

$Ba(OH)_{2(aq)} + 2\ HClO_{3(aq)} \rightarrow Ba(ClO_3)_{2(aq)} + 2\ H_2O_{(\ell)}$

TIE: $Ba^{+2}_{(aq)} + 2\ (OH)^{-1}_{(aq)} + 2\ H^{+1}_{(aq)} + 2\ (ClO_3)^{-1}_{(aq)} \rightarrow Ba^{+2}_{(aq)} + 2\ (ClO_3)^{-1}_{(aq)} + 2\ H_2O_{(\ell)}$

Net: $H^{+1}_{(aq)} + (OH)^{-1}_{(aq)} \rightarrow H_2O_{(\ell)}$

DF: $H_2O_{(\ell)}$ SI: $Ba^{+2}_{(aq)}$, $(ClO_3)^{-1}_{(aq)}$

4. Ammonium carbonate + calcium nitrate $\longrightarrow$

$(NH_4)_2(CO_3)_{(aq)} + Ca(NO_3)_{2(aq)} \rightarrow CaCO_{3(s)} + 2\ (NH_4)(NO_3)_{(aq)}$

TIE: $2\ (NH_4)^{+1}_{(aq)} + (CO_3)^{-2}_{(aq)} + Ca^{+2}_{(aq)} + 2\ (NO_3)^{-1}_{(aq)} \rightarrow CaCO_{3(s)} + 2\ (NH_4)^{+1}_{(aq)} + 2\ (NO_3)^{-1}_{(aq)}$

Net: $Ca^{+2}_{(aq)} + (CO_3)^{-2}_{(aq)} \rightarrow CaCO_{3(s)}$

DF: $CaCO_{3(s)}$ SI: $(NH_4)^{+1}_{(aq)}$, $(NO_3)^{-1}_{(aq)}$

5. Acetic acid + potassium hydroxide $\longrightarrow$

$HC_2H_3O_{2(aq)} + KOH_{(aq)} \rightarrow KC_2H_3O_{2(aq)} + H_2O_{(\ell)}$

TIE: $H^{+1}_{(aq)} + (C_2H_3O_2)^{-1}_{(aq)} + K^{+1}_{(aq)} + (OH)^{-1}_{(aq)} \rightarrow K^{+1}_{(aq)} + (C_2H_3O_2)^{-1}_{(aq)} + H_2O_{(\ell)}$

NET: $H^{+1}_{(aq)} + (OH)^{-1}_{(aq)} \rightarrow H_2O_{(\ell)}$

DF: $H_2O_{(\ell)}$ SI: $K^{+1}_{(aq)}$, $(C_2H_3O_2)^{-1}_{(aq)}$

6. Zinc plus chloric acid $\longrightarrow$

$Zn_{(s)} + 2\ HClO_{3(aq)} \rightarrow Zn(ClO_3)_{2(aq)} + H_{2(g)}$

TIE: $Zn_{(s)} + 2\ H^{+1}_{(aq)} + 2\ (ClO_3)^{-1}_{(aq)} \rightarrow Zn^{+2}_{(aq)} + 2\ (ClO_3)^{-1}_{(aq)} + H_{2(g)}$

NET: $2\ H^{+1}_{(aq)} + 2\ e^{-1} \rightarrow H_{2(g)}$

DF: $H_{2(g)}$ SI: $(ClO_3)^{-1}_{(aq)}$

7. Manganese IV oxide + hydrochloric acid $\longrightarrow$

$MnO_{2(s)} + 4\ HCl_{(aq)} \rightarrow MnCl_{4(aq)} + 2\ H_2O_{(\ell)}$

TIE $MnO_{2(s)} + 4\ H^{+1}_{(aq)} + 4\ Cl^{-1}_{(aq)} \rightarrow Mn^{+4}_{(aq)} + 4\ Cl^{-1}_{(aq)} + 2\ H_2O_{(\ell)}$

NET $H^{+1}_{(aq)} + O^{-2}_{(aq)} \rightarrow H_2O_{(\ell)}$

DF: $H_2O_{(\ell)}$ SI $Cl^{-1}_{(aq)}$

8. Carbonic acid + Iron (II) nitrate $\longrightarrow$

$H_2CO_{3(aq)} + Fe(NO_3)_{2(aq)} \rightarrow Fe(CO_3)_{(s)} + 2\ H(NO_3)_{(aq)}$

TIE: $2\ H^{+1}_{(aq)} + (CO_3)^{-2}_{(aq)} + Fe^{+2}_{(aq)} + 2\ (NO_3)^{-1}_{(aq)} \rightarrow Fe(CO_3)_{(s)} + 2\ H^{+1}_{(aq)} + 2\ (NO_3)^{-1}_{(aq)}$

NET: $Fe^{+2}_{(aq)} + (CO_3)^{-2}_{(aq)} \rightarrow Fe(CO_3)_{(s)}$

DF: $Fe(CO_3)_{(s)}$ SI $H^{+1}_{(aq)}$, $(NO_3)^{-1}_{(aq)}$

9. Mercury (II) hydroxide + nitric acid $\longrightarrow$

$Hg(OH)_{2(s)} + 2\ HNO_{3(aq)} \rightarrow Hg(NO_3)_{2(aq)} + 2\ H_2O_{(\ell)}$

TIE: $Hg(OH)_{2(s)} + 2\ H^{+1}_{(aq)} + 2\ (NO_3)^{-1}_{(aq)} \rightarrow Hg^{+2}_{(aq)} + 2\ (NO_3)^{-1}_{(aq)} + 2\ H_2O_{(\ell)}$

NET: $H^{+1}_{(aq)} + (OH)^{-1}_{(aq)} \rightarrow H_2O_{(\ell)}$

DF: $H_2O_{(\ell)}$ SI: $(NO_3)^{-1}_{(aq)}$

10. Aluminum iodide + silver nitrate $\longrightarrow$

$AlI_{3(aq)} + 3\ Ag(NO_3)_{(aq)} \rightarrow Al(NO_3)_{3(aq)} + 3\ AgI_{(s)}$

TIE: $Al^{+3}_{(aq)} + 3\ I^{-1}_{(aq)} + 3\ Ag^{+1}_{(aq)} + 3\ (NO_3)^{-1}_{(aq)} \rightarrow Al^{+3}_{(aq)} + 3\ (NO_3)^{-1}_{(aq)} + 3\ AgI_{(s)}$

NET: $Ag^{+1}_{(aq)} + I^{-1}_{(aq)} \rightarrow AgI_{(s)}$

DF: $AgI_{(s)}$ SI: $Al^{+3}_{(aq)}$, $(NO_3)^{-1}_{(aq)}$

11. Chloric acid + magnesium oxide $\longrightarrow$

$2\ HClO_{3(aq)} + MgO_{(s)} \rightarrow Mg(ClO_3)_{2(aq)} + H_2O_{(\ell)}$

TIE: $2\ H^{+1}_{(aq)} + 2\ (ClO_3)^{-1}_{(aq)} + MgO_{(s)} \rightarrow Mg^{+2}_{(aq)} + 2\ (ClO_3)^{-1}_{(aq)} + H_2O_{(\ell)}$

NET: $H^{+1}_{(aq)} + O^{-2}_{(aq)} \rightarrow H_2O_{(\ell)}$

DF: $H_2O_{(\ell)}$ SI: $(ClO_3)^{-1}_{(aq)}$

12. Nitric acid + copper (II) $\longrightarrow$

$2\ HNO_{3(aq)} + Cu_{(s)} \rightarrow Cu(NO_3)_{2(aq)} + H_{2(g)}$

TIE $2\ H^{+1}_{(aq)} + 2\ (NO_3)^{-1}_{(aq)} + Cu_{(s)} \rightarrow Cu^{+2}_{(aq)} + 2\ (NO_3)^{-1}_{(aq)} + H_{2(g)}$

NET $2\ H^{+1}_{(aq)} + 2\ e^{-1} \rightarrow H_{2(g)}$

DF: $H_{2(g)}$ SI: $(NO_3)^{-1}_{(aq)}$

13. Hydrochloric acid + sodium hydroxide $\longrightarrow$

$HCl_{(aq)} + NaOH_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(\ell)}$

TIE: $H^{+1}_{(aq)} + Cl^{-1}_{(aq)} + Na^{+1}_{(aq)} + (OH)^{-1}_{(aq)} \rightarrow Na^{+1}_{(aq)} + Cl^{-1}_{(aq)} + H_2O_{(\ell)}$

NET: $H^{+1}_{(aq)} + (OH)^{-1}_{(aq)} \rightarrow H_2O_{(\ell)}$

DF: $H_2O_{(\ell)}$ SI: $Na^{+1}_{(aq)}$, $Cl^{-1}_{(aq)}$

14. Nitric acid + ammonia $\longrightarrow$

$HNO_{3(aq)} + NH_{3(\ell)} \rightarrow NH_4NO_{3(aq)}$

TIE $H^{+1}_{(aq)} + (NO_3)^{-1}_{(aq)} + NH_{3(\ell)} \rightarrow (NH_4)^{+1}_{(aq)} + (NO_3)^{-1}_{(aq)}$

DF: None SI: None