File: Balancing Equations Problems 26-Feb-2008

1. **Write formulae for the Reactants and Products**
2. **Balance the equation**
3. **Will the reaction go to completion**

Hydrochloric Acid and Cobalt III Nitrate

Sodium Dichromate + Lead (II) Nitrate

Ammonium Dichromate [Heated] -> Chromium III Oxide + Nitrogen + Water

Ammonia + Oxygen -> NO + HOH

Calcium + Water -> Bubbles

Methane + Oxygen -> Flame

Zinc + HCl ->

Magnesium Metal and Water ->

Iron III Oxide + Nitric Acid -> Iron III Nitrate + Water

Hydrogen Sulfide gas + Lead II Nitrate

Iron III Chloride + Potassium Hydroxide

Lead II Acetate + Potassium Iodide

Lithium Oxide + Water ->

Antimony Metal and Chlorine Gas ->

Iron II Sulfide + Hydrochloric Acid ->

Aluminum Metal and Copper II Oxide ->

Ammonium Chloride + Potassium Hydroxide

Hydrogen Sulfide + Chlorine Gas ->

Lithium Hydroxide + Carbon Dioxide

Potassium Carbonate + Nitric Acid ->

Sodium Chloride + Sulfuric Acid ->

Sodium Sulfate + Calcium Chloride ->

Calcium Hydroxide + Hydrochloric Acid ->

Sodium Hydroxide + Phoshoric Acid ->

Sodium Bicarbonate -> Decomposition with heat

Barium Nitrate + Sodium Chromate ->

Lead II Chloride + Potassium Sulfate ->

$Na_2 SO_4 + KCl$

$Ba (NO_3)_2 + NaCl$

$Na_2S + Cu (NO_3)_2$

$2 NH_4 + Pb (NO_3)_2$

Silver Nitrate + Sodium Chromate

Nickel II Nitrate + Potassium Carbonate

Lead (II) Nitrate and Potassium Iodide

Hydrobromic Acid and aq Sodium

ANSWERS

Hydrochloric Acid and Cobalt III Nitrate -> Blue
HCl + Cobalt III Nitrate -> Blue

Sodium Dichromate + Lead (II) Nitrate -> Solid

Ammonium Dichromate -> Chromium III Oxide + Nitrogen + Water
$(NH_4)_2\ Cr_2\ O_7$ -> $Cr_2\ O_3 + N_2 + HOH$

Ammonia + Oxygen -> NO + HOH

Calcium + Water -> Bubbles

Methane + Oxygen -> Flame

Zinc + HCl ->

Magnesium Metal and Water ->
$Mg + HOH -> Mg(OH)_2 + H_2$

Iron III Oxide + Nitric Acid -> Iron III Nitrate + Water
$Fe_2O_3 + 6\ HNO_3$ -> $2\ Fe\ (NO_3)_3 + 3\ HOH$

Hydrogen Sulfide gas + Lead II Nitrate -> Lead II Sulfide + Nitric Acid
$H_2S + Pb\ (NO_3)_2$ -> $PbS + 2\ HNO_3$

Iron III Chloride + Potassium Hydroxide
$FeCl_3 + 3\ KOH$ -> $Fe\ (OH)_3 + 3\ KCl$

Lead II Acetate + Potassium Iodide
$Pb\ (C_2H_3O_2)_2 + 2\ KI$ -> $PbI_2 + 2\ K\ C_2H_3O_2$

Lithium Oxide + Water ->
$Li_2O + HOH$ -> $2\ LiOH$

Antimony Metal and Chlorine Gas ->
$2\ Sb + 3\ Cl_2$ -> $2\ SbCl_3$

Iron II Sulfide + Hydrochloric Acid ->
$FeS + 2\ HCl$ -> $FeCl_2 + H_2S$

Aluminum Metal and Copper II Oxide ->
$2\ Al + 3\ CuO$ -> $Al_2O_3 + 3\ Cu$

Ammonium Chloride + Potassium Hydroxide
$NH_4Cl + KOH$ -> $NH_3 + HOH + KCl$

Hydrogen Sulfide + Chlorine Gas ->
$8\ H_2S + 8\ Cl_2$ -> $S_8 + 16\ HCl$

Lithium Hydroxide + Carbon Dioxide
$2\ LiOH + CO_2$ -> $Li_2CO_3 + HOH$

Potassium Carbonate + Nitric Acid ->
$K_2CO_3 + 2\ HNO_3$ -> $2\ KNO_3 + HOH + CO_2$

Sodium Chloride + Sulfuric Acid ->
$2\ NaCl + H_2SO_4$ -> $Na_2SO_4 + 2\ HCl$

Sodium Sulfate + Calcium Chloride ->
$NaSO_4 + CaCl_2$ -> $CaSO_4 + 2\ NaCl$

Calcium Hydroxide + Hydrochloric Acid ->
$Ca\ (OH)_2 + 2\ HCl$ -> $CaCl_2 + 2\ HOH$

Sodium Hydroxide + Phoshoric Acid ->
$3\ NaOH + H_3PO_4$ -> $Na_3PO_4 + 3\ HOH$

Sodium Bicarbonate -> Decomposition with heat
$2\ NaHCO_3$ -> $Na_2CO_3 + CO_2 + HOH$

Barium Nitrate + Sodium Chromate ->
$Ba\ (NO_3)_2 + NaCrO_4$ -> $BaCrO_4\ (s) + 2\ NaNO_3$

Lead II Chloride + Potassium Sulfate ->
$PbCl_2 + K_2SO_4$ -> $PbSO_4 + 2\ KCl$

$Na_2\ SO_4 + KCl$ -> NR

$Ba\ (NO_3)_2 + NaCl$ -> NR

$Na_2S + Cu\ (NO_3)_2$ -> $CuS + 2\ NaNO_3$

$2\ NH_4 + Pb\ (NO_3)_2$ -> $PbCl_2 + 2\ NH_4NO_3$

Silver Nitrate + Sodium Chromate -> Silver Chromate + Sodium Nitrate
$2\ AgNO_3 + NaCrO_4$ -> $Ag_2\ CrO_4 + 2\ NaNO_3$

Nickel II Nitrate + Potassium Carbonate -> Nickel II Carbonate ppt + Potassium Nitrate
$Ni\ (NO_3)_2 + K_2CO_3$ -> $NiCO_3$ ppt $+ 2\ KNO_3$

Lead (II) Nitrate and Potassium Iodide -> yellow ppt
$Pb\ (NO_3)_2 +\ 2\ KI \rightarrow 2\ KNO_3\ +\ PbI_2$

Reaction of Hydrobromic Acid and aq Sodium Hydroxide
$HBr\ +\ NaOH \rightarrow NaBr\ +\ HOH$

Redox
4 Al + 3 O2 _> 2 Al2 O3

4 Na + O2 -> 2 Na2O

C. Balance the following chemical reactions [5 Points Each] :

1. $Ag_2S_{(s)} + H_2O_{(l)} \rightarrow Ag_{(s)} + H_2S_{(g)} + O_{2(g)}$ **42a**

2. $Fe_2O_{3(s)} + HNO_{3(aq)} \rightarrow Fe(NO_3)_{3(aq)} + H_2O_{(l)}$ **43b**

3. $NH_{3(g)} + O_{2(g)} \rightarrow NO_{(g)} + HOH_{(g)}$ **43c**

4. $PCl_{5(l)} + H_2O_{(l)} \rightarrow H_3PO_{4(aq)} + HCl_{(g)}$ **43 d**

5, $CH_3CH_2OH_{(l)} + O_{2(g)} \rightarrow CO_{2(g)} + H_2O_{(l)}$
[Burning Ethanol in air]

A. Write the Formulae for the Reactants and Products
B. Balance the Equation
C. Will the Reaction go to Completion

1. Sulfuric Acid and Calcium Hydroxide

2. Ammonium Carbonate and Lead II Nitrate

3. Potassium Phosphate and Cobalt III Chloride