Stoichiometry Problems

1) **How many grams of magnesium carbonate can be produced by reacting 1.75 g of magnesium nitrate with sodium carbonate? The balanced equation is:**

$Mg(NO_3)_2(aq) + Na_2CO_3(aq) \rightarrow 2NaNO_3(aq) + MgCO_3(s)$

2) **What mass of magnesium hydroxide will precipitate if 3.09 g of potassium hydroxide are added to a magnesium nitrate solution?**

3) **The reaction of a dry cell may be represented by:**

$Zn(s) + 2NH_4Cl(aq) \rightarrow ZnCl_2(aq) + 2NH_3(aq) + H_2(g)$

Determine the mass of the zinc consumed during the release of 6.03 g of anmmonia.

4) **How many grams of zinc chloride, $ZnCl_2$, are required to completely react with 17.0 g of aluminum metal, Al? The balanced equation is:**

$2Al(s) + 3ZnCl_2(aq) \rightarrow 3Zn(s) + 2AlCl_3(aq)$

5) **What mass of oxygen can be produced by reacting 125 g KO_2 according to the reaction below:**

$KO_2(s) + CO_2(g) \rightarrow K_2CO_3(s) + 3O_2(g)$

6) **Calculate the volume of oxygen produced when 3.5 g of potassium chlorate are decomposed by heat. The balanced equation for this reaction is:**

$2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$

Solutions

1) **1.75 ~~g $Mg(NO_3)_2$~~ x 1 ~~mol $Mg(NO_3)_2$~~/148.32 ~~g $Mg(NO_3)_2$~~ x**

1 ~~mol $MgCO_3$~~/1 ~~mol $Mg(NO_3)_2$~~ x 84.31 g $MgCO_3$/1 ~~mol $MgCO_3$~~ = 0.995 g $MgCO_3$

2) **Must balance the chemical equation first.**

$2KOH(aq) + Mg(NO_3)_2(aq) \rightarrow 2KNO_3(aq) + Mg(OH)_2(s)$

3.09 ~~g KOH~~ x 1 ~~mol KOH~~/56.11 ~~g KOH~~ x 1 ~~mol $Mg(OH)_2$~~/2 mol ~~KOH~~ x

58.32 g $Mg(OH)_2$/1 ~~mol $Mg(OH)_2$~~ = 1.61 g $Mg(OH)_2$

3) **6.03 ~~g NH_3~~ x 1 ~~mol NH_3~~/17.04 ~~g NH_3~~ x 1 ~~mol Zn~~/2 ~~mol NH_3~~ x**

65.39 g Zn/1 ~~mol Zn~~ = 11.6 g Zn

4) **17.0 ~~g Al~~ x 1 ~~mol Al~~/26.98 ~~g Al~~ x 3 ~~mol $ZnCl_2$~~/2 ~~mol Al~~ x**

136.29 g $ZnCl_2$/1 ~~mol $ZnCl_2$~~ = 129 g $ZnCl_2$

5) **125 ~~g KO_2~~ x 1 ~~mol KO_2~~/71.10 ~~g KO_2~~ x 3 ~~mol O_2~~/4 ~~mol KO_2~~ x**

32.00 g O_2/1 ~~mol O_2~~ = 42.2 g O_2

6) **3.5 ~~g $KClO_3$~~ x 1 ~~mol $KClO_3$~~/122.55 ~~g $KClO_3$~~ x 3 ~~mol O_2~~/2 ~~mol $KClO_3$~~ x**

22.4 L O_2/1 ~~mol O_2~~ = 0.96 L O_2