General Chemistry Multiple Choice Questions Chapter 8

1 Write the skeleton chemical equation for the following word equation:
Hydrochloric acid plus magnesium yields magnesium chloride and hydrogen gas.

a $HClO_4 + Mg \rightarrow MgClO_4 + H_2$
b $HClO_4 + Mg \rightarrow MgClO_4 + H$
c $HCl + Mg \rightarrow MgCl_2 + H_2$
d $HCl + Mg \rightarrow MgCl_2 + H$

	8.1

2 Write the skeleton chemical equation for the following word equation:
Sodium hydroxide and hydrochloric acid react to yield sodium chloride and water.

a $NaOH + HCl \rightarrow NaCl + H_2O$
b $NaOH + HClO_4 \rightarrow NaCl + H_2O$
c $NaH + HCl \rightarrow NaCl + H_2O$
d $NaOH + HOCl \rightarrow NaCl + H_2O$

	8.1

3 Write the skeleton chemical equation for the following word equation:
Ammonia plus sulfuric acid yield the ammonium ion and the hydrogen sulfate (-) ion.

a $NH_4 + H_2SO_4 \rightarrow NH_3^- + HSO_4^-$
b $NH_3 + H_2SO_4 \rightarrow NH_4^+ + HSO_4^-$
c $NH_3 + HSO_4 \rightarrow NH_4^+ + SO_{4-}$
d $NH_3 + H_2SO_4 \rightarrow NH_4 + HSO_4$

	8.1

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1 Which of the following chemical equations is *not* balanced?

a	$CaF_2 + H_2SO_4$ ---> $2HF + CaSO_4$	**b**	$Ca_3(PO_4)_2 + 4H_3PO_4$ ---> $3Ca(H_2PO_4)_2$
c	$NaNO_3 + H_2SO_4$ ---> $Na_2SO_4 + 2HNO_3$	**d**	$P_4O_6 + 6H_2O$ ---> $4H_3PO_3$

	8.2

2 What is the coefficient in front of MnO_2 when the following equation is balanced?

$MnO_2 + Al$ ---> $Mn + Al_2O_3$

a	1	**b**	2
c	3	**d**	4

	8.2

3 When the equation below is balanced and the coefficients are reduced to lowest whole-number terms, what is the coefficient on H_2O (l)?

…$LiHCO_3$ (aq) + …H_2SO_4 (aq) ---> …Li_2SO_4 (aq) + …H_2O (l) + …CO_2 (g)

a	1	**b**	2
c	3	**d**	4
e	5		

	8.2

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1 When CH_3NH_2 is combusted in air, all of the following are products except

	8.3

a H_2 (g) **b** H_2O (l)

c CO_2 (g) **d** N_2 (g)

2 Which of the following reactions represents a decomposition reaction?

	8.3

a $P_4O_{10} + 6H_2O$ --> $4H_3PO_4$ **b** $2NaN_3$ ---> $2Na + 3N_2$

c $2H_2O + O_2$ ---> $2H_2O_2$ **d** $HCl + NaOH$ ---> $NaCl + H_2O$

3 Which of the following represents a synthesis reaction?

	8.3

a $H_2SO_4 + 2\ LiOH$ ---> $Li_2SO_4 + 2\ H_2O$ **b** $2NaN_3$ ---> $2Na + 3N_2$

c $2H_2O + O_2$ ---> $2H_2O_2$ **d** $HCl + NaOH$ ---> $NaCl + H_2O$

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1 Copper does not react with hydrochloric acid wheras manganese does. This means that

a Copper is more active than hydrogen
b Manganese is less active than hydrogen
c Chloride ion will react with copper
d Manganese is higher in the activity series than copper

	8.4

2 Which of the following metals cannot displace hydrogen from water (steam or liquid)?

a Mg
b K
c Li
d Ag

	8.4

3 Use the activity series to predict which of the following reactions will occur.

a $Cu\ (s) + 2AgNO_3\ (aq) \text{--->} Cu(NO_3)_2\ (aq) + 2Ag\ (s)$
b $3Fe\ (s) + Al_2(SO_4)_3\ (aq) \text{--->} 2Al\ (s) + 3FeSO_4\ (aq)$
c $H_2\ (g) + LiOH\ (aq) \text{--->} 2Li\ (s) + 2H_2O\ (l)$
d $Cu\ (s) + ZnSO_4\ (aq) \text{--->} Zn\ (s) + CuSO_4\ (aq)$

	8.4

4 25.00 mL of a 0.100 *M* aqueous solution of magnesium chloride is added to 25.00 mL of a 0.150 *M* aqueous solution of NaOH. A fine white solid substance is observed. Which substance is the white substance?

a $MgCl_2$
b $Mg(OH)_2$
c NaCl
d NaOH

	8.4

5 When a strong acid reacts with an active metal, which of the following is formed?

a $H_2\ (g)$
b $H_2O\ (l)$
c An element of the acid
d Another acid

	8.4

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1 In the reaction below, what mass of HF is produced by the reaction of 3.0×10^{23} molecules of H_2 with excess F_2 assuming the reaction goes to completion? $H_2 + F_2 \text{ ---> } 2\ HF$

	8.5

a 1.0 g
b 4.0 g
c 10. g
d 20. g
e 40. g

2 Consider the following reaction. How many grams of O_2 are needed for the complete reaction of 162 g of NH_3? $4\ NH_3 + 5\ O_2 \text{ --> } 4\ NO + 6\ H_2O$

	8.5

a 108 g
b 381 g
c 244 g
d 202 g

3 How many moles of H_2O are requred to react with 0.800 moles of N_2?
$2\ N_2 + 6\ H_2O \text{ --> } 4\ NH_3 + 3\ O_2$

	8.5

a 2.40 moles
b 1.00 moles
c 1.56 moles
d 0.233 moles

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1 If 5.0 g of each reactant are used for the following process, what compound is the limiting reactant?
$2\ KMNO_4 + 5\ Hg_2Cl_2 + 16\ HCl \rightarrow 10\ HgCl_2 + 2\ MnCl_2 + 2\ KCl + 8\ H_2O$

a $KMnO_4$	**b** HCl
c Hg_2Cl_2	**d** H_2O

	8.6

2 What mass of $ZnCl_2$ can be prepared from the reaction of 3.27 grams of zinc and 3.30 grams of HCl?
$Zn + 2\ HCl \rightarrow ZnCl_2 + HCl$

a 6.89 g	**b** 6.82 g
c 6.46 g	**d** 6.17 g

	8.6

3 How many grams of NH_3 can be prepared from 77.3 grams of N_2 and 14.2 grams of H_2?
HINT: Write and balance the synthesis reaction first

a 93.9 g	**b** 79.7 g
c 47.0 g	**d** 120.0 g

	8.6

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1 What is the mass of Cu produced if 10.0 g of Cu_2S reacts with 16.0 g of O_2 as follows:
$Cu_2S + O_2$ ---> $2Cu + SO_2$

	8.7

a 31.8 g
b 63.5 g
c 3.99 g
d 7.98 g

2 What is the percent yield if 25.0 g of I_2 is formed when 130.0 g of HNO_3 reacts with 285.0 g of HI as follows:
$2HNO_3 + 6HI$ ---> $2NO + 3I_2 + 4H_2O$

	8.7

a 27.2%
b 17.6%
c 8.84%
d 4.42%

3 How many moles of $KClO_3$ are required to produce 2.51 g of O_2?
$2KClO_3$ ---> $2KCl + 3O_2$

	8.7

a 1.18×10^{-1} mol
b 5.23×10^{-2} mol
c 2.35×10^{-1} mol
d 1.57×10^{-2} mol

4 A 6.0 mol sample of C_3H_8 (g) and a 20. mol sample of Cl_2 (g) are placed in a previously evacuated vessel where they react according to the equation below. After one of the reactions has been totally consumed, how many moles of HCl (g) have been produced?
C_3H_8 (g) + 4 Cl_2 (g) ---> $C_3H_4Cl_4$ (g) + 4 HCl (g)

	8.7

a 4.0 mol
b 8.0 mol
c 20. mol
d 24 mol

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1 What are the spectator ions in the reaction
$BaCl_2$ *(aq)* + Na_2SO_4 *(aq)* ---> 2NaCl *(aq)* + $BaSO_4$ *(s)*

	8.8

a Ba^{2+}, Cl^-
b Na^+, Cl^-
c Ba^{2+}, SO_4^{2-}
d Na^+, SO_4^{2-}

2 Which of the following is the net ionic equation for the reaction
$Fe(NO_3)_3$ *(aq)* + K_3PO_4 *(aq)* ---> $FePO_4$ *(s)* + $3KNO_3$ *(aq)*

	8.8

a K^+ *(aq)* + NO_3^- *(aq)* ---> KNO_3 *(aq)*
b Fe^{3+} *(aq)* + PO_4^{3-} *(aq)* ---> $FePO_4$ *(aq)*
c $3K^+$ *(aq)* + PO_4^{3-} *(aq)* ---> K_3PO_4 *(aq)*
d Fe^{3+} *(aq)* + PO_4^{3-} *(aq)* ---> $FePO_4$ *(s)*

3 What is the net ionic equation for the reaction between $Cu(NO_3)_2$ *(aq) and NaOH (aq)?*

	8.8

a No reaction
b Na^+ *(aq)* + NO_3^- *(aq)* ---> $NaNO_3$ *(s)*
c Cu^{2+} *(aq)* + $2OH^-$ *(aq)* ---> $Cu(OH)_2$ *(s)*
d Cu^{2+} *(aq)* + $2NO_3^-$ *(aq)* ---> $Cu(NO_3)_2$ *(s)*

4 What is the net ionic equation for the reaction between $Pb(NO_3)_2$ *(aq) and* $CaCl_2$ *(aq)?*

	8.8

a No reaction
b Pb^{2+} *(aq)* + $2Cl^-$ *(aq)* ---> $PbCl_2$ *(s)*
c Pb^{2+} *(aq)* + $2NO_3^-$ *(aq)* ---> $Pb(NO_3)_2$ *(s)*
d Ca^{2+} *(aq)* + $2NO_3^-$ *(aq)* ---> $Ca(NO_3)_2$ *(s)*

5 25.00 mL of a 0.100 *M* aqueous solution of magnesium chloride is added to 25.00 mL of a 0.150 *M* aqueous solution of NaOH. A fine white solid substance is observed. What is the net ionic equation for the reaction?

	8.8

a Mg^{2+} *(aq)* + $2OH^-$ *(aq)* + $2Cl^-$ *(aq)* + $2Na^+$ *(aq)* ---> $Mg(OH)_2$ *(s)* + 2NaCl *(s)*
b Mg^{2+} *(aq)* + $2OH^-$ *(aq)* ---> $Mg(OH)_2$ *(s)*
c $2Cl^-$ *(aq)* + $2Na^+$ *(aq)* ---> 2NaCl *(s)*
d Mg^{2+} *(aq)* + $2OH^-$ *(aq)* + $2Cl^-$ *(aq)* + $2Na^+$ *(aq)* ---> $Mg(OH)_2$ *(s)* + 2NaCl *(aq)*

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1 Determine whether the following reaction is exothermic, endothermic, or neither:
CH_4 (g) + O_2 (g) --> CO_2 (g) + H_2O (g) + 213 kcal

	8.9

a Exothermic
b Endothermic
c Thermodynamically Neutral
d Cannot be determined

2 Determine whether the following reaction is exothermic, endothermic, or neither:
N_2 (g) + O_2 (g) + 43 kcal --> 2 NO (g)

	8.9

a Exothermic
b Endothermic
c Thermodynamically Neutral
d Cannot be determined

3 Determine whether the following reaction is exothermic, endothermic, or neither:
2 H_2 (g) + O_2 (g) --> 2 H_2O (g) ΔH = -483.6 J

	8.9

a Exothermic
b Endothermic
c Thermodynamically Neutral
d Cannot be determined