AP Chemistry Multiple Choice Questions - Chapter 3

1 Which of the following reactions represents a decomposition reaction? | 3.2

a $P_4O_{10} + 6H_2O$ --> $4H_3PO_4$
b $2NaN_3$ ---> $2Na + 3N_2$
c $2H_2O + O_2$ ---> $2H_2O_2$
d $HCl + NaOH$ ---> $NaCl + H_2O$

2 Which of the following chemical equations is *not* balanced? | 3.2

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 $P_4O_6 + 6H_2O$ ---> $4H_3PO_3$

3 What is the coefficient in front of MnO_2 when the following equation is balanced? | 3.2

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

a 1
b 2
c 3
d 4

5 When the following is completed and balanced, the products of the reaction below are | 3.2

$Al(OH)_3$ *(s)* + H_2SO_4 *(aq)*

a $AlSO_4$ *(aq)* + $6H_2O$ *(l)*
b $Al_2(SO_4)_3$ *(aq)* + $6H_2O$ *(l)*
c $AlSO_4$ *(s)* + H_2O *(l)*
d $Al_2(SO_4)_3$ *(aq)* + H_2O *(l)*

11 When a strong acid reacts with an active metal, which of the following is formed? | 3.2

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

13 Copper does not react with hydrochloric acid wheras manganese does. This means that | 3.2

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

14 Which of the following metals cannot displace hydrogen from water (steam or liquid)? | 3.2

a Mg
b Ba
c Li
d Ag

15 Use the activity series to predict which of the following reactions will occur. | 3.2

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

24 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?

	3.2

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

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

	3.2

…LiHCO $_3$ (aq) + …H $_2$ SO $_4$ (aq) ---> …Li $_2$ SO $_4$ (aq) + …H $_2$ O (l) + …CO $_2$ (g)

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

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1 Determine the solubility of the following compound:
$AgNO_3$

	3.4

a Soluble
b Insoluble
c Mixed
d Cannot determine without more information

2 Determine the solubility of the following compound:
Lithium Carbonate

	3.4

a Soluble
b Insoluble
c Mixed
d Cannot determine without more information

3 Determine the solubility of the products of the reaction involving the following compounds:
Lead (II) Nitrate and Potassium Iodide

	3.4

a One Solid, One Aqueous
b Cannot determine without more information
c Both Aqueous
d Both Solid

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

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

	3.5

7 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)*

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)*

	3.5

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

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)*

	3.5

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

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)*

	3.5

23 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?

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)*

	3.5

25 When HBr is neutralized with KOH, what salt is produced?

		3.6

a H_2O **b** KH

c KBr **d** K_2O

27 Which of the following completes the reaction

CaH_2 (s) + $2H_2O$ (l) ---> $Ca(OH)_2$ (s) + ?

		3.6

a OH^- (aq) **b** H_2 (g)

c H^+ (aq) **d** O^{2-} (aq)

1 Which of the following is the net ionic equation for the following reaction?

HCl (aq) + NaOH (aq) --> H_2O + NaCl

		3.6

a Na^+ (aq) + Cl^- (aq) --> NaCl (s) **b** H^+ (aq) + Cl^- (aq) + Na^+ (aq) + OH^- (aq) --> H_2O (l) + Na^+ (aq) + Cl^- (aq)

c H^+ (aq) + OH^- (aq) --> H_2O (l) **d** None of the above

16 Which of the following contains an element in the +1 oxidation state?

a	CO_2	**b**	PbO_2
c	CaO	**d**	N_2S_5
e	Cu_2O		

3.8a

20 What is the coefficient in front of Mn^{2+} when the following redox reaction is balanced in acid solution:

$MnO_4^- + Cl^- \text{ ---> } Mn^{2+} + Cl_2$

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

3.8a

16 Which of the following contains an element in the +1 oxidation state?

a	CO_2	**b**	PbO_2
c	CaO	**d**	N_2S_5
e	Cu_2O		

3.8a

21 What is the coefficient in front of NHO_3 when the following redox reaction is balanced in acid solution:

$NHO_3 + I_2 \text{ ---> } NO_2 + HIO_3$

a	4	**b**	6
c	10	**d**	12

3.8a

AP Chemistry Multiple Choice Questions - Chapter 3

10 Which of the following is most easily oxidized? | | **3.8b**

a Na
b Cl_2
c Au
d S

12 Magnesium is more active than cobalt and hydrogen lies below both of them in the activity series. This means that | | **3.8b**

a Cobalt is the most easily oxidized
b Magnesium is the most easily oxidized
c Neither metal reacts with acids
d Water is produced when the metals react with hydrogen ion

18 Which of the following reactions has a single species both oxidized and reduced? | | **3.8b**

a $2C_6H_6\ (l) + 15O_2\ (g) \text{--->} 12CO_2\ (g) + 6H_2O\ (l)$
b $C_2H_3O_2^-\ (aq) + H_3O^+\ (aq) \text{--->} HC_2H_3O_2\ (aq) + H_2O\ (l)$
c $CaCO_3\ (s) \text{--->} CaO\ (s) + CO_2\ (g)$
d $2H_2O_2\ (l) \text{--->} O_2\ (g) + 2H_2O\ (l)$
e $4H^+\ (aq) + 4Co^{2+}\ (aq) + O_2\ (g) + 24NH_3\ (aq) \text{--->} 4Co(NH_3)_6^{3+}\ (aq) + 2H_2O\ (l)$

22 Which of the following statements is false for the reaction between Rb (s) and Cl_2 (g)? | | **3.8b**

a Rb is oxidized
b The product is RbCl
c Cl^- ions are formed
d The product is covalent

28 Which of the following contains nitrogen in a negative oxidation state? | | **3.8b**

a NO_2
b HNF_2
c N_2
d NH_2OH