Chemistry II Redox Quiz Name_____

SHOW ALL STEPS

Balance the following equation, which takes place in acidic solution, using the ion-electron method.

$$MnO_4^- + S_2O_3^{2-} \rightarrow S_4O_6^{2-} + Mn^{2+}$$

Chemistry II Redox Quiz Name Teacher

SHOW ALL STEPS

Balance the following equation, which takes place in acidic solution, using the ion-electron method.

$$MnO_4^- + S_2O_3^{2-} \rightarrow S_4O_6^{2-} + Mn^{2+}$$

(1)

$$MnO_4^- \longrightarrow Mn^{2+}$$

$$2S_2O_3^{2-} \longrightarrow S_4O_6^{2-}$$

(2)

$$8H^+ + MnO_4^- \longrightarrow Mn^{2+} + 4H_2O$$

$$2S_2O_3^{2-} \longrightarrow S_4O_6^{2-}$$

(3)

$$5e^- + 8H^+ + MnO_4^- \longrightarrow Mn^{2+} + 4H_2O$$

$$2S_2O_3^{2-} \longrightarrow S_4O_6^{2-} + 2e^-$$

(LCM = 10)

(4)

$$10e^- + 16H^+ + 2MnO_4^- \longrightarrow 2Mn^{2+} + 8H_2O$$

$$10S_2O_3^{2-} \longrightarrow 5S_4O_6^{2-} + 10e^-$$

(5)

$$16H^+ + 2MnO_4^- + 10S_2O_3^{2-} \longrightarrow 2Mn^{2+} + 5S_4O_6^{2-} + 8H_2O$$

Chemistry II Redox Quiz Name_____

**SHOW ALL STEPS**

Balance the following equation, which takes place in basic solution, using the ion-electron method.

$$Br_2 \rightarrow Br^- + BrO_3^-$$

Chemistry II Redox Quiz Name Teacher

**SHOW ALL STEPS**

Balance the following equation, which takes place in basic solution, using the ion-electron method.

$$Br_2 \rightarrow Br^- + BrO_3^-$$

(1)

$Br_2 \rightarrow 2Br^-$

$Br_2 \rightarrow 2BrO_3$

(2)

$Br_2 \rightarrow 2Br^-$

$12OH^- + Br_2 \rightarrow 2BrO_3^- + 6H_2O +$

(3)

$2e^- + Br_2 \rightarrow 2Br^-$

$12OH^- + Br_2 \rightarrow 2BrO_3^- + 6H_2O + 10e^-$ (LCM = 10)

(4)

$10e^- + 5Br_2 \rightarrow 10Br^-$

$12OH^- + Br_2 \rightarrow 2BrO_3^- + 6H_2O + 10e^-$

(5)

$12OH^- + 6Br_2 \rightarrow 10Br^- + 2BrO_3^- + 6H_2O$

Then Reduce TO lowest terms

$$\boxed{6OH^- + 3Br_2 \rightarrow 5Br^- + BrO_3^- + 3H_2O}$$

Chemistry II Chapter 5 Test Name_____

**SHOW ALL WORK**

1. Write a **balanced** ionic and net ionic equation for the following:

$$BaCl_{2(aq)} + Al_2(SO_4)_{3(aq)} \rightarrow BaSO_{4(s)} + AlCl_{3(aq)}$$

2. For each of the following, state whether their aqueous solutions would be expected to be acidic or basic.

   (a) $N_2O_3$

   (b) $CaO$

   (c) $SeO_2$

   (d) $Cs_2O$

3. What acid is formed by the reaction of $P_4O_{10}$ with water?

4. Write molecular, ionic and net ionic equations for the reaction that would occur between potassium chloride and lead (II) nitrate.

5. The concentration of $Cl^-$ is 0.160 M in a solution of $FeCl_3$. What is the molar concentration of $FeCl_3$?

6. How many milliliters of 0.300 M NaOH are required to react with 500.0 mL of 0.170 M $H_3PO_4$ to yield $Na_3PO_4$?

7. How many grams of AgCl will be formed if 25.0 mL of 0.050 M HCl is added to 100.0 mL of 0.50 M $AgNO_3$?

8. What is the equivalent mass of $MnSO_4$ when it is oxidized to produce $MnO_2$?

9. How many mL of water must be added to 85.0 mL of 1.00 N $H_3PO_4$ to give a solution that is 0.650 N $H_3PO_4$? Assume that the volumes are additive.

10. Balance the following reaction by the ion-electron method (in acidic solution).

$$As_2O_3 + NO_3^- \rightarrow H_3AsO_4 + N_2O_3$$

11. Balance the following reaction by the ion-electron method (basic solution).

$$ClO_3^- + N_2H_4 \rightarrow NO_3^- + Cl^-$$

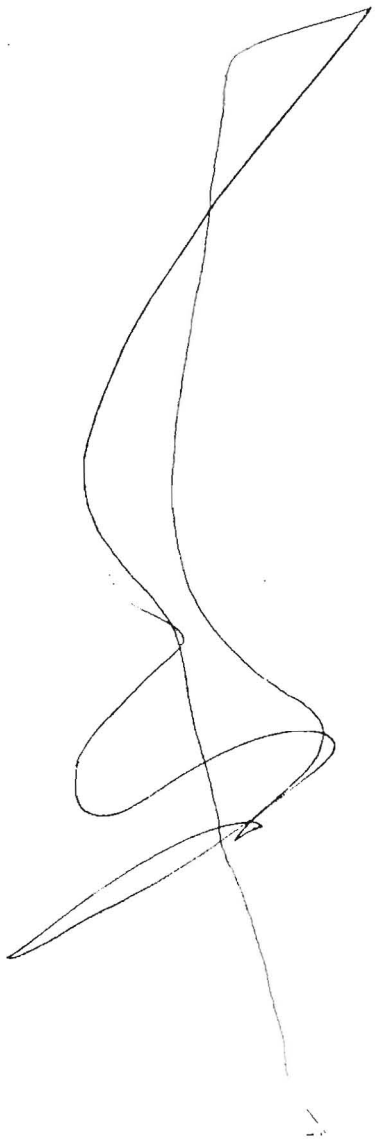
12. Balance the following reaction by the oxidation-number method.

$$H^+ + IO_3^- + SO_3^{2-} \rightarrow I_2 + SO_4^{2-} + H_2O$$

Chem II Name _____

1) Balance the following Reaction (In acid Solution).

$$As_2O_3 + NO_3^- \longrightarrow H_3AsO_4 + N_2O_3$$



(7) Balance in Basic Solution.

$$N_2H_4 + Mn(OH)_3 \longrightarrow Mn(OH)_2 + NH_2OH$$

(3)

In Acidic Solution

$$IPO_4 \longrightarrow I_2 + IO_3^- + H_2PO_4^-$$

(4) How many moles of $H_3PO_4$ must be used to give 5.00 eq $H_3PO_4$ if the acid is to be neutralized to give $PO_4^{3-}$?

(5) What is the normality of a solution which is:

41.7 g of $K_2Cr_2O_7$ in 600 mL of solution where one of the products is $Cr^{3+}$

(7) Balance in Basic Solution.

$$N_2H_4 + Mn(OH)_3 \longrightarrow Mn(OH)_2 + NH_2OH$$

$5 \times 60$ (e)

$$\cancel{2H_2O} + \cancel{4OH^-} + N_2H_4 \longrightarrow 2NH_2OH + \cancel{2H_2O} + 2OH^- + 2e^-$$

LCM = 2

$$1e^- + OH^- + H_2O + Mn(OH)_3 \longrightarrow Mn(OH)_2 + 2OH^- + H_2O$$

$$\cancel{2OH^-} + N_2H_4 \longrightarrow 2NH_2OH + \cancel{2e^-}$$

$$\cancel{2e^-} + 2Mn(OH)_3 \longrightarrow 2Mn(OH)_2 + \cancel{2OH^-}$$

$$N_2H_4 + 2Mn(OH)_3 \rightarrow 2NH_2OH + 2Mn(OH)_2$$

④ How many moles of $H_3PO_4$ must be used to give 5.00 eq $H_3PO_4$ if the acid is to be neutralized to give $PO_4^{3-}$?

5.111

$$5.00\,\text{eq}\left(\frac{1\,\text{mole}}{3\,\text{eq}}\right) = \boxed{1.67\,\text{moles } H_3PO_4}$$

⑤ What is the normality of a solution which is:

41.7g of $K_2Cr_2^{6+}O_7$ in 600 mL of solution.

5.119(b)

$2\,Cr^{3+}$ is product

$$\frac{41.7\,\text{g}}{0.600\,\text{L}}\left(\frac{1\,\text{mole}}{294.2\,\text{g}}\right)\left(\frac{6\,\text{eq}}{1\,\text{mole}}\right) = 1.42\,\text{eq/L} = \boxed{1.42\,\text{N}}$$

Exam II

Name _____

Teacher

1) Balance the following reaction (in acid solution).

$$As_2O_3 + NO_3^- \longrightarrow H_3AsO_4 + N_2O_3$$

Semi (W)

$$5H_2O + As_2O_3 \longrightarrow 2H_3AsO_4 + 4H^+ + 4e^-$$

$$4e^- + 6H^+ + 2NO_3^- \longrightarrow N_2O_3 + 3H_2O$$

LCM = 4

$$2H_2O + 2H^+ + As_2O_3 + 2NO_3^- \rightarrow 2H_3AsO_4 + N_2O_3$$

(7) Balance in Basic Solution:

$$N_2H_4 + Mn(OH)_3 \longrightarrow Mn(OH)_2 + NH_2OH$$

Sn60(e)

$$\cancel{2H_2O} + \cancel{4OH^-} + N_2H_4 \longrightarrow 2NH_2OH + \cancel{2H_2O} + 2OH^- + 2e^-$$

LCM = 2

$$1e^- + OH^- + H_2O + Mn(OH)_3 \longrightarrow Mn(OH)_2 + 2OH^- + H_2O$$

$$\cancel{2OH^-} + N_2H_4 \rightarrow 2NH_2OH + \cancel{2e^-}$$

$$\cancel{2e^-} + 2Mn(OH)_3 \rightarrow 2Mn(OH)_2 + \cancel{2OH^-}$$

$$N_2H_4 + 2Mn(OH)_3 \rightarrow 2NH_2OH + 2Mn(OH)_2$$

(3)

## In Acidic Solution

$$IPO_4 \longrightarrow I_2 + IO_3^- + H_2PO_4^-$$

S.6/(6)

$$6e^- + 4H^+ + 2IPO_4 \rightarrow I_2 + 2H_2PO_4^-$$

LCM = 6

$$3H_2O + IPO_4 \rightarrow IO_3^- + H_2PO_4^- + 4H^+ + 2e^-$$

$$6e^- + 4H^+ + 2IPO_4 \rightarrow I_2 + 2H_2PO_4^-$$

$$9H_2O + 3IPO_4 \rightarrow 3IO_3^- + 3H_2PO_4^- + 12H^+ + 6e^-$$

$$9H_2O + 5IPO_4 \rightarrow I_2 + 3IO_3^- + 5H_2PO_4^- + 8H^+$$

④ How many moles of $H_3PO_4$ must be used to give 5.00 eq $H_3PO_4$ if the acid is to be neutralized to give $PO_4^{3-}$?

5.111

$$5.00\,\text{eq}\left(\frac{1\,\text{mole}}{3\,\text{eq}}\right) = \boxed{1.67\,\text{moles } H_3PO_4}$$

⑤ What is the normality of a solution which is:

41.7g of $K_2Cr_2^{6+}O_7$ in 600 mL of solution.

$2\,Cr^{2+}$ is product

5.119(d)

$$\frac{41.7\,\text{g}}{0.600\,\text{L}}\left(\frac{1\,\text{mole}}{294.25}\right)\left(\frac{6\,\text{eq}}{1\,\text{mole}}\right) = 1.42\,\text{eq/L} = \boxed{1.42\,N}$$

Chem II Chapter 5 (Round 2) Name _____

1) Balance the following reaction which takes place in Basic Solution.

$$Zn + NO_3^- \longrightarrow Zn(OH)_4^{2-} + NH_3$$

(2A) Calculate the normality of a solution which consists of 7.88 g of $H_2SO_4$ per liter of solution.

(2B) The concentration of Chloride in Tap-water is approximately 0.003 g per 1000 g of water. Express this concentration in

(A) percent by mass

(B) parts per million

③ How many grams of $KBiO_3$ are required to react with 0.250 g of $Mn(NO_3)_2$ to produce $KMnO_4$ and $Bi(NO_3)_3$. Solve using equivalent masses.

(4) How many grams of $Na_2CrO_4$ are needed to give 0.500 eq $Na_2CrO_4$ if it will be reduced to $Cr^{3+}$?

(5) In an experiment 40.0 mL of 0.270 M $Ba(OH)_2$ is added to 25.0 mL of 0.330 M $Al_2(SO_4)_3$

A.) Write the net ionic equation for the reaction that occurs.

B.) What mass, in grams of precipitate is formed?

C.) What is the Molar concentration of each of the ions remaining in solution?

(1) Balance the following reaction which takes place in Basic Solution.

$$Zn + NO_3^- \longrightarrow Zn(OH)_4^{2-} + NH_3$$

5/5

$$4H_2O + 8OH^- + Zn \longrightarrow Zn(OH)_4^{2-} + 4H_2O + 4OH^-$$

$$4OH^- + Zn \longrightarrow Zn(OH)_4^{2-} + 2e^-$$ x4

$$16OH^- + 4Zn \longrightarrow 4Zn(OH)_4^{2-}$$

$$3H_2O + 3H_2O + NO_3^- \longrightarrow NH_3 + 6OH^- + 3OH^-$$

$$8e^- + 6H_2O + NO_3^- \longrightarrow NH_3 + 9OH^-$$

$$16OH^- + 4Zn \longrightarrow 4Zn(OH)_4^{2-}$$

$$6H_2O + NO_3^- \longrightarrow NH_3 + 9OH^-$$

---

$$7OH^- + 6H_2O + 4Zn + NO_3^- \longrightarrow 4Zn(OH)_4^{2-} + NH_3$$

$$7OH^- + 6H_2O + 4Zn + NO_3^- \longrightarrow 4Zn(OH)_4^{2-} + NH_3$$

17

(2A) Calculate the normality of a solution which consists of 7.88 g of $H_2SO_4$ in liter of solution.

$$7.88\,g \times \frac{1\ mole}{98.1\ g} = 0.08036\ moles$$

$$0.08036\ mole\ H_2SO_4 \left(\frac{2\ eq}{1\ mole}\right) = \boxed{0.161\ \frac{eq}{L}}$$

(5)

(2B) The concentration of Chloride in Tap-water is approximately 0.003 g per 1000 g of water. Express this concentration in

(A) percent by mass

$$\frac{0.003\,g}{1000\,g} \times 100 = \boxed{0.0003\%}$$

(5)

(B) parts per million

$$\frac{0.003\,g}{1000\,g} \times 100 = \boxed{3\ ppm}$$

(5)

(15)

(3) How many grams of $KBiO_3$ are required to react with 0.250 g of $Mn(NO_3)_2$ to produce $KMnO_4$ and $Bi(NO_3)_3$. Solve using equivalent masses

$\frac{5\ eq}{mole}$

$$0.250\ g\ Mn(NO_3)_2 \left(\frac{1\ mole}{178.9\ g}\right) = 1.397 \times 10^{-3}\ moles\ Mn(NO_3)_2$$

$$1.397 \times 10^{-3}\ moles\ Mn(NO_3)_2 \left(\frac{5\ eq}{1\ mole}\right) = 0.006986\ eq\ of\ Mn(NO_3)_2$$

Solve via $\frac{eq}{moles}$

$$0.006986\ eq\ of\ KBiO_3 \left(\frac{1\ mole}{2\ eq}\right) = 0.003493\ moles\ KBiO_3$$

$$0.003493\ moles \left(\frac{296.1\ g}{1\ mole}\right) = \boxed{1.03\ g\ KBiO_3}$$

---

Via $\frac{g}{eq}$

$$0.250\ g \left(\frac{5\ eq}{178.9\ g}\right) = 0.006986\ eq\ Mn(NO_3)_2$$

$$0.006986\ eq\ KBiO_3 \left(\frac{296.1\ g}{2\ eq}\right) = 1.03\ g\ KBiO_3$$

(4) How many grams of $Na_2CrO_4$ are needed to give 0.500 eq $Na_2CrO_4$ if it will be reduced to $Cr^{3+}$?

$$Na_2\overset{6+}{C}rO_4 \rightarrow Cr^{3+}$$

$$\frac{3e^-}{mole}$$

$$0.500\,eq\left(\frac{1\,mole}{3\,eq.}\right) = 0.1667\,moles\,Na_2CrO_4$$

$$0.1667\,moles\,Na_2CrO_4\left(\frac{161.98\,g}{1\,mole}\right) = 27.00\,g\,Na_2CrO_4$$

5) In an experiment 40.0 mL of 0.270 M $Ba(OH)_2$ is added to 25.0 mL of 0.330 M $Al_2(SO_4)_3$

A.) Write the net ionic equation for the reaction that occurs.

$$3\,Ba(OH)_2 + Al_2(SO_4)_3 \longrightarrow 3\,BaSO_4 + 2\,Al(OH)_3$$

$$3\,Ba^{2+}_{(aq)} + 6OH^-_{(aq)} + 2Al^{3+}_{(aq)} + 3\,SO_4^{2-} \longrightarrow 3\,BaSO_{4(s)} + 2\,Al(OH)_{3(s)}$$ (5)

$0.270M = \frac{x\ mole}{0.040L}$ $\quad 0.330M = \frac{moles}{0.025L} = 0.0825\ mole \times 2$

$Ba^{2+} = 0.0108$ $\quad Al^{3+} = 0.0165$

B.) What mass, in grams of precipitate is formed?

$0.0108\ mole\ Ba^{2+}$ $\quad Ba^{2+}$ is limiting for $BaSO_4$

$0.0216\ mole\ OH^-$

$0.0165\ mole\ Al^{3+}$ $\quad OH^-$ is limiting for $Al(OH)_3$

$0.0248\ mole\ SO_4^{2-}$ (5)

$$0.0108\ mole\ Ba^{2+}\left(\frac{3\ BaSO_4}{3\ Ba^{2+}}\right)\left(\frac{233.4\ g\ BaSO_4}{1\ mole\ BaSO_4}\right) \longrightarrow \boxed{2.52\ g\ BaSO_4}$$

$$0.0216\ mole\ OH^-\left(\frac{2\ Al(OH)_3}{6\ OH^-}\right)\left(\frac{78.0\ g\ Al(OH)_3}{1\ mole\ Al(OH)_3}\right) \longrightarrow \boxed{0.562\ g\ Al(OH)_3}$$

C.) What is the Molar concentration of each of the ions remaining in solution!

$\emptyset M\ Ba^{2+}$ and $\emptyset M\ OH^-$

$$\frac{0.0248\ mole\ SO_4^{2-} - 0.0108\ mole\ SO_4^{2-}\ ppt}{0.0650L} = \boxed{0.215M\ SO_4^{2-}}$$ (5)

$$\frac{0.0165\ mole\ Al^{3+} - 0.00720\ Al^{3+}\ ppt}{0.0650L} = \boxed{0.143M\ Al^{3+}}$$

(15)

Name _____

Chem II Worksheet (Round 4)

(1) Balance the following reaction which takes place in Basic Solution

$$Zn + NO_3^- \longrightarrow Zn(OH)_4^{2-} + NH_3$$

(2A) Calculate the normality of a solution which consists of 7.88 g of $H_2SO_4$ per liter of solution.

(2B) The concentration of Chloride in Tap water is approximately 0.003 g per 1000 g of water. Express this concentration in

(A.) percent by mass

(B) parts per million

③ How many grams of $KBiO_3$ are required to react with 0.250 g of $Mn(NO_3)_2$ to produce $KMnO_4$ and $Bi(NO_3)_3$. Solve using equivalent mass

(4) How many grams of $Na_2CrO_4$ are needed to give 0.500 eq $Na_2CrO_4$ if it will be reduced to $Cr^{3+}$?

(5) In an experiment 40.0 mL of 0.270 M $Ba(OH)_2$ is added to 25.0 mL of 0.330 M $Al_2(SO_4)_3$

A.) Write the net ionic equation for the reaction that occurs.

B.) What mass, in grams of precipitate is formed?

C.) What is the Molar concentration of each of the ions remaining in solution!

Chemistry II Chapter 5 Test Name Teacher

**SHOW ALL WORK**

1. Write a **balanced** ionic and net ionic equation for the following:

$$3\ BaCl_{2(aq)} + Al_2(SO_4)_{3(aq)} \rightarrow 3\ BaSO_{4(s)} + 2\ AlCl_{3(aq)}$$

$$3\ Ba^{2+}_{(aq)} + 6\ Cl^-_{(aq)} + 2\ Al^{3+}_{(aq)} + 3\ SO_4^{2-} \longrightarrow 3\ BaSO_{4(s)} + 2\ Al^{3+} + 6\ Cl^-_{(aq)}$$

$$Ba^{2+}_{(aq)} + SO_4^{2-}{}_{(aq)} \rightarrow BaSO_{4(s)}$$

2. For each of the following, state whether their aqueous solutions would be expected to be acidic or basic.

(a) $N_2O_3$ Acidic

(b) $CaO$ Basic

(c) $SeO_2$ Acidic

(d) $Cs_2O$ Basic

3. What acid is formed by the reaction of $P_4O_{10}$ with water?

$$P_4O_{10} + 6H_2O \rightarrow 4H_3PO_4$$

$H_3PO_4$

4. Write molecular, ionic and net ionic equations for the reaction that would occur between potassium chloride and lead (II) nitrate.

(Molecular) $2KCl_{(aq)} + Pb(NO_3)_{2(aq)} \rightarrow 2KNO_{3(aq)} + PbCl_{2(s)}$

(ionic) $2K^+_{(aq)} + 2Cl^-_{(aq)} + Pb^{2+}_{(aq)} + 2NO_3^-{}_{(aq)} \rightarrow 2K^+_{(aq)} + 2NO_3^{2-}{}_{(aq)} + PbCl_{2(s)}$

(Net ionic) $Pb^{2+}_{(aq)} + 2Cl^-_{(aq)} \rightarrow PbCl_{2(s)}$

5. The concentration of $Cl^-$ is 0.160 M in a solution of $FeCl_3$. What is the molar concentration of $FeCl_3$?

3 $Cl^-$ to 1 $FeCl_3$

$0.160 \div 3 = 0.0533$ M $FeCl_3$

6. How many milliliters of 0.300 M NaOH are required to react with 500.0 mL of 0.170 M $H_3PO_4$ to yield $Na_3PO_4$?

$3NaOH + H_3PO_4 \rightarrow 3H_2O + Na_3PO_4$

$0.170\ M\ H_3PO_4 = \frac{n}{0.500\ L}$ $\quad n = 0.0850$ moles $H_3PO_4$

Need 3 times as many moles NaOH

$\therefore 0.0850 \times 3 = 0.255$ moles NaOH needed

$0.300\ M = \frac{0.255\ \text{moles}}{X}$

$X = 0.85$ L or 850 mL NaOH

7. How many grams of AgCl will be formed if 25.0 mL of 0.050 M HCl is added to 100.0 mL of 0.50 M $AgNO_3$?

$HCl + AgNO_3 \rightarrow AgCl + HNO_3$

0.00125 moles HCl

0.050 moles $AgNO_3$

∴ HCl is limiting and we 0.00125 moles AgCl Fo

$0.00125 \text{ mole} = \frac{x_g}{143 g/}$ $x = 0.179 g AgCl$

3

8. What is the equivalent mass of $MnSO_4$ when it is oxidized to produce $MnO_2$?

$Mn^{2+} SO_4 \rightarrow Mn^{4+} O_2 + 2e^-$

$\frac{150 g \ MnSO_4}{mole} \left(\frac{1 \ mole}{2 \ eq}\right) = 75.4 g/eq$

9. How many mL of water must be added to 85.0 mL of 1.00 N $H_3PO_4$ to give a solution that is 0.650 N $H_3PO_4$? Assume that the volumes are additive.

$N_1 V_1 = N_2 V_2$

$(1.00N)(85mL) = (0.650N) X mL$

$X = 130.8 mL$

$- 85.0 mL$

46 mL of $H_2O$ added

3

8

10. Balance the following reaction by the ion-electron method (in acidic solution).

$$As_2O_3 + NO_3^- \rightarrow H_3AsO_4 + N_2O_3$$

$$5H_2O + As_2O_3 \longrightarrow 2H_3AsO_4 + 4H^+ + 4e^-$$

$$4e^- + 6H^+ + 2NO_3^- \longrightarrow N_2O_3 + 3H_2O$$

$$2H_2O + 2H^+ + As_2O_3 + 2NO_3^- \longrightarrow 2H_3AsO_4 + N_2O_3$$

11. Balance the following reaction by the ion-electron method (basic solution).

$ClO_3^- + N_2H_4 \rightarrow NO_3^- + Cl^-$

$3H_2O + ClO_3^- \longrightarrow Cl^- + 6OH^-$

$4OH^- + 12OH^- + N_2H_4 \longrightarrow 2NO_3^- + 6H_2O + 4H_2O$

$6e^- + 3H_2O + ClO_3^- \longrightarrow Cl^- + 6OH^-$ (x 7)

LCM = 42

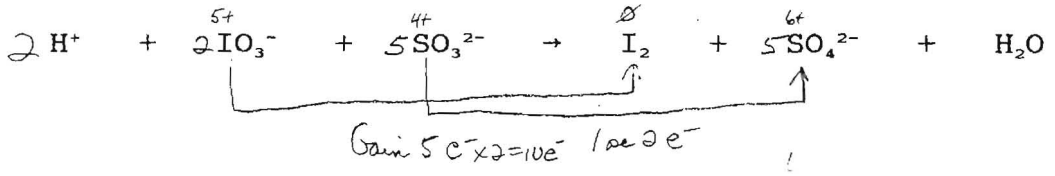
$16OH^- + N_2H_4 \longrightarrow 2NO_3^- + 10H_2O + 14e^-$ (x 3)

$\cancel{42e^-} + \cancel{21H_2O} + 7ClO_3^- \rightarrow 7Cl^- + \cancel{126OH^-}$

$\cancel{48}^{6}OH^- + 3N_2H_4 \rightarrow 6NO_3^- + \cancel{30}^{9}H_2O + \cancel{42e^-}$

$6OH^- + 7ClO_3^- + 3N_2H_4 \rightarrow 7Cl^- + 6NO_3^- + 9H_2O$

12. Balance the following reaction by the oxidation-number method.

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Chemistry II Units of Concentration Quiz Name_____

**SHOW ALL WORK**

1. How many grams of solute are required to prepare 1.5 liters of a 2.6 N solution of $H_3PO_4$ (assume that all hydrogens are replaceable).

2. Determine the mole fractions of both substances in a solution containing 45.6 g of water and 65.2 g of glycerin, $C_3H_5(OH)_3$.

Chemistry II Units of Concentration Quiz Name Teacher

**SHOW ALL WORK**

1. How many grams of solute are required to prepare 1.5 liters of a 2.6 N solution of $H_3PO_4$ (assume that all hydrogens are replaceable).

For $H_3PO_4$ $\frac{3\ eq}{1\ mole}$

$2.6N = \frac{X\ eq}{1.5L}$ $X = 3.9\ eq$ needed

$3.9\ eq \left(\frac{1\ mole}{3\ eq}\right) = 1.3\ moles\ H_3PO_4$

$1.3\ moles \left(\frac{98\ g}{1\ mole}\right)$

127 g 130 g

2. Determine the mole fractions of both substances in a solution containing 45.6 g of water and 65.2 g of glycerin, $C_3H_5(OH)_3$.

$\frac{45.6\ g}{18.0\ g/_n} = 2.53\ moles\ H_2O$ $X_{H_2O} = \frac{2.53}{3.24} = 0.78$

$\frac{65.2\ g}{92.1\ g/_n} = 0.708\ moles\ Glycerin$ $X_{Glycerin} = \frac{0.708}{3.24} = 0.22$

Total Moles = 3.24

$X_{H_2O} = 0.78$

$X_{Glyc.} = 0.22$

Chemistry II Units of Concentration Test Name_____

**SHOW ALL WORK**

1. How many grams of a 5.0% by weight NaCl solution are necessary to yield 3.2 g NaCl?

2. Calculate the mass of anhydrous HCl in 5.00 $cm^3$ of concentrated hydrochloric acid (density = 1.19 $g/cm^3$), containing 37.23% HCl by weight.

3. What is the molality of a solution which contains 20.0 g of cane sugar, $C_{12}H_{22}O_{11}$, dissolved in 125 g of water?

4. What is the molar concentration of a solution containing 16.0 grams of $CH_3OH$ in 200.0 mL of solution?

5. Calculate the normality of a 46.5 mL solution of $H_2SO_4$ which is able to react completely with 56.7 mL of 1.34 N $Al(OH)_3$ solution.

6. An aqueous solution having a mass of 123 grams contains 23.6 grams of NaCl and 17.5 grams of $KNO_3$. Calculate the mole fraction of **EACH** component.

Chemistry II Units of Concentration Test Name Teacher

**SHOW ALL WORK**

1. How many grams of a 5.0% by weight NaCl solution are necessary to yield 3.2 g NaCl?

$$\frac{5.0\%}{100} = \frac{3.2\,g}{X}$$

$X = 64\,g$

2. Calculate the mass of anhydrous HCl in 5.00 $cm^3$ of concentrated hydrochloric acid (density = 1.19 $g/cm^3$), containing 37.23% HCl by weight.

$$5.00\,cm^3 \left(\frac{1.19\,g}{cm^3}\right) = 5.95\,g \text{ Total}$$

$$\frac{X}{5.95\,g}\,100 = 37.23\%$$

$X = 2.22\,g$

3. What is the molality of a solution which contains 20.0 g of cane sugar, $C_{12}H_{22}O_{11}$, dissolved in 125 g of water?

$C_{12} = 144.12$

$H_{22} = 22.15$

$O_{11} = 176.00$

$342.3\,g/_n$

$$\frac{20.0\,g}{342.3\,g/_n} = 0.0584 \text{ mole Sugar}$$

$$m = \frac{0.0584\,mole}{0.125\,kg}$$

$m = 0.467\,m$

4. What is the molar concentration of a solution containing 16.0 grams of $CH_3OH$ in 200.0 mL of solution?

$CH_3OH = 32.04\ g/n$ $\qquad \frac{16.0\ g}{32.04\ g/n} = 0.500\ moles$

$\frac{0.500\ moles}{0.200\ L} = M = \boxed{2.50\ M}$

5. Calculate the normality of a 46.5 mL solution of $H_2SO_4$ which is able to react completely with 56.7 mL of 1.34 N $Al(OH)_3$ solution.

$1.34 = \frac{eq\ Al(OH)_3}{0.0567}$ $\qquad 0.07598\ eq\ Al(OH)_3$ reacts with same eq of $H_2SO_4$

$N = \frac{0.07598\ eq\ H_2SO_4}{0.0465\ L}$

$\boxed{1.63\ N\ H_2SO_4}$

6. An aqueous solution having a mass of 123 grams contains 23.6 grams of NaCl and 17.5 grams of $KNO_3$. Calculate the mole fraction of **EACH** component.

$\frac{23.6\ g\ NaCl}{58.44\ g/n} = 0.4038\ moles\ NaCl$ $\qquad X_{NaCl} = \frac{0.4038}{5.127} = 0.079$

$\frac{17.5\ g\ KNO_3}{101.11\ g/n} = 0.1731\ moles\ KNO_3$ $\qquad X_{KNO_3} = \frac{0.1731}{5.127} = 0.034$

$\frac{81.9\ g\ H_2O}{18.0\ g/n} = 4.55\ moles\ H_2O$ $\qquad X_{H_2O} = \frac{4.55}{5.127} = 0.887$

$5.127\ moles\ total$