Time: 55min

Chem. 101
Laboratory Final

Thurs. June 11th, 1998
S. Sadek

Name: _____

I.D. #: _____

Lab. Instructor: _____

Score:

I_____ / 36

II_____ / 24

III_____ / 12

IV_____ / 14

V _____ / 14

Grade:_____/ 100

☺ Good Luck

I) (36%)

In the following multiple choice-type questions, circle the letter preceding the best answer:

Hydrogen peroxide is decomposed according to the following unbalanced reaction:

$$H_2O_{2(g)} \longrightarrow O_{2(g)} + H_2O_{(g)}$$

The volume of H_2O produced at S.T.P. if 68.0 g of H_2O_2 are decomposed is equal to:

a- 11.2 L
b- 22.4 L
c- 33.6 L
d- 44.8 L
e- 52.8 L

32. 60 g of a sample containing only Na_2CO_3 and NaCl were treated with HCl solution. If 8.80 g. of CO_2 were evolved, then the sample contains:

a- 44.0 % NaCl
b- 23.4% NaCl
c- 65.0% Na_2CO_3
d- 44.0% Na_2CO_3
e- 35.0% Na_2CO_3

An iron ore sample weighing 1.00 g is dissolved in HCl solution:

$$Fe_{(s)} + 2HCl_{(aq)} \longrightarrow FeCl_{2(aq)} + H_{2(g)}$$

The solution thus obtained is then titrated with 30ml of $KMnO_4$ 0.30 N to a colorless end point where Fe^{2+} is oxidized to Fe^{3+}. The percent of Fe in the ore sample is:

a- 0.90%
b- 90%
c- 50%
d- 61%
e- None of the above; my answer is _____

The fractions by which the original volume of a gas at S.T.P. is multiplied to correct its volume to new conditions is $\frac{298}{273} \times \frac{760}{800}$; the new conditions are:

a- 25°C, 1 atm
b- 298 k, 1 atm
c- 0°C, 1 atm
d- 0°C, 800 torr
e- 25°C, 800 torr

$NH_{3(g)}$ and $HCl_{(g)}$ are allowed to diffuse through both ends of a 20cm glass tube. when the two gases meet, a white fume forms. The distance X travelled by HCl:

a- $x = (20 - x)\ (36.5/17)^{1/2}$
b- $x = (20 - x)\ (17/36.5)^{1/2}$
c- $(20 - x) = x\ (17/36.5)^{1/2}$
d- $d_{NH_3} / d_{HCL} = (\text{M.Wt } NH_3 / \text{M.Wt HCl})^{1/2}$
e- None of the above, my answer is _____

The ion that gives a deep blue color with ammonia is:

a- Cu^{+}
b- Cl^{-}
c- Sb^{3+}
d- Cu^{2+}
e- NH_4^{+}

II) (24%) Write balanced equations for the following processes:

a- When oxalic acid is titrated with sodium hydroxide

b- When Zinc metal reacts with a hydrochloric acid solution

c- When antimony chloride hydrolyzes in water

d- When aluminum nitrate solution reacts with thioacetamide

e- When chromate is converted to dichromate in acidic medium

f- When ferric nitrate solution reacts with ammonium carbonate

g- When nitrogen dioxide gas is generated from lead nitrate

h- When iron is heated with sulfur

III) (12%)

A(4%)- Define Titration and name two types of it.

B(8%)- A 3.664 g sample of a monoprotic acid HA was dissolved in water and required 20.27 ml of a 0.1578 M NaOH solution for neutralization.

a- Write the equation of the chemical reaction

b- Calculate the molar mass of the acid

IV) (14%) Sulfuric ions can be oxidized to sulfate ions by dichromate ions in acid solution:

$$Cr_2O_7^{2-} + SO_3^{2-} \longrightarrow Cr^{3+} + SO_4^{2-}$$

a- Balance the above chemical reaction; show the steps.

b- Name the oxidizing agent and the reducing agent.

c- Calculate the molarity of the $K_2Cr_2O_7$ solution if 28.42 ml of the solution react completely with 25.00 ml solution of 0.3143 M Na_2SO_3.

V) (14%) The solubility of potassium chlorate $KClO_3$ was determined at different temperatures. The following values were obtained:

T(°C) :	10	30	40	50
S(g / 100g H_2O):	2. 5	10	15	20

a- On the graph paper provided, plot the soluibility curve for $KClO_3$

b- Determine the solubility at 43°C

c- Mark on your graph the point that corresponds to 12g / 100g H_2O at 50°C . Is the solution saturated at this point ? If not, to what temperature should it be taken to make it saturated ?