

Time: 55min

Chem. 101  
Laboratory Final

Thurs. June 11<sup>th</sup>, 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:



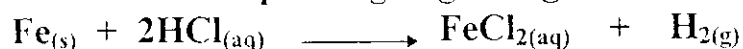
The volume of  $\text{H}_2\text{O}$  produced at S.T.P. if 68.0 g of  $\text{H}_2\text{O}_2$  are decomposed is equal to:

- 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  $\text{Na}_2\text{CO}_3$  and  $\text{NaCl}$  were treated with  $\text{HCl}$  solution. If 8.80 g of  $\text{CO}_2$  were evolved, then the sample contains:

- a- 44.0 %  $\text{NaCl}$
- b- 23.4%  $\text{NaCl}$
- c- 65.0%  $\text{Na}_2\text{CO}_3$
- d- 44.0%  $\text{Na}_2\text{CO}_3$
- e- 35.0%  $\text{Na}_2\text{CO}_3$

An iron ore sample weighing 1.00 g is dissolved in  $\text{HCl}$  solution:



The solution thus obtained is then titrated with 30ml of  $\text{KMnO}_4$  0.30 N to a colorless end point where  $\text{Fe}^{2+}$  is oxidized to  $\text{Fe}^{3+}$ . 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

$\text{NH}_3(\text{g})$  and  $\text{HCl}(\text{g})$  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-  $d_{\text{NH}_3} / d_{\text{HCL}} = (\text{M. Wt NH}_3 / \text{M. Wt HCl})^{1/2}$
- e- None of the above, my answer is \_\_\_\_\_

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

- a-  $\text{Cu}^+$
- b-  $\text{Cl}^-$
- c-  $\text{Sb}^{3+}$
- d-  $\text{Cu}^{2+}$
- e-  $\text{NH}_4^+$

**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:



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

b- Name the oxidizing agent and the reducing agent.

c- Calculate the molarity of the  $\text{K}_2\text{Cr}_2\text{O}_7$  solution if 28.42 ml of the solution react completely with 25.00 ml solution of 0.3143 M  $\text{Na}_2\text{SO}_3$ .

V) (14%) The solubility of potassium chlorate  $\text{KClO}_3$  was determined at different temperatures. The following values were obtained:

T( $^{\circ}\text{C}$ )	:	10	30	40	50
S(g / 100g $\text{H}_2\text{O}$ ):		2.5	10	15	20

- a- On the graph paper provided, plot the solubility curve for  $\text{KClO}_3$
- b- Determine the solubility at  $43^{\circ}\text{C}$
- c- Mark on your graph the point that corresponds to 12g / 100g  $\text{H}_2\text{O}$  at  $50^{\circ}\text{C}$ . Is the solution saturated at this point? If not, to what temperature should it be taken to make it saturated?