

⌚: 75 min .

Chemistry 102
Lab. Final

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Name : _____

I. D. # : _____

Score :

I _____ / 42

II _____ / 15

III _____ / 12

IV _____ / 21

V _____ / 10

Grade : _____ / 100



I. (42%) In each of the following questions , circle the letter preceeding the best answer :

One mole H_2 (g) , one mole I_2 (g) , and 2 moles HI (g) are injected into a 1 liter box . If the equilibrium constant for the reaction :

H_2 (g) + I_2 (g) \rightleftharpoons 2HI (g) is 45.0 then the concentration of HI species at equilibrium will be :

- a- 0.54 M
- b- 0.92 M
- c- 2.00 M
- d- 3.08 M
- e- 4.00 M

The compound which most conducts electricity is :

- a- NaCl
- b- CH_3COOH
- c- $\text{C}_6\text{H}_{12}\text{O}_6$
- d- distilled water
- e- (a) and (c)

When zinc reacts with hydrochloric acid , other than hydrogen gas ,the following is obtained :

- a- chlorine gas
- b- two atoms of hydrogen
- c- zinc chloride
- d- a hydrogen ion
- e- zinc solid

Ag (NH₃)₂ Cl + HNO₃ give a solid precipitate :

- a- AgNO₃
- b- AgCl
- c- Ag(NH₃)₃Cl
- d- NH₄NO₃
- e- NH₄Cl

The detection of CO₂ gas in an experiment indicates the presence of :

- a- HCl
- b- CaCO₃
- c- CO₃
- d- CO₃²⁻

200 mls of 0.10 M H₂SO₄ solution are already prepared in a flask . The concentration of 10 mls taken from this solution would be :

- a- 0.10 M
- b- 0.025 M
- c- 0.20 M
- d- 0.0050 M

Centrifugation is used for :

- a- separating colored and colorless substances
- b- separating homogenous liquid - solid mixtures
- c- coagulating substances in a suspension
- d- decoagulating substances in a homogenous mixture .
- e- (a) an (b)

Which of the elements below do not give H₂ when reacted with HCl ?

- a- Zn
- b- Al
- c- Fe
- d- Na
- e- Cu

A buffer solution :

- a- neutralizes acidic solutions
- b- neutralizes basic solutions
- c- produces some changes in pH
- d- resists changes in pH
- e- (a) and (b)

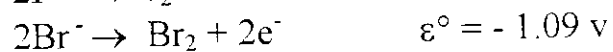
The source of the sulfide ion used in Chem 102 lab is :

- a- CH₃CONH₂
- b- CH₃CSNH₂
- c- NH₄S
- d- Na₂SO₄
- e- Na₂S

While testing for the presence of Al³⁺ in a solution , you have to add the base solution slowly and dropwise so as :

- a- to dissolve the precipitate formed
- b- to form the complex Al(OH)₄⁻
- c- not to dissolve the precipitate formed
- d- not to form NaAlO₂ if NaOH is the base
- e- None of the above

Given the following half - reactions :



What would happen when Br_2 solution is added to sodium iodide solution ?

- a- No reaction takes place
- b- There would be a reaction
- c- Br_2 can reduce I^-
- d- I_2 can reduce Br^-
- e- None of the above

What would be the voltage reading of the above total cell reaction (if there would be a reaction) ?

- a- - 0.55 v
- b- - 1.63 v
- c- + 0.55 v
- d- + 1.63 v
- e- can not be determined since no reaction occurs .

Aqua regia :

- a- is used in the qualitative analysis of group II ions
- b- consists of 12 M HCl and 16 M HNO_3
- c- is used to dissolve HgS
- d- all of the above
- e- none of the above

II. A. (6%) Give the molecular formula for each of the following compounds and find the oxidation number of oxygen in each one :

Aluminum (III) oxide

Aluminum (III) peroxide

Aluminum (III) superoxide

B. (9%) Explain how can you identify each of the following gases (write chemical reactions where applicable) :

O_2 :

CO :

NH_3 :

III (12%) Based on some properties (studied in this course) , a mixture of metal cations can be separated into its constituents . Name three of these properties and give a clear example on each one .

IV (21%) Write balanced chemical equations for the following reactions :

a- Generation of oxygen gas

b- Preparation of hydrogen peroxide

c- Dissolution of calcium oxide in water

d- Reaction of ferric nitrate with thioacetamide

e- Test for magnesium ion

f- Action of conc. nitric acid on copper metal

g- Heating a solution containing hard water

V. (10%) 10.0 ml of $2.00 \times 10^{-3}\text{M}$ KSCN and 10.0 ml of $2.00 \times 10^{-3}\text{M}$ $\text{Fe}(\text{NO}_3)_3$ solutions were placed in a large test tube and mixed thoroughly. A red color was observed due to the formation of FeSCN^{2+} . The concentration of the latter was determined colorimetrically and found to be $1.50 \times 10^{-4}\text{M}$.

a. Calculate the initial concentrations of Fe^{3+} and SCN^- in the tube :

$$[\text{Fe}^{3+}]_0 =$$

$$[\text{SCN}^-]_0 =$$

b. Calculate the equilibrium concentrations :

$$[\text{Fe}^{3+}] =$$

$$[\text{SCN}^-] =$$

c. Determine the equilibrium constant for the reaction :

