المستوى الرابع - كيمياء - طرق التركيز المسبق لتقدير العناصر لـ ٤١٢

Mansoura University Faculty Of Science Chemistry Department Subject : Analytical Chemistry Course(s): pre-concentration C412		First term 4th year Chemistry Program: Analytical preconcentration Date: Dece. 2013 Time Allowed: 2 Hours Full Mark: 80 Marks

Answer The Following Questions Note : Express your answers by formulas , equation ,pathways, figures or drawings wherever possible.

1- Define 5 only of the following (10 Marks)

1-D_I(AAS& AES.) & Heavymetals . 2- $K_{d,\&}$ α & R % 3- D , capacity of resin , S_{max} 4- F-, t-, Q-, X^2 – tests 5- F %,R_e % &Specificaton (cpds , elements) 6- Renolles- Soveck equation. &Bragg' s equation. 7-Scheibe, Lomakin-equations .

2-Complete 10 only from the following: (10 Marks)

1-Preconcentration methods should be done to overcome on difficulties.....and.....

2--Flotation is define as..... the classification of the methods basd on .... ,.... and....

4-Using the Flotation method for separation of 1...2....3.....4.....5.....6....and .....

5- Applications of ions exchanger in analytical chemistry 1...,.2....,3.....,4....., 5.....and 6

6-Types ions exchanger are 1.....2.....and 3..... gives eg. 1.....2.....3....

7- Ions exchanger techniques are 1-..... and 2-.....

8- Factors affecting up on ions exchanger separation are 1.....,2...,.3...,.4...,.5...,.and.6...

9- Factors affecting up on Flotation 1....2.....3.....4...5.....6....7- ... and 8.....

10- Equipment's in Flow injection analysis (FIA) are the following 1-..., 2...,3...and4....

11- Advantages of the (FIA) are 1.... 2.....3.....and .....

12- Electrophoresis method depends upon the following factors 1...,.2..., 3..., 4...and 5 ...

3--*Calculate of K_d & log K_d & R% for 25 ppb total concentration of Hg(II) using 50 mg ion exchanger resin and 50ml of solution .* The Hg (II) ion in solution after pre-concentration. is 2 ppb .If the log K_d = 2.o for CuII) calculate α. (10 Marks)

4- Determination of heavy metals ions and what are their effects on the human body, write short notes on the methods of pre-concentration (10 Marks)-----

Good Luck : prof. Dr. I.Kenawy

First Question: **(20marks)**

1.a) Calculate the fundamental frequency expected in the infrared absorption spectrum for the C - O stretching frequency.The value of the force constant is 5.0 X 10^5 dynes/cm. (C= 12, O=16).

1.b) Draw a schematic diagram for an atomic absorption instrument explaining in detail the source and the atomization device used

1.c)Compare between Three of the following:

i) Different types of infra-red instruments

ii) Atomic absorption and emission spectroscopy

iii) Turbidimetric and Nephelometric methods of analysis

iv) Mole-ratio and Slope-ratio methods for determination the stoichiometry of a complex

Second Question: **(20marks)**

2.a) Draw a schematic diagram for a torch plasma indicating the several methods used for sample introduction into the plasma

2.b) Discuss briefly Three the following:

i) Characteristics of arc and spark excitation sources

ii) Different types of photometric titration curves

iii) Different types of electronic transitions which can take place in molecules in UV-Vis region

iv) The most common sources and detectors used in IR spectrometer

2.c) The lowest excited state of Na atom lies 3.371x 10^{-19} J/atom above the ground state. The degeneracy of the excited state is 2, while that of the ground state is 1. Calculate the fraction of Na atoms in the excited state at 2700K.

With my best wishes

Prof. Dr Magdi Khalifa

المستوى الرابع - كيميا ،
كيمياصوان - كيميا رضوية - كيميا الأطياف ك ٤٣١
كيميا نبات

Mansoura University
Faculty of Science
Chemistry Department
Mansoura, Egypt

جامعة المنصورة
كلية العلوم
قسم الكيمياء
المنصورة – مصر

First Semester Term 2013/2014

Educational Year: 4th Year Chemistry, Bot. & Chem., Zool. & Chem.
Course (s): Photochemistry& Organic spectroscopy.
Date: 29/12/2013.
Course Code: CH 431.

Subject: Chemistry.
Full Mark: 60.
Time: 2 hrs.

A. Answer all the following questions

1)

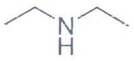
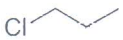
i. Explain carefully, what happen when electrons absorb photo energy? (5 Marks)

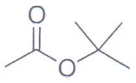
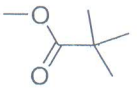
ii. Write short notes on Norrish type I for the photoreaction of carbonyl compounds and explain your answer by an example. (5 Marks)

iii. Write short notes on photochemical reaction of Type A of cyclohexenonc c. (5 Marks)

2)

i. How would you use ^{1}HNMR spectroscopy to distinguish between the following compounds: (5 Marks)

a. and  b.  and

c. and d.  and 

ii. There are three isomeric **dichlorocyclopropanes**. Their ^{1}HNMR spectra show one signal for isomer **A**, two signals for isomer **B**, and three signals for isomer **C**. Draw the structures of isomers **A**, **B** and **C.** (5 Marks)

iii. A signal has been reported to occur at 1200 Hz downfield from TMS in an NMR spectrometer with a 300 MHz frequency. (5 Marks)

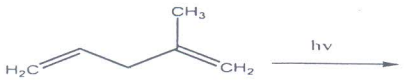
a) What is the chemical shift of the signal?
b) What would its chemical shift be in an instrument operating at 100 MHz?
c) How many hertz downfield from TMS would the signal be in a 100 MHz Spectrometer?

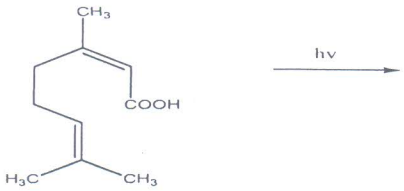
B. Answer only one of the following questions:

3)

i. Complete the following photochemical equations. (15 Marks)

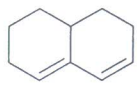
a.

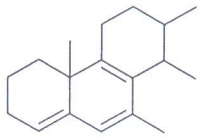
b. 

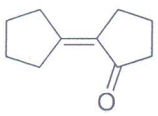
c. 

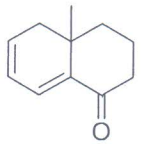
d.

ii. Calculate λ_{max} for each of the following(7.5 Marks):

a. 

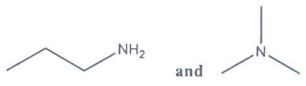
b. 

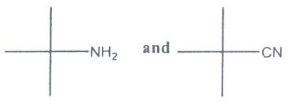
c. 

d. 

iii. How would you use IR spectroscopy to distinguish between the following compounds: (7.5 Marks)

a.

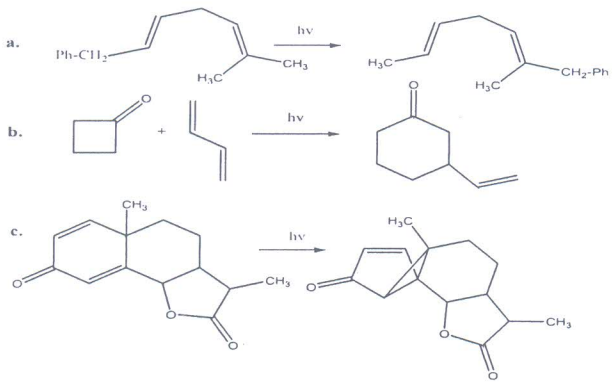
b. 

c. 

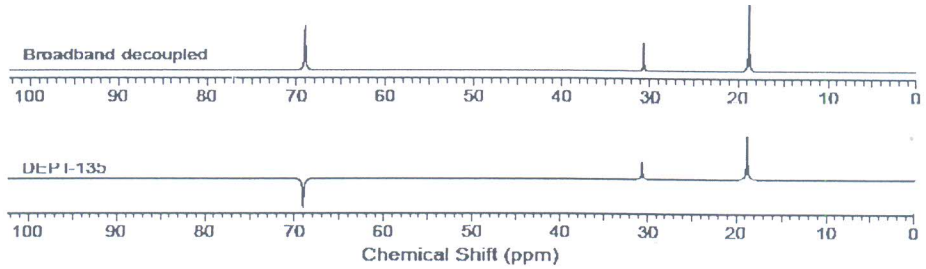
d.

4)

i. Is the chemical structure of the product of the following equations right? If is it wrong, suggest the correct one. Write your suggestion mechanisms. (15 Marks)



ii. Determine the structure of an alcohol with molecular formula $C_4H_{10}O$ that exhibits the following ^{13}C NMR spectra. (7.5 Marks)

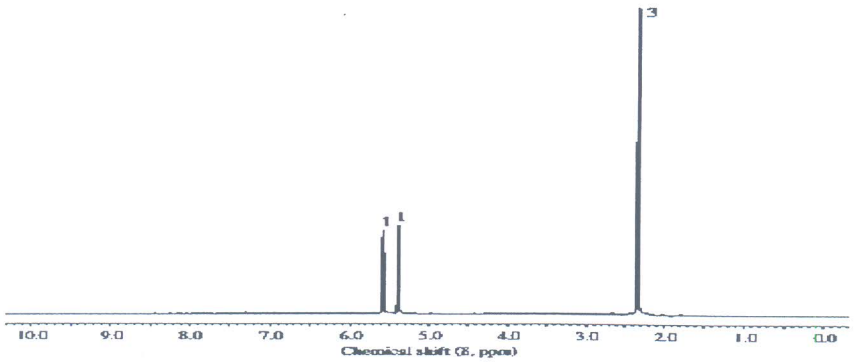


iii. Identify the C_3H_5Br isomers on the basis of the following information: (7.5 Marks)

i. Isomer A has three peaks in its ^{13}C NMR spectrum: δ 32.6 ppm (CH_2); 118.8 ppm (CH_2); and δ 134.2 ppm (CH).

ii. Isomer B has two peaks in its ^{13}C NMR spectrum: δ 12.0 ppm (CH_2) and δ 16.8 ppm (CH). The peak at lower field is only half as intense as the one at higher field.

iii. Isomer C has the ^{1}H NMR spectrum shown in the following Figure.



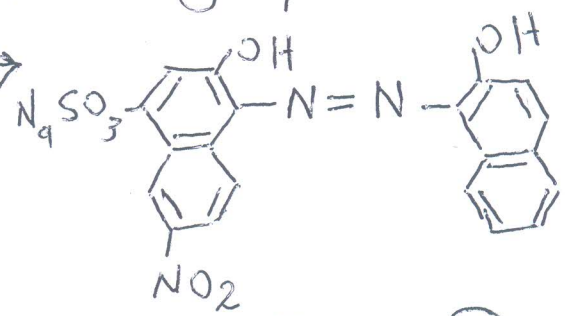
المستوى الرابع - كيمياء - كيمياء الأصباغ ك ٤٣٢

Mansoura University Faculty of Science Chemistry Department Subject: Chemistry Course(s): Org. Chem.(432)	كلية العلوم جامعة المنصورة	First Term 4th Level Students Date : Jan, 2014 Time Allowed: 2 hours Full Mark: 80 Marks

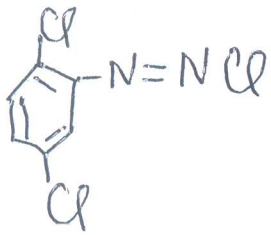
Answer The Following Questions

I Complete the following equations : (26 Marks)

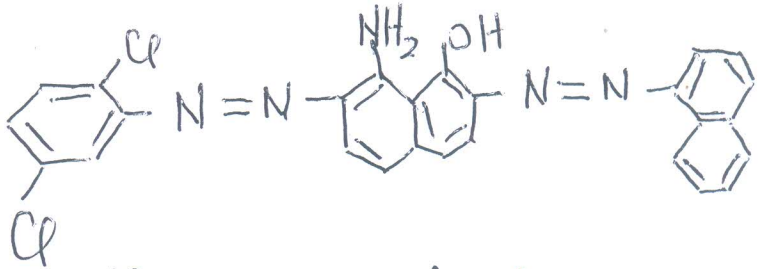
i A + B →



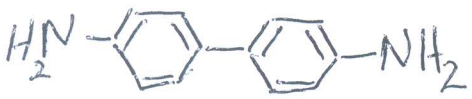
ii



+ B → C $\xrightarrow{+D}$

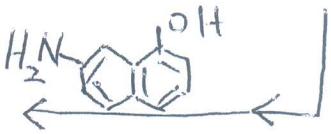


iii



$\xrightarrow{2\,HNO_2}$ A $\xrightarrow{\text{Salicylic acid}}$ B

C



II Write an essay on Indigoid and thioindigoid dyes. (27 Marks)

III Give an account on : (27 Marks)

i Reactive dyes

ii Anthraquinone dyes

good luck Dr. M. Yousif

ع كيمياء - الحفر لـ ٤٤١

Mansoura University
Faculty of Science
Chemistry Department
Course: Physical Chemistry
Date : 5/ 01/ 2014

First Semester Examination
Subject: Catalysis, Chem.441
Fourth level, Chemistry Student
Full Mark: 60 Marks
Time Allowed : 2hours

Answer the Following Questions: (20 marks for each question)

1- A) When organosulfur compounds react with H_2 in the presence of a sulfur-containing Ni-Mo/Al2O3 supported catalyst; the reaction is much faster than that of organonitrogen compounds under the same conditions. However, when a mixture of the same sulfur and nitrogen compounds is hydrogenated, then the nitrogen compounds react faster, regardless of the concentration ratio. Explan these observations with the aid of a kinetic model.

B) Explain the factors which affect the catalyst performance?

C) What are the four most common causes of catalyst deactivation? Explain?

D) What is the adsorption theory of catalysis?

2- A) Observations show that often acids or bases can act as catalysts. In some cases the rate depends on the nature of the acid or base (specific acid-base catalysis) and in other cases it does not depend on the nature of the acid or base. Discuss this statement considering the following equation:

$$S + \frac{H^+,\ OH^-}{HA,\ A^-} \rightarrow P,$$ where S is the substrate.

B) The reduction of CO_2 with H_2 on Pt catalysts is described by the equation:

$$CO_{2(g)} + H_{2(ads)} \rightarrow H_2O + CO$$

According to which well-known mechanism does this hydrogenation proceed.

C) What is supported catalysis and the reasons for the predominant use of supported catalysts in industry? What is an *E*-factor? Which processes usually have the highest *E*-factors?

D) The kinetics of the alkylation of benzene with a rare earth zeolite Y is described by the equation:

rate = kC_OC_T / 1+ K_OC_O O= Olefine, T = Toluene

What can be said about the mechanism of zeolite-catalyzed alkylation?

3- A) The decomposition of phosphine PH_3 on tungsten catalysts is first order at low pressures but zero order at high pressures. Interpret these findings.

B) In the nitration of aromatic compounds, solid acid catalysts such as clays and zeolites are an alternative to the conventional process employing a mixture of HNO_3/H_2SO_4. List some reasons in view of green chemistry.

C) Show that the form of the kinetics enzyme-catalyzed reaction is equivalent to Langmuir–Hinshelwood kinetics. Explain why very tight binding of a substrate to an enzyme is not desirable for enzyme catalysis.

D) The decarboxylation of a keto acid catalyzed by a decarboxylation enzyme can be measured by the rate of CO_2 formation. From the initial rates given in the table, determine the Michaelis-Menten constant for the enzyme and the maximum velocity by a graphical method.

[Keto Acid], M	2.500	1.000	0.714	0.526	0.250
Initial Velocity, micromoles CO_2/2 min	0.588	0.500	0.417	0.370	0.256

Prof. S. A. El-Hakam and Prof. Awad I. Ahmed

كيمياء - كيمياء طبية وكيمياء البيئة لـ ٤٣٣

Mansoura University Faculty of Science Chemistry Department Subject: Organic Chemistry (Chem. 433) Courses: Chemotherapy&Environmental		First Term 4th level chemistry Date: 12/1/2014 Time allowed: 2 hours Full Mark: 70 Marks

Answer the FOLLOWING questions:

[1] (a) Based on the lead compound for the development of cocaine, **define** the molecular modification and **propose a** structure for another compound used as anesthetics. [6 Marks]

(b) What account for the ease of **imine** formation between penicillinase and the sulfone antibiotic that counteracts penicillin **resistance**? [8 Marks]

(C) The lethal dose of tetrahydrocannabinol in mice is 2.0 g/kg and the therapeutic dose is 20 mg/kg. The lethal dose of sodium pentothal in mice is 100 mg/kg, and the therapeutic dose is 30 mg/kg. Which is the **safer** drug? [6 Marks]

[2] (a) **Describe** the synthesis and the main therapeutic action of the following:

I. Penicillin V [5 Marks] II. Phensuximide [5 Marks]

III. Cyclopal [5 Marks] IV. Sulphaguanidine [5 Marks]

(b) Several **greenhouse gases** participate in the global warming. (**Explain and give examples**) [6 Marks]

[3] (a) **Write briefly** on the Acid-Base reactions in atmosphere. [8 Marks]

(b) What two chemical species are most generally responsible for the **removal** of $OH^{\bullet}$ produced by energetic electromagnetic radiation in the atmosphere? [6 Marks]

(c) Many organohalides and organosulfur compounds were encountered as air pollutants (**Give two examples of each**). [4 Marks]

(d) **Write briefly** on the chlorofluorocarbons (CFCs) and show their role in the ozone destruction. [8 Marks]

(e) **Write briefly** on the regions of the Atmosphere. [8 Marks]

Best wishes

Examiner: Dr. Ahmed Fekri

المستوى الرابع - كيمياء - كيمياء كهربية متقدمة له ٤٤٢

Mansoura University Faculty Of Science Chemistry Department Code: Chem. 442 Subject: Advanced Electrochemistry		First term Fourth level Program: Chemistry Date: Jan. 2014 Time Allowed: 2 Hours Full Mark: 80 Marks

Answer All Questions الأسئلة على الوجهين

First Question: (20 Mark)

[A] Complete: (6 Mark)

Charge distribution according to Helmholtz is considered as..... Chemical or electrochemical attack may be accompanied by physical deterioration is defined as ..... To prevent pit formation in some electrodeposited metal ..... is added and to obtain smooth deposit ..... Is added.

[B] Show how to reduce the corrosion rate of an active metal on the bases of mixed potential theory. **(8 Mark)**

[C] Discuss briefly the electrodeposition on plastic. **(6 Mark)**

Second Question: (20 Mark)

[A] Tick (√) for the correct answer: **(6 Mark)**

(1) The only environment in E/PH diagram is:

(i) Water.

(ii) Acid medium.

(iii) Ethyl alcohol.

(iv) Ether.

(2) Stress in electrodeposited metal may arise from:

(i) Presence of foreign material on the cathode surface.

(ii) Passing moderate current density.

(iii) Addition of colloidal material.

(iv) Matching between the lattice parameter of the deposite and the cathode surface.

(3) Formation of electrodeposited metal away from electrode surface in the form of trees arise from:

(i) Presence of conducting salt.

(ii) Depletion of metal ion in the region adjacent to the electrode surface.

(iii) Addition of wetting agent.

[B] Discuss the following:

(i) The equilibrium reactions represented by the slopping lines in E/PH diagram. **(7 Mark)**

(ii) Transpassivity and anodizing. **(7 Mark)**

Third Question: **(20 Mark)**

[A] Give reason: **(10 Mark)**

(1) The corrosion rate of iron is more than the corrosion rate of zinc in the same concentration of acid solution although zinc is anodic to iron according to the emf series.

(2) In aqueous aluminium solutions only Hydrogen can be obtained at the cathode.

(3) A non uniform deposit is formed in some electroplating bath.

(4) A two metal cations in the same solution deposit simultaneously.

[B] What will happen when: **(10 Mark)**

(i) Gold is coupled with zinc metal.

(ii) Presence of OH^- and SO_4^{-2} ions during passivation of electroactive passive metal and presence of active ions such as Cl^- , Br^- and I^- .

(iii) Addition of gum to some electroplating bath.

Fourth Question: **(20 Mark)**

(A) Show how to modify the following electrodeposited metals: **(8 Mark)**

(i) An electrodeposited metal, which appears dull.

(ii) A coarse crystalline electrodeposited metal.

(iii) Spongy and dirty electrodeposits.

(B) If we have two metals, one is deposited at a potential 3 mV and the other at 800 mV (i) differentiate between the physical properties of both metals and (ii) discuss two reasons for this difference in the deposition potential **(12 Mark)**