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. 2012 Time Allowed: 2 Hours Full Mark: 80 Marks

Answer All Questions الأسئلة على الوجهين

First Question: (20 Mark)

[A] Complete: (6 Mark)

(1) The common intermediate mixed potential is called .....

(2) A stress in electrodeposits may arise from ..... Or from .....

(3) When coupling a two corroding metal the corrosion rate of the less noble metal is ..... While the corrosion rate of the more noble is .....

(4) A metal characterized by higher deposition potential its electrodeposit is characterized by ..... while by higher exchange current density its electrodeposit is characterized by .....

[B] Discuss briefly the preplate cycle. **(8 Mark)**

[C] Write short notes on the following: **(6 Mark)**

(i) Anodizing (ii) Errosion corrosion (iii) Adhesion

Second Question: **(20 Mark)**

[A] Tick (√) for the correct answer:

(1) According to E/PH diagram, which one of the following method can be used to reduce corrosion: **(2 Mark)**

(i) By raising the electrode potential up into the region of immunity

(ii) By lowering the electrode potential down into the region of passivity

(iii) By raising the PH or alkalinity of the solution so that a passive film is formed

(2) When coupling an active metal with an inert metal the corrosion rate of the active metal is: **(2 Mark)**

(i) Increase (ii) Decrease (iii) Not change

(3) Rubber is added to some electroplating bath to: **(2 Mark)**

(i) Increase conductivity (ii) Stabilize the solution

(iii) Stabilize the PH of the solution (iv) Give fine smooth deposit

(4) Increasing the current density to the limiting value the deposit obtained characterized by: **(2 Mark)**

(i) Coarse crystalline (ii) Fine crystalline

(iii) Dirty and spongy deposit (iv) Formed away from the electrode surface in the form of needle or trees

[B] Describe briefly the potentiostatic anodic polarization curve for metals exhibiting passivity. **(12 Mark)**

Third Question: **(20 Mark)**

[A] Give reason:

(1) When coupling an active metal with an inert metal of higher surface area five times that of the active metal, the corrosion rate of the active metal increase vigorously. **(4 Mark)**

(2) When zinc placed in copper sulfate bath immersion deposit occur but doesn't occur in highly concentrated cyanide copper solution. **(4 Mark)**

(3) A non uniform deposit is formed in some electroplating bath. **(2 Mark)**

[B] Write briefly on the following:

(i) The limitation of the E/PH diagram. **(5 Mark)**

(ii) The different possible cathodic reaction in corrosion. **(5 Mark)**

Fourth Question: **(20 Mark)**

[A] (i) Explain briefly the simultaneous deposition of two metals. **(6 Mark)**

(ii) What is meant by current efficiency 95%. **(4 Mark)**

[B] (i) Write briefly on Hemhaltz and Gouy and Chapman double layer. **(6 Mark)**

(ii) Illustrate the effect of exchange current density on the structure of the deposited metal. **(4 Mark)**

With best wishes

Prof. Dr. H. Abd El-Rasoul

٤ كيمياء - أله (٤٤١) الحفز

Mansoura University
Faculty of Science
Chemistry Department
Course: Catalysis
Date; Saturday, 24 September 2011

First term Examination
Subject: Chem 441
Fourth level Students
Full Mark: 60 Marks
Time Allowed: 2 hours

Answer the following questions: (60 Marks)

1.A. At high pressure and 100°C the specific rate constant for the catalytic decomposition of HI on Pt-surface is 500 mm Hg Sec^{-1} and at low pressure, the specific rate constant becomes 50 sec^{-1}. calculate the P_{HI} at which the value of dP_{HI}/dt should be 250 mm Hg Sec^{-1}. (6 marks)

B. The catalytic oxidation of SO_2 to SO_3 led to the following observation:

(a) the rate was proportional to the SO_2 and O_2 pressures and was inversely proportional to the SO_3 pressure.

(b) the apparent activation energy was 30 Kcal/mole, and the heats of adsorption for SO_2, SO_3 and O_2 were 80, 100 and 120 kJ/mol respectively.

(i) Derive the rate law for this reaction starting with some reasonable assumed mechanism for the surface reaction

(ii) calculate the true activation energy for this reaction. (12 marks)

2.A. Plot the diagrams for the variation of the rate with concentration for various types of surface reactions. Explain each diagram. (6 marks)

B. For the reaction at 30°C: $2H_2O_2 \rightarrow 2H_2O + O_2$ ΔH -191.8 kJ, Ea 75.3 kJ/mol for the uncatalysed reaction and Ea 56.5 kJ mol^{-1} for the catalyzed reaction. Prepare a reaction co-ordinate diagram describing this reaction. What is the ratio of the rate constant for the catalysed and the uncatalysed reactions. (6 marks)

C. Explain the kinetic of enzyme catalysis.(8 marks)

3.A. The catalyst cannot affect the equilibrium point in reversible reactions. Explain?(6 marks)

B. Write briefly on the specific and general acid-base catalysis, give examples.(10 marks)

C. Explain the catalyst poisoning. (6 marks)

Examiner: Prof.Dr. Awad I. Ahmed

المستوى الرابع كيمياء

Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Organic Chemistry** **Course(s): Chemotherapy & Environmental Chemistry (433)**	Faculty of Science Mansoura University	**First Term** **Fourth Level – Chemistry** **Date: January 14, 2012** **Time allowed: 2 hours** **Full Mark: 80 Marks**

لـ ٤٣٢ كيمياء طبية
كيمياء البيئة

Answer the FOLLOWING questions:

[1] **(a)** **Show by equations**, the Sheehan synthesis of Penicillin II. [8 Marks]

(b) **Mention** the ideal requirements of a drug and show how it behaves in practice. [3 Marks]

(c) **Draw the chemical structure of**: [8 Marks]

(i) Terramycin
(ii) Sulphapyrimidine
(iii) Minoxidil
(iv) Salysal

(d) It has been evidenced that the natural product, curcumin has a wide range of pharmacological activities. **Give examples**. [5 Marks]

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

(i) Barbitol [3 Marks]
(ii) Azomycin [5 Marks]
(iii) Novalgine [3 Marks]
(iv) Iproniazide [5 Marks]

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

[3] **(a)** **Show by equations** the major aquatic chemical processes. [8 Marks]

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

(c) Acid rains can lead to poisoning of the trees and fish **(Comment)**. [3 marks]

(d) Several greenhouse gases participate in the global worming **(Give examples)**. [3 Marks]

(e) **Complete:** [3 Marks]

	Reasons & Problems associated with acid rains	Possible solution
1	Increasing acidity of lakes	
2	High nitrogen oxides from car exhausts	
3	Smokes from coal fires	

(f) **Describe briefly** a municipal water treatment plant [8 Marks]

(g) The following processes produce acidic gases which cause acid rain. **Arrange** them in order, starting with the worst offender: i- Forest fires & volcanoes; ii- Generating electricity; iii- Domestic reasons as home fires; iv- Transport including cars, trains, planes, etc. [3 Marks]

Good Luck

Examiner: Dr. Ibrahim M. El-Sherbiny

المستوى الرابع كيمياء - (ك ٤٣١) كيمياء ضوئية كيمياء بالطاف (٤٣١ك)

Mansoura University
Faculty of Science
Chemistry Department
Course(s): Photochemistry& Organic spectroscopy (CH 431)

First term
4th Year, Chem. Students.
Date: 17 / 01 / 2012.
Time Allowing : 2 Hours
Full Mark: 60

Answer the following questions

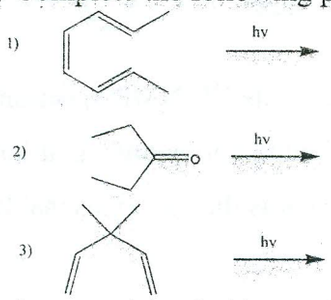
1.

a) Write brief account on Jablonski diagram. (7.5 Marks)

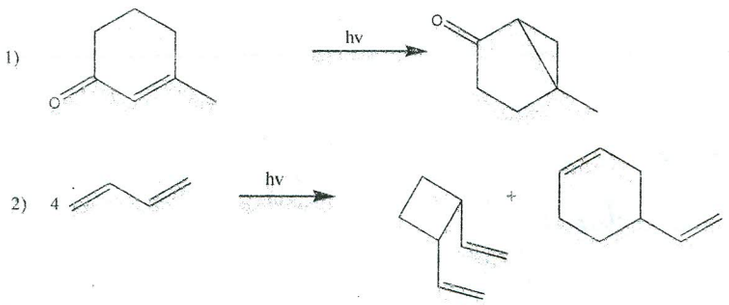
b) Write short notes on Type A for the photoreaction of cyclic enones and explain your answer by an example. (7.5 Marks)

2.

a) Complete the following photochemical equations. (7.5 Marks)



b) Suggest the suitable mechanism for the following equations. (7.5 Marks)



3.

a) Each of the following compounds is characterized by a ^{1}H NMR spectrum that consists of two peaks, both singlets, having the chemical shifts indicated. Identify each compound. (5 Marks)

i. C_6H_8; δ 2.7 ppm (4H) and 5.6 ppm (4H).
ii. $C_5H_{11}Br$; δ 1.1 ppm (9H) and 3.3 ppm (2H).
iii. $C_6H_{12}O$; δ 1.1 ppm (9H) and 2.1 ppm (3H).
iv. $C_6H_{10}O2$; δ 2.2 ppm (6H) and 2.7 ppm (4H).

b) There are three isomeric dichlorocyclopropanes. Their ^{1}H NMR spectra show one signal for isomer 1, two signals for isomer 2, and three signals for isomer 3. Draw the structure of isomers 1, 2, and 3. (5 Marks)

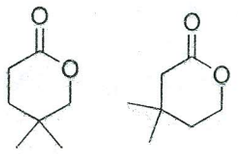
c) The chemical shifts of hydrogens bonded to sp2 hybridized carbons are at a higher frequency than those of hydrogen bonded to sp hybridized carbons. Explain. (5 Marks)

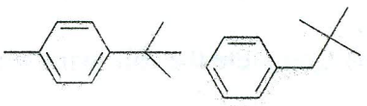
4.

a) How could ^{1}H NMR distinguish between the compounds in each of the following pairs: (5 Marks)

i. 

ii. 

iii. 

iv. 

b) A compound ($C_3H_7ClO_2$) exhibited three peaks in its ^{13}C NMR spectrum at δ 46.8 (CH_2), 63.5 (CH_2), and 72.0 ppm (CH). Excluding compounds that have Cl and OH on the same carbon, which are unstable, what is the most reasonable structure for this compound. (5 Marks)

c) Why do you suppose accidental overlap of signals is much more common in ^{1}H NNIR than in ^{13}C NMR. (5 Marks)

Examiner

Prof. Dr. M. Abou-Elzahab

Dr. Saad Eldeen Elaraby

كيمياء - (ك ٤٢١) كيمياء العناصر الانتقالية الداخلية والمركبات الفلزية العضوية

Mansoura University
Faculty of Science
Chemistry Department
Subject: Chemistry
Course (s): Chem 421
(Organometallic and f-block elements)

First Term
Year: 4th Year Chemistry
Date: 29/12/ 2011
Time Allowed: 2 hrs
Total Mark: 80 marks

Answer the following Questions:-

A- Put (√) or (X) for the following:- (37.5 Marks)

1- $Ca(OH)_2$ is more basic than $Al(OH)_3$ but less basic than $Lu(OH)_3$.
2- Most of the lanthanides form double salts.
3- The tendency to form complexes decreases in the order: P > As >Sb.
4- $Cr(CO)_6$ has sp^3d^2 configuration.
5- Ce reacts with O_2 or air forming Ce_2O_3.
6- Lu is more active than Sm.
7- Acetylinic complexes are types of 4 donor atoms.
8- Actinide and lanthanide elements form variable oxidation states.
9- Gd has a $5d^1$ configuration.
10- Pa is theheaviest naturally occurring element.
11- The increase of negative charge on the metal carbonyl compounds the higher Will be the bond order of the M-C.
12- Lu^{3+} compounds and complexes are diamagnetic in nature.
13- Most of organometalic complexes are diamagnetic and non volatile.
14- The 4f electrons in the lanthanide elements take part in bonding.
15- DP_1 and DP_2 hybride orbitals are used to explain the formation of actylenic complexes.
16- The most stable and common oxidation state in Ce is 3.
17- The 4th I.P. for lanthanides is less than the 3rd I.P.
18- Nd reacts with P forming Nd_2P_3.
19- Lanthanide elements resemble each others than the horizontal rows of 3d-elements.
20- The values of magnetic moments for the elements starting from Gd→Lu obtaind S+L are higher than these of S values only.
21- $Lu(OH)_3$ is a strong base than $Eu(OH)_3$.
22- $[Co(CO)_4]$ is a stable compound.
23- $S[Co(CO)_3]_3$ is a paramagnetic complex.
24- $[V(CO)_6]^-$ is more stable than $\{V(CO)_6]$.

P.T.O

25- $K[Mn(CO)_5]$ is less stable than $[M(CO)_5]$.

B- Write short notes on the following:- (31.5 Marks)

1- Separation of lanthanides by ion Exchange resins. (5 Marks)
2- Lanthanides fluorescence spectra. (5 Marks)
3- The bonding in $PdCl_2.C_4H_6$ where C_4H_6 is a butadiene molecule. (4 Marks)
4- Indirect synthesis of metal carbonyls invlving metal halides. (2.5 Marks)
5- Bonding in Phosphine complexes. (3.5 Marks)
6- Similarities and differences between Eu^{2+} and Ca^{2+}. (2.5 Marks)
7- Similarities and differences between Gd and Cm. (2.5 Marks)
8- Bonding in acetylenic complexes using only one π- bond. (3.5 Marks)
9- Bonding in nitrosylium complexes. (3 Marks)

C- Comments on the following:- (11 Marks)

1- Flourides are used for test of lanthanides in qualatative chemistry. (2 Marks)
2- Burrettes containing Ce^{4+} salts must be washed with acids. (2 Marks)
3- $Fe_2(CO)_9$ is a diamagnetic compound. (3 Marks)
4- Ce is easily seperated from lanthanide elements. (2 Marks)
5- Pt prefers to form square-planar complexes. (2 Marks)

Good Luck

Prof. Dr. Mohsen M. Mostafa