المستوى الرابع - كيمياء
طرق التركيز المسبق لتقدير العناصر ه ع

Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Chemistry** **Course(s): Analytical Chem. .**	كلية العلوم جامعة المنصورة	**First Term** **4th Year Chemistry Students** **Time Allowed: 3 hours** **Full Mark: 80 Marks** **Date:** Jan, 2013

Answer all Question with formula ,equation ,figures whenever as possible

1)A) Define 5 only of the following express your answer by equation, diagram : (10 Marks)

1-D_l (AAS& AES.) Bragg equation. 2-Heavymetals . & Specificaton (cpds , elements)

3- K_d, & α & R % 4- D , capacity of resin , S_{max}

5- F-, t-, Q-, X^2 – tests. 6 - Renolle 's Soveck. equation & Doemer -Hoskins law.

***B)* Give 10 methods for pre-concentration & effects on human body and determination of multi trace heavy metal ions**

2)-A)*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 based on …. , …. and….
3-Using the Flotation method for separation of 1-…2-….3-…..4-……5-…and.6-…..
5- Application of FIA for determination of the following metal ions ,1-… to 6- ..applications.
6- Applications of ions exchanger in analytical chemistry 1…,.2….,3…..,4……, 5…..and6-…..
7-Types ions exchanger are 1……2…..and 3…… gives example 1……2…and 3….
8-Preparation of Resin by using 1…. 2…. 3…. 4…… gives examples ….
9- Ions exchanger techniques are 1-……. and 2-……
10- Equipments Flow injection analysis (FIA) are the following 1-…, 2…,3….,and4….
11- The on – line concentration methods are 1-….. , 2-…..and 3-…
12-Precision is ……. and accuracy is ….. and RSD =.. ….σ =…. R(LRC) =…..
13- Electrophoresis method depends upon the following factors 1…,.2…, 3…, 4…and 5 ….

B) -Calculate of K_d & log K_d & R% for 20 ppm total concentration of Zn (II) in 50 ml solution using 50 mg ion exchanger resin . The Zn(II) ion in solution after pre-concentration. is 0.5 ppm .If the log K_d = 2.0 for Ca(II) calculate α . (10 Marks)

---Good Luck : prof. Dr. prof. Dr. I.Kenawy

Answer the following questions:

3-a) . ***Define the following:*** **{ 10 Marks }**

a) Plasma source

b) Sensitivity and detection limit in atomic absorption spectrometry

c) Interference filters

d) Isobestic point

e) Selection rules associated with i.r. absorption

3-b) Calculate the fundamental wave no. □ 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 = 3.0x10^{10}cm/s, Avogadro's no =6.023x10^{23}. C= 12; O =16) **{ 5 Marks }**

3-c) Draw a schematic diagram of flame atomic absorption spectrometer explaining the source in detail and showing how it works **{ 5 Marks }**

4. a) Discuss briefly: **{ 10 Marks }**

a) Applications of Uv.-Vis. Spectrometry for qualitative and quantitative analysis
b) Types of interference in atomic spectral measurements
c) Applications and advantages of using Michelson Interferometer
d) Limitations of Beer's law
e) Different types of photometric titration

4. b) A grating containing 1450 blazes per millimeter was irradiated with a polychromatic beam at an incident angle 48 degrees to the grating normal. Calculate the wavelengths of radiation of 1st , 2nd and 3rd order that would appear at an angle of reflection of +20 degrees (angle r).

{ 2 Marks }

4.c) Compare between: **{ 8 Marks }**

i) Use of flame atomic absorption and graphite furnace atomic absorption
ii) Application of flame Atomic emission and arc or spark atomic emission
iii) Detectors in i.r. spectrometers and detectors in Uv-Vis. Spectrophotometer
iv) Nephelometry and turbidimetry

المستوى الرابع كيمياء – كيمياء ضوئية كيمياء الطيف له ٤٣١

Mansoura University
Faculty of Science
Chemistry Department
El- Mansoura, Egypt

جامعة المنصورة
كلية العلوم
قسم الكيمياء
المنصورة – مصر

Educational Year: 4th Year Chemistry.
Course (s): Photochemistry& Organic spectroscopy.
Date: 29/12/2012.
Course Code: CH 431.

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

Answer the following questions

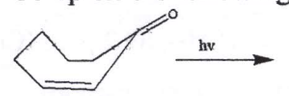
1.

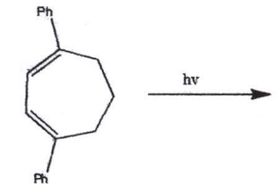
a) Write brief account on (Fluorescence – Phosphorescence – Intersystem crossing). (7.5 Marks)

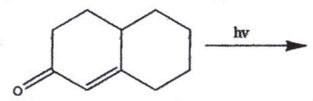
b) Write on cyclisation reactions of conjugated olefins and explain your answer by examples for each. (7.5 Marks)

2.

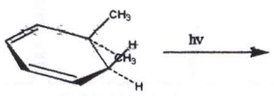
a) Complete the following photochemical equations. (7.5 Marks)

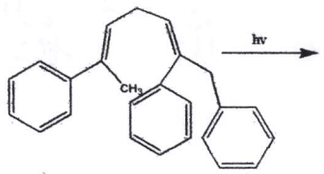
1) 

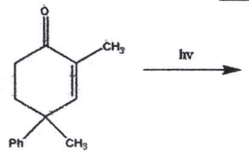
2) 

3) 

b) Complete and suggest the suitable mechanism for the following equations. (7.5 Marks)

1) 

2) 

3) 

3.

a) Propose structures for compounds that fit with following ^{1}H-NMR data (5 Marks):

i. $C_4H_6Cl_2$; 2.18 δ (3H, singlet), 4.16 δ (2H, doublet, J= 7 Hz), 5.71 δ (1H, triplet, J= 7Hz).

ii. $C_{10}H_{14}$; 1.30 δ (9H, singlet), 7.30 δ (5H, singlet).

iii. C_4H_7BrO; 2.11 δ (3H, singlet), 3.52 δ (2H, triplet, J= 6 Hz), 4.40 δ (2H, triplet, J= 6Hz).

iv. $C_9H_{11}Br$; 2.15 δ (2H, quintet), 2.75 δ (2H, triplet), 3.38 δ (2H, triplet), 7.22 δ (5H, singlet).

b) Identify each of the $C_4H_{10}O$ isomers on the basis of their ^{13}C NMR spectra (5 Marks):

i. δ 18.9 ppm CH_3 (two carbons), δ 30.8 ppm (CH) (one carbon), 69.4 ppm (CH_2) (one carbon).

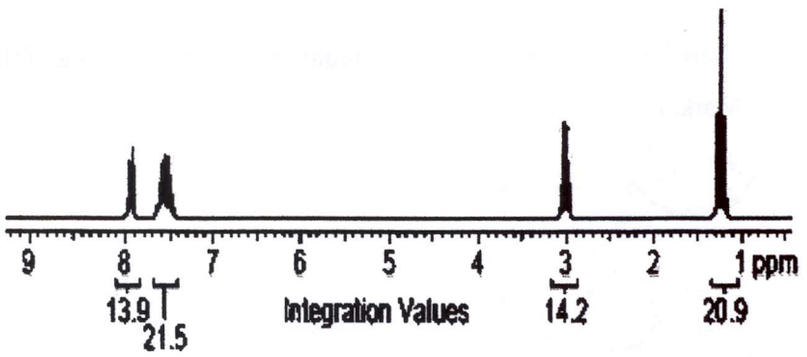
ii. 10.0 ppm (CH_3), 22.7 ppm (CH_3), 32.0 ppm (CH_2), 69.2 ppm (CH).

iii. δ 31.2 ppm (CH_3) (three carbons), 68.9 ppm (C) (one carbon).

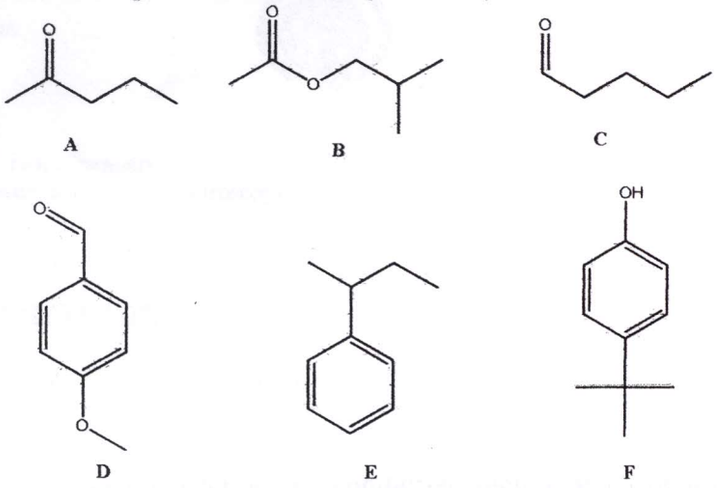
c) What is the term DEPT stands for? (5 Marks)

4.

a) Propose a structure that is consistent with following ^{1}H NMR spectra provided that the molecular formula is $C_9H_{10}O$ (5 Marks):

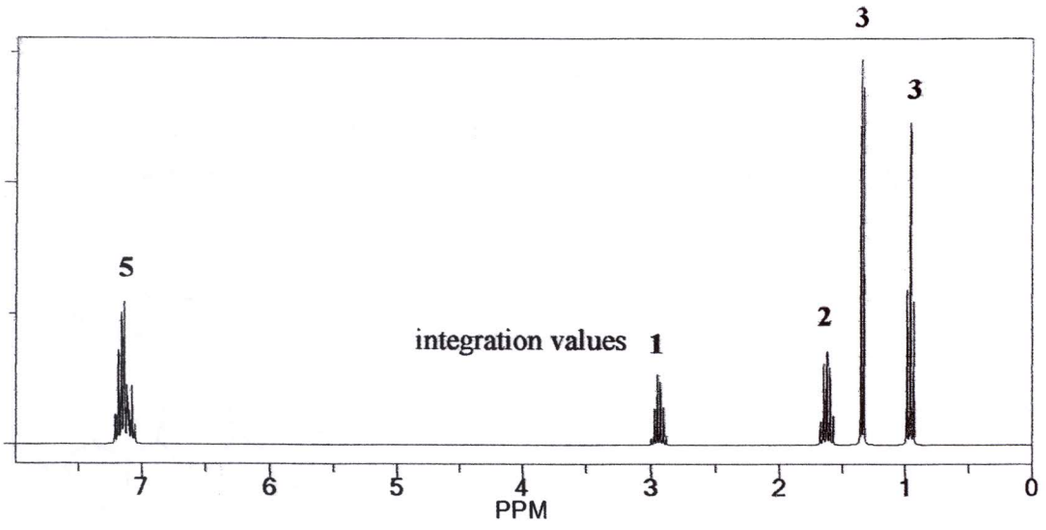


b) Consider the following molecules, **A – F** (10 Marks):



More than one answer may be correct. GIVE ALL CORRECT ANSWERS.

1) Which of the molecules would give four signals in the ^{1}H NMR and five signals in ^{13}C NMR spectrum?
2) Which of the molecules would give four signals in the ^{1}H NMR and six signals in ^{13}C NMR spectrum?
3) Which of the molecules would possess eight signals in ^{13}C NMR spectrum?
4) How many triplet signals would be observed in the ^{1}H NMR spectrum of **C**?
5) Examine the ^{1}H NMR spectrum below. To which of the compounds does it belong?



Examiners

Prof. Dr. Mohamed Abou-Elzahab **Dr. Saad Shaaban**

المستوى الرابع - كيمياء - ل ١٤٤١ الحقر

Mansoura University
Faculty of Science
Chemistry Department
Course: Physical Chemistry
Date: 1/ 01/ 2013

First term Examination
Subject: Chemistry (441)
Fourth level, Chemistry students
Full Mark: 60 Marks
Time Allowed : 2hours

Answer the Following Questions: **(60 marks)**

I. a) Comment on the following rate equations for the surface reaction A + B → C and what is the effect of the heat of adsorption of the different species on the true activation energy for each case ?

i) rate $= k_2 b_A P_A$ **(4 marks)**

ii) rate $= k_2 b_A P_A / b_C P_C$ **(4 marks)**

iii) rate $= k b_A b_B P A P_B$ **(4 marks)**

iv) rate $= k b_A P_A / b_B P_B$ **(4 marks)**

b) The decomposition of diacetone alcohol is catalyzed by OH^{-1} ions. The rate constant is $k_2 = 1.31 \times 10^{11} \exp^{(-9070/T)}$ dm^3 $mole^{-1} s^{-1}$. How long would it take to decompose half of the diacetone alcohol in a solution at 20°c and pH = 11 ? **(4 marks)**

II. a) Offer some general comments relating to both homogeneous and heterogeneous catalysis with respect to each of the following points:

i) use of solvent, ii) separation requirements, iii) catalyst stability, iv) catalyst efficiency and v) selectivity. **(5 marks)**

b) Write what you know about:

i) Catalyst poisoning. **(4 marks)**

ii) Positive , negative and **autocatalyst** catalysts. **(3 marks)**

iii) Catalytic destruction of ozone in the upper atmosphere. (3 marks)

iv) The methods used in the preparation of catalysts. **(5 marks)**

III. a) Why is desorption important for a substance to act as good catalyst? **(2 marks)**

b) What is the role of diffusion in heterogeneous catalysis? **(2 marks)**

c) How does a solid catalyst enhance the rate of combination of gaseous molecules? **(2marks)**

d) The prototropic mechanism for the acid catalyzed reactions and give example for the general acid catalyzed reactions. **(5marks)**

e) Catalase catalyzes $H_2O_2 \rightarrow H_2O + 1/2\ O_2$ with a turnover number of $9 \times 10^6\ s^{-1}$. If H_2O_2 is being produced in a cell at the rate of 10^{-10} mol dm^{-3} s^{-1}, what is the minimum concentration of catalase in the cell required to keep the $[H_2O_2]$ below 10^{-9}M? **(4marks)**

f) Choose the response that best complete each statement: (one mark for each one)

1-In which of the following reactions heterogeneous catalysis is involved?

a) $2SO_{2\,(g)} + O_{2\,(g)} + NO_{2\,(g)} \rightarrow 2SO_3\,(g) + NO_{2\,(g)}$

b) $2SO_{2\,(g)} + Pt_{(s)} \rightarrow 2SO_3\,(g) + Pt_{(s)}$

c) $N_2\,(g) + 3H_{2\,(g)}\ Fe_{(s)} \rightarrow 2NH_{3\,(g)} + Fe_{(s)}$

d) $CH_3COOCH_{3\,(l)} + H_2O_{(l)} + HCl_{(l)} \rightarrow CH_3COOH_{(aq)} + CH_3OH_{(aq)} + HCl_{(l)}$

2-An uncatalysed reaction requires a

a) Higher activation energy b) Lower activation energy

c) Balanced activation energy d) All of these

3- According to adsorption theory of catalysis, the speed of the reaction increases because:

a) adsorption produces heat which increases the speed of the reaction.

b) in the process of adsorption, the activation energy of the molecules becomes large.

c) the concentration of the reactant molecules at the active centers of the catalyst becomes high due to adsorption.

d) adsorption lowers the activation energy of the reaction.

4- The catalytic activity of an enzyme is restricted to its small portion called

a) Active site b) Passive site c) Allosteric site d) All Choices are correct

5- A catalyst is a chemical involved in, but not _____ by, a chemical reaction.

a) Supported b) Changed c) Controlled d) All of these

Examiner: Prof. Dr. Sohier A. El-Hakam.

Mansoura University Faculty of Science Chemistry Department Subject: Chemistry of Dyes Coures(s):Org.Chem.432		1st Term 4th Level Students Date: 5/1/2013 Time Allowed:2 Hours Full Mark: 80 Marks

Answer all questions

(27marks)

1- (A) Choose one best correct answer : **(12 marks)**

i)Alizarine blue is a (vat-direct-mordant)dye
ii)Viscose is a (protein-celluolosic-polyester)fiber
iii)Gluber salt is ($Na_2S_2O_4$- Na_2SO_4-Na_2SO_3)
iv)Terylene is dyed with (direct-disperse-vat) dye
v) Dichlorotriazinyl dyes are a class of (direct-vat-reactive) dyes.
vi) Congo Red is a (disperse-direct-basic) dye.
vii) Terylene is (polyacrylonitrile-polyester-polyamide).
viii) Stabilized diazonium salts are present as ($AlCl_3$-$ZnCl_2$-Cu_2Cl_2) complexes.
ix) Basic dyes are commonly used for (arylic-wool-cotton) fibers.

(B) Put (√) or (X): (15 Marks)

i) Vat dyes are called ingrain dyes.
ii) Acid dyes are commonly used for acrylic fiberes.
iii) Malachite Green is used to prepare Schiff's reagent.
iv) Vat Blue exists in the trans form.
v) Monochlorotrizinyl dyes have moderate reactivity.
vi) Dacron is polyamide.
vii) Alizarine RS is direct dye.
viii) Wool is dyed in acid medium.
ix) Disperse dyes require low temperature.
x) Azoic dyes are the best choice for cotton.
xi) An a auxochrome is a functional group which alters the intensty of absorption of light.
xii) Dyes used for cotton are not suitable for dyeing viscose.
xiii) Disperse dyes are used for hydrophobic fibers.

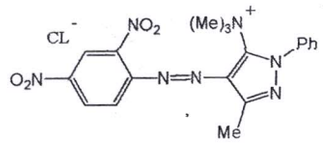
2 -Complete these statements: (26 Marks)

i) .....dyes are water insoluble dyes used for dying hydrophobic fibers.
ii) Stabilized diazonium salts are present as .....complexes.
iii) Dichlorotriazinyl dyes tend to be unstable during.....
iv) Thioindigo Red exists in .....form(s).
v) .....dyes are called ingrain dyes.
vi) Nylon is a.....fiber.
vii) Amordant azo dye has an ..... relative to the azo linkage.
viii) Vinylsulphone dyes are a class of .....dyes.
ix) Although colored the compound, it is useless as a dye for no..... is present.

P.T.O.

x) .....is the ability of a dye to resist fading.
xi) .....is a substance used to fix dyes on fibers.
xii) .....dyes are cationic whereas basic dyes are.....
xiii) Dyes used for .....are convenient for dying viscose.
xiv) .....dyes are the best choice for dyeing cotton.
xv) .....is a regenerated fiber.
xvi) Para Red is an ..... dye.

3. Read carefully the structures drawn (I-XII) then answer only ten of the questions :(27 marks)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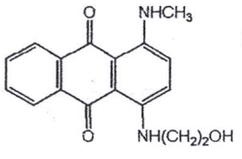
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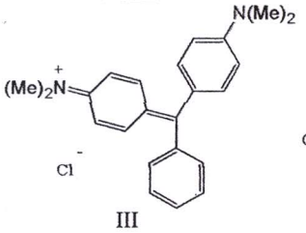
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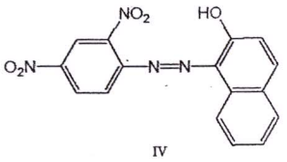
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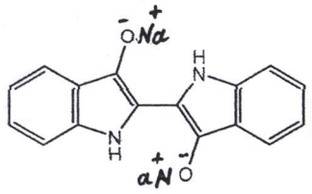
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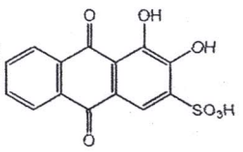
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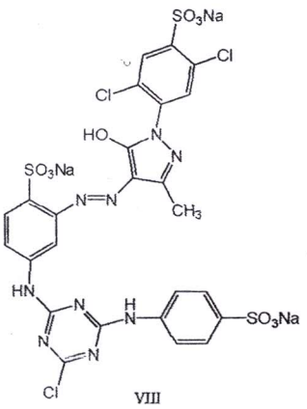
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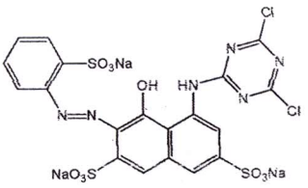
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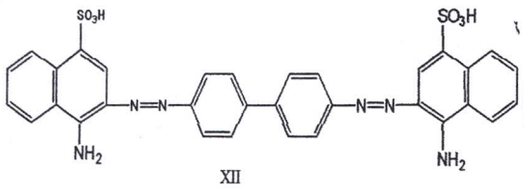
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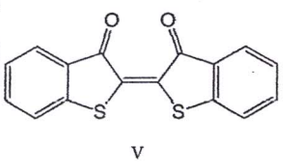
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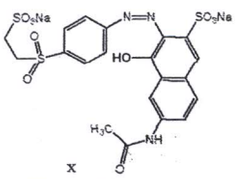
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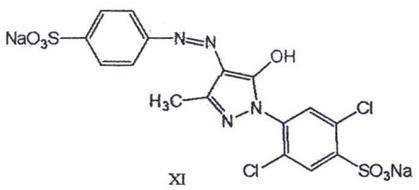
XI

i)Classify each of dyes I,II,IV and XII according to applications
ii)which of these copounds is colorless? Explain
ii)Suggest a synthesis for each of III and V
iv)Briefly, give receipes for dying using each of IV and X
v)Which of these dyes is the best choice for cotton?why
vi)Give names to III and XII
vii)What are the chromophoric systems and auxochromes of VII and VIII?
viii)Classify each of II,III and IX according to consititution
ix)Suggest only one fiber to be dyed by each of I,II and VII
x)Which of these dyes have the highest solubility in water and which is insoluble?
xi)Dye XI is known as Acid Yellow, offer an explanation
xii)Can you classify XIas a reactive dye? why

أ.د. عزالدين قنديل

Mansoura University **Faculty of Science** **Chemistry Department** **Subject: Organic Chemistry (Chem. 433)** **Courses: Chemotherapy&Environmental**		**First Term** **4th level chemistry** **Date: 12/1/2013** **Time allowed: 2 hours** **Full Mark: 80 Marks**

Answer the FOLLOWING questions:

[1] (a) Show a mechanism for the formation of a benzodiazepine 4-oxide from the reaction of a quinazoline-3-oxide with methylamine. [8 Marks]

(b) Explain how each of the following antiviral drugs Aclovir® and Cytosar®, differ from the naturally occurring nucleoside that it most closely resembles. [5 Marks]

(C) Based on the lead compound for the development of cocaine, define the molecular modification and propose a structure for another compound used as anesthetics. [3 Marks]

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

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

I. Penicillin V [5 Marks] II. Iproniazide [3 Marks]
III. Morephazine amide [5 Marks] IV. Sulphaguanidine [3 Marks]

(b) In the reaction $O_2^* + M \rightarrow O_2 + M$, What is "M" and why is it important in some atmospheric processes? What would likely happen to O_3 if "M" were not present? [6 Marks]

[3] (a) **Complete:** [16 Marks]

I. Including water, the five most common gases in the atmosphere listed in decreasing order of their abundance are [1]_____
II. The bottom layer of the atmosphere is the [2]_____ and the next layer up is called the [3]_____
III. The most significant feature of atmospheric chemistry is the occurrence of [4]_____ resulting from the absorption by molecules of [5]_____ designated [6]_____
IV. The single most important reactive intermediate species in atmospheric chemical processes is [7]_____. A related species containing two oxygen atoms is [8]_____
V. The atmosphere is normally at least slightly acidic because of the presence of a low level of [9]_____
VI. More strongly acidic pollutant acids found in the atmosphere are [10]_____
VII. The only water-soluble base present at significant levels in the atmosphere is [11]_____
VIII. The reaction $O_2 + h\nu \rightarrow O + O$ is of particular importance in the stratosphere because it [12]_____
IX. The atmospheric "nonpollutant" species of most concern is [13]_____ because of its potential to cause [14]_____
X. Having absorbed energy from a photon of electromagnetic radiation, loss of energy by a reaction such as $O_2^* \rightarrow O + O$ is known as [15]_____ whereas loss of energy by the immediate emission of light is [16]_____

(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]

Best wishes

Examiner: Dr. Ahmed Fekri

Mansoura University Faculty Of Science Chemistry Department Code: Chem. 442 Subject: Advanced Electrochemistry		First term Fourth level Program: Chemistry Date: Jan. 2013 Time Allowed: 2 Hours Full Mark: 80 Marks

Answer All Questions الأسئلة على الوجهين

First Question: **(20 Mark)**

[A] Complete: **(6 Mark)**

(1) A dull electrodeposit change to bright when adding .....

(2) The presence of indifferent cations such as hydrogen ..... the deposition potential.

(3) The passive film on some metals or alloys could be destroyed if ..... are present in the electrolyte.

(4) The potential at which the active state is re-established is known as ..... or ..... Potential.

(5) Wetting agent is used to prevent .....

[B] Illustrate by diagram the mixed potential theory for determining the corrosion rate and corrosion potential. **(7 Mark)**

[C] Discuss briefly the electrodeposition on plastic. **(7 Mark)**

Second Question: **(20 Mark)**

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

(1) The only environment in E/PH diagram is:
- (i) Ethyl alcohol.
- (ii) Water.
- (iii) Sodium sulphate.

(2) A uniform deposit is formed when:
- (i) The current density passing in the cell is high.
- (ii) The current density passing in the cell is low.
- (iii) The current density is distributed uniformally along the surface of the electrode.

(3) The anodic current in the passive state could be quite high when:

(i) The rate of passive film dissolution is low.

(ii) The rate of passive film dissolution is high.

(iii) The rate of passive film dissolution is nearly zero.

(4) A metal is used as a secrifying anode to protect another metal against corrosion when its equilibrium potential is:

(i) More noble than that of the protected metal.

(ii) Less noble than that of the protected metal.

(iii) Nearly equal that of the protected metal.

[B] Discuss the following:

(i) The different possible cathodic reaction in corrosion. **(7 Mark)**

(ii) The methods used to reduce corrosion according to E/PH diagram. **(7 Mark)**

Third Question: **(20 Mark)**

[A] Give reason: **(6 Mark)**

(1) A surface active substance when added to some electroplating bath give smooth deposit.

(2) A galvanic couple of gold with a corroding metal produces a less severe galvanic effect than coupling with platinum.

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

(4) The corrosion rate of iron $i_{corr(Fe)}$ is more than the corrosion rate of zinc $i_{corr(Zn)}$ under indentical condition while there position in the emf series indicate that zinc has a greater tendency to corrode than iron.

[B] Discuss the electrolysis of aqueous solution of sodium chloride and its molten salt. **(7 Mark)**

[C] Write short notes on anodizing process. **(7 Mark)**

Fourth Question: **(20 Mark)**

Discuss the following:

(i) The equilibrium reaction represented by vertical lines in E/PH diagram. **(6 Mark)**

(ii) The role of anions on the structure of electrodeposited metal. **(8 Mark)**

(iii) The electrochemical principle of corrosion. **(6 Mark)**

With best wishes

Prof. Dr. H. Abd El-Rasoul