الفصل الثاني برنامج الكيمياء كيمياء حيوية (الأحماض الأمينية والبروتينات)

Mansoura University
Faculty of Science
Chemistry Department
Subject: Biochem (279)
Course: Amino acids and proteins

Second Term
Level (2) Biochemistry
Date: June 2010
Time allowed:2 hours
Total Marks: 80 marks

Please: Answer all the following questions.

Question (1) Complete the following spaces with suitable answer.

(20 marks, one mark for each point)

1) Sulpher containing amino acids is……,……...and……..
2) Protein bonds is……..…,……..…..,……..…..,……...and……
3) Zwitter ion means……
4) Transdeamination means……
5) L amino acids oxidase needs ……as a co enzyme, while D-amino acids oxidase needs……..as a co enzyme.
6) In oxidative deamination L- glutamate gives ……. and … by enzyme ……..and needs ……..as a co enzyme
7) Amino acids give α- ketoglutrate are ……,……..,…..…..,……..and……..
8) Amino acids give succinyl –Co A are……..,……..and…..……
9) Serine delaminated to pyruvate by ……
10) Creatine is formed from ....., …. and ….Which need …. to give creatine phosphate

Question(2).which of the following statement is true or false.

(20 marks, one mark for each point)

1) Glycine is formed from serine.
2) Albinism is due to defective in melanin synthesis.
3) Classic PKU is due to a defect in phenylalanine hydroxylase enzyme.
4) Tyrosine is hydroxylated to dihydroxy phenylalanine by tyrosine hydroxylase.
5) Histadine is decarboxylated to histamine by histadine decarboxylase.
6) Melatonin is produced from N-acetylation of serotonin..
7) Lysine is the precursor of carnitine.
8) Deficiency of tryptophan lead to deficiency of nicotinic acid.
9) Insulin is inactivated by hepatic glutathione insulin trans hydrogenase.
10) Glutamine is hydrolysed to glutamate and NH3 by glutaminase enzyme.

Question (3). Compare between the following with special reference to biosynthesis and structure **(40 marks, 10 marks for each point)**

a) Urea cycle & glucose alanine cycle
b) Phenyl ketonuria & Alkaptonuria
c) Polyamines & Catecholamines.
d) Skatole & Indole

Good luck
Prof.Dr. El Said El Sherbini

المستوى الثانى
برنامج كيمياء - كيميا فيزيائية للسوائل والمحاليل

Mansoura University **Faculty of Science** **Chemistry Department** **Subject :Physical Chemistry** **Course(s):** Physical Chemistry of Solutions	كلية العلوم جامعة المنصورة	**First Term** **Date : June - 2010** **Time Allowed : 2 hours** **Full Marks : 60 Marks**

Answer the following questions :

1-a) Expllain the following :

Partial molar quantities – Gibbs Duhem equation and free energies of components of a solution. (7.5 marks)

b) The vapour pressure of pure water at 25°C is 3.12×10^{-2} atm. What is the vapour pressure of a 100 gram sample of water in which 28 gram of sucrose. $C_{12}H_{22}O_{11}$, is dissolved?
(M.W: H =1, C =12 and O =16) (7.5 marks)

2- a)Write shortly on the different colligative properties of solutions. (7.5 marks)

b) The boiling point of benzene is raised from its normal value 80.1 to 82.4°C by the addition of 15 gram of biphenyl $C_6H_5C_6H_5$ to 100 gram of benzene. What are the boiling point elevation constant and the heat of vaporization of benzene. (7.5 marks)

3- a)Explain three different applications of conductance measurements. (7.5 marks)

b) At 300 K,the equivalent conductance at infinite dilution of KCl , KNO_3 and $AgNO_3$ are 149×10^{-4}, 145×10^{-4} and 133×10^{-4} $Ohm^{-1}.m^2.eq^{-1}$. Calculate the equivalent conductance of AgCl at infinite dilution.. If the conductivity of saturated solution of AgCl at this temperature is 1.887×10^{-4} Ohm^{-1}, calculate the solubility and solubility product of AgCl.

(7.5 marks)

4- a) Write on the transference number and its methods of determination . (7.5 marks)

b) In moving boundary experiment for 0.1 M KCl solution and by using LiCl as indicator solution, 0.007 Ampere current was passed for 30 minutes. The moving boundary moves 6 cm in capillary tube with area 0.12 cm^2, calculate the transference numbers for cation and anion.

(7.5 marks)

المستوى الثاني - كيميا - ميكانيكية التفاعلات العضوية - [illegible]

Mansoura University Faculty of Science Chemistry Department Subject: Chemistry Course(s): Chem.233 Physical Organic Chemistry II		Second Term 2^{nd} Level Chemistry Students Date: May, 2010 Time Allowed: 2 Hours Full Mark: **60** Marks

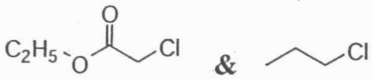
Answer Three Questions only, Each Question = 20 Marks

Q. 1: In each of the following pairs of compounds decide which member that fits the description. Explain your answer **(Each one 2.5 Marks)**

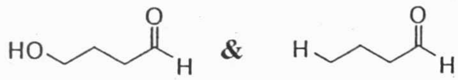
i– More reactive toward nucleophilic addition

ii- Has lower PKb value

iii- Form more stable yilde with Ph_3P/Bu-Li



iv- Form cyclic acetal with CH_3OH/H^+

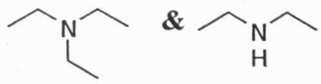


v- More reactive toward acyl substitution addition

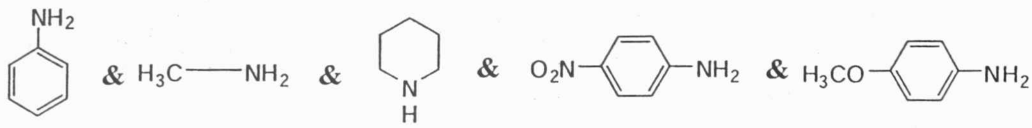
vi- Form stable hydrate

vii- More suitable for synthesis of 3° alkyl ester

viii- Much stronger base in H_2O



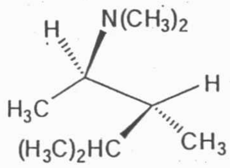
Q. 2: **a**- Arrange the following in order of decreasing with respect to their basic strength. Explain. **(4 Marks)**



b) Draw the structure of the major product(s) when the isomer of the amine **I** is treated with: **(6 Marks)**

i- An excess of CH_3I, then Ag_2O, then heated

ii- MCBPA and then heated

I 

c) For the reaction of aldehydes and ethanol in acid medium, the results shown in the table are obtained:

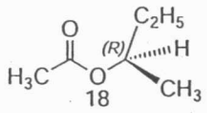
$$R\text{-}CHO + 2\ C_2H_5OH / HCl_g \longrightarrow RCH(OC_2H_5)_2$$ **(6 Marks)**

R	CH_3	$(CH_3)_2$-CH	$(CH_3)_3C$	C_6H_5
% Yield of product (%)	78	71	56	39

i- Write the steps involved in the formation of the product

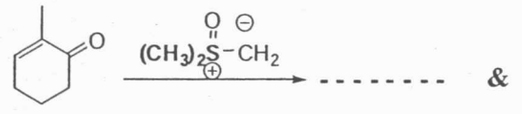
ii- Explain the difference in percent conversion of aldehydes to the product as shown in the table.

d) Suppose we have pure (*R*)-2-butyl acetate shown below that has been labeled with the heavy ^{18}O isotope. Draw a mechanism for the hydrolysis of this compound under basic conditions (NaOH). Predict which of the products will contain the ^{18}O label. Also predict whether the 2-butanol produced will be pure (*R*), pure (*S*).

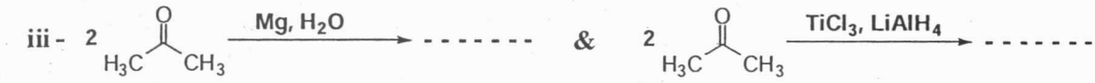


(4 Marks)

Q. 3: For each of the following reactions pair, complete, discuss the reaction mechanism and compare the difference in reactivity **(Each one 5 Marks)**

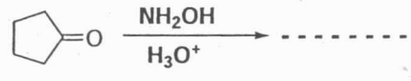
i - 

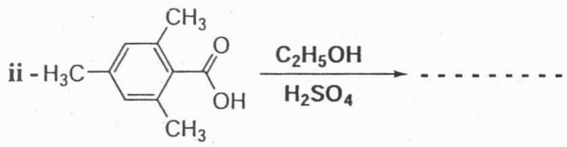
ii - 

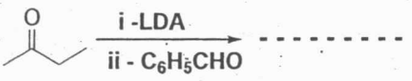
iii - 

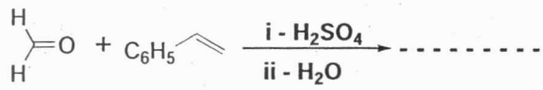
iv - 

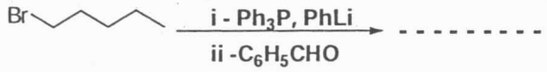
Q. 4: Give the structure of the product(s) for the following reactions. ***Please do not forget to draw out the reaction mechanism.*** **(Each one 2.5 Marks)**

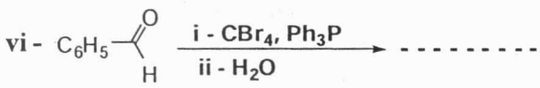
i - 

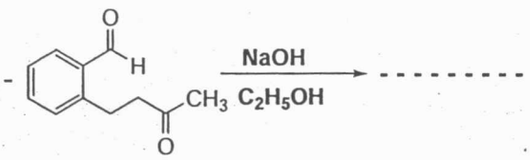
ii - 

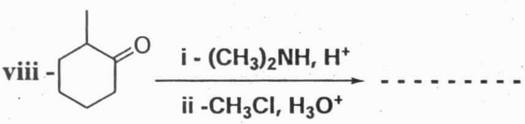
iii - 

iv - 

v - 

vi - 

vii - 

viii - 

Good Luck

Examiners: Prof. Dr. S. Elmorsy ***Prof. Dr. M. Abdel-Mogibe***

Dr. M. Elfedawy ***Dr. Ebrahim Abdel-Galil***

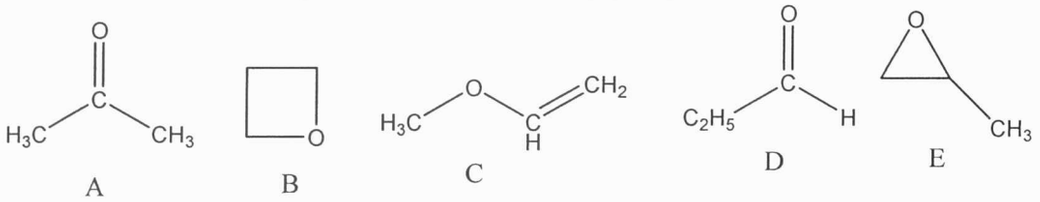
المستوى الثالث - برنامج كيمياء
كيمياء (اختياري)

Mansoura University
Faculty of Science
Dept. of Chemistry
Course Code and Title: Chem 234
Spectroscopy I

Second Semester (May 2010)
Final Exam
2nd level Chemistry Programme
Time allowed: 2 hours
Full Mark: 4x20= 80

Answer The Following Questions

1) Three C_3H_6O isomers have the spectroscopic properties given below. Select the most likely structure for each from the compounds in the following group:



A B C D E

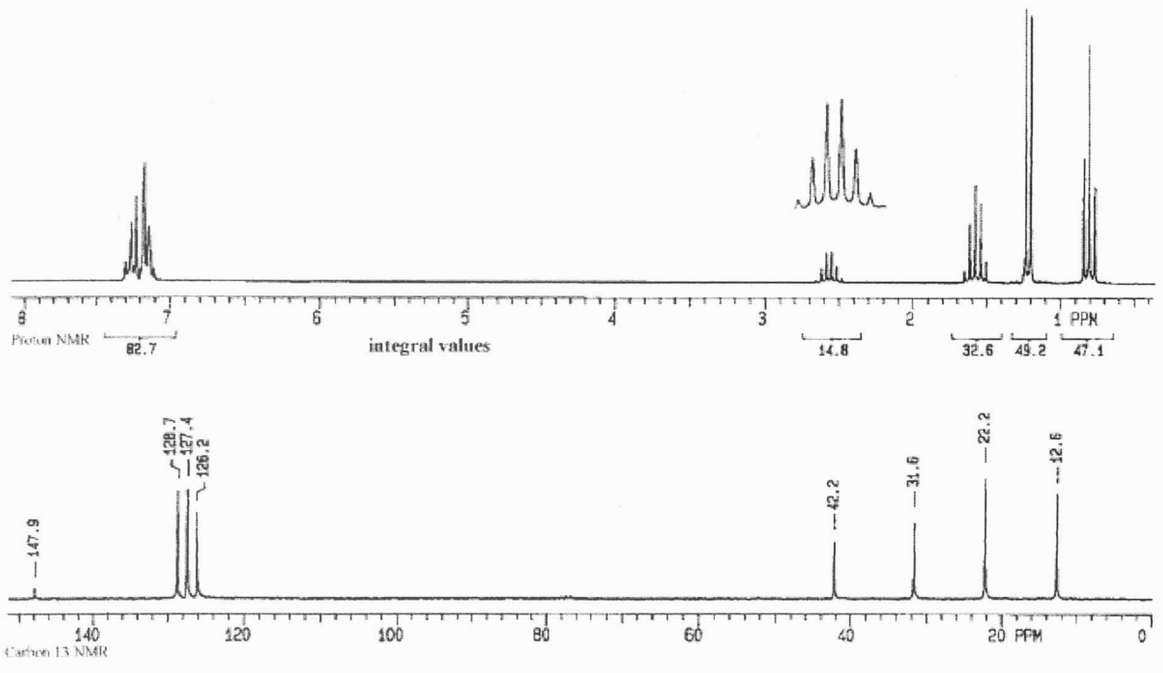
(i) One ^1H nmr signal; infrared absorption at 2900 and 1715 cm^{-1} (6 *marks*)

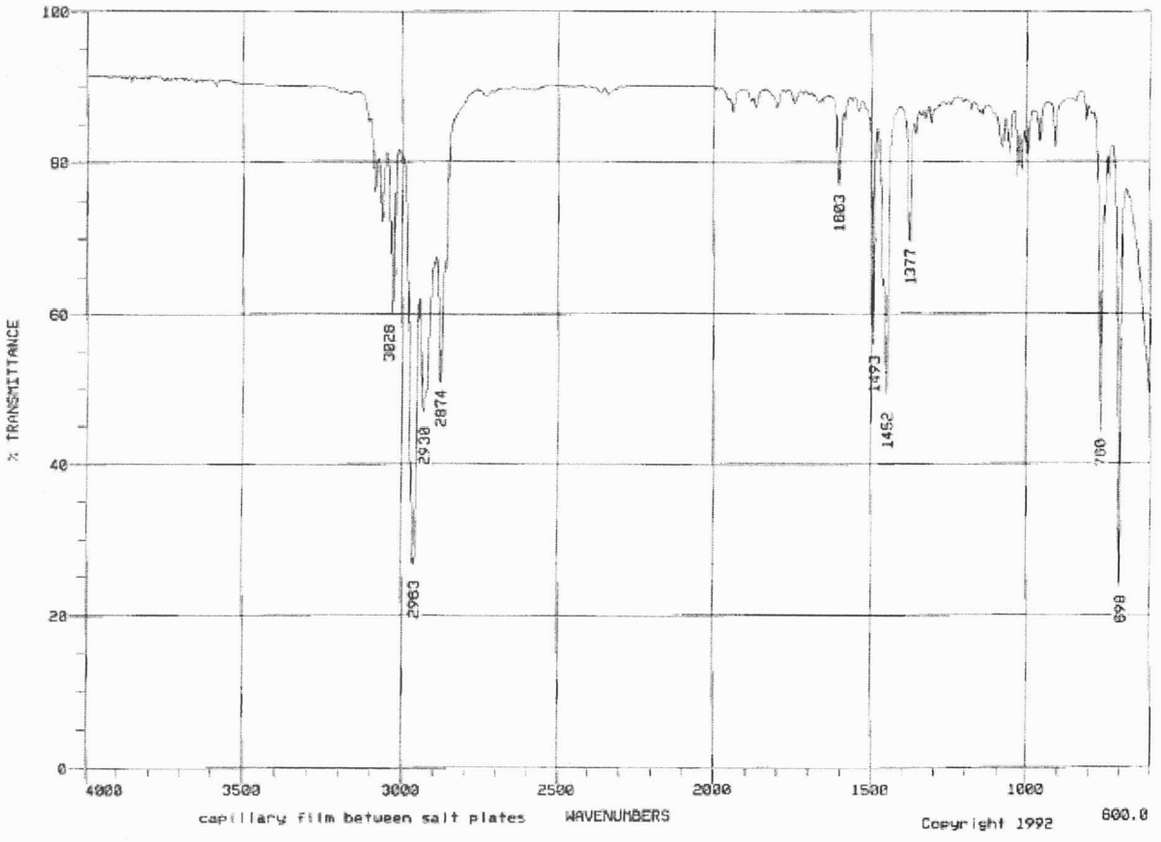
(ii) Three ^{13}C nmr peaks (two at δ >100 ppm); infrared absorption at 3100, 2900, 1650 & 1100 cm^{-1} (7 *marks*)

(iii) Three ^{13}C nmr peaks (one ca. δ 200 ppm); Three ^1H nmr signals (one near δ 9.0 ppm) (7 *marks*)

2) A $C_5H_{12}O_2$ compound has strong infrared absorption at 3300 to 3400 cm^{-1} The ^1H NMR spectrum has three singlets at δ 0.9 , δ 3.45 and δ3.2 ppm; relative areas 3:2:1. The ^{13}C NMR spectrum shows three signals all at higher field than 100 ppm. Discuss the spectra suggesting a structure for this compound. (20 *marks*)

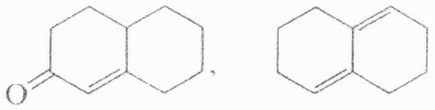
3) A $C_{10}H_{14}$ compound has the following ^1H NMR, ^{13}C NMR and IR spectra. Discuss the spectra suggesting a structure for this compound. (20 *marks*)





4) **(i)** Which of the following pairs of compounds could probably be distinguished from each other by their uv spectra? Explain. (8 *marks*)

(a) $CH_3CO_2CH_2CH_3$, $CH_3CH_2CO_2CH_3$

(b) 

(c) $CH_3CH{=}CHCH_2\overset{\overset{O}{\|}}{C}CH_3$, $CH_3CH_2CH{=}CH\overset{\overset{O}{\|}}{C}CH_3$

(d) 

(ii) Predict the *m/e* values for the products of the McLafferty rearrangement of **three of the following** compounds: (12 *marks*)

(a) $CH_3CH_2CH_2\overset{\overset{O}{\|}}{C}CH_3$ (b) $CH_3\overset{\overset{CH_3}{|}}{C}HCH_2\overset{\overset{O}{\|}}{C}H$

(c) $CH_3\overset{\overset{O}{\|}}{C}OCH_2CH_2CH_3$ (d) $(CH_3)_2CHCH_2\overset{\overset{O}{\|}}{C}OCH_2CH_3$

Good Luck

Prof. Dr. Mamdouh Abdel-Mogib

المستوى الثانى - برنامج كيمياء - كيمياء الكم (فيزيائية)

Mansoura University
Faculty of Science
Chemistry Department
Subject: physical chemistry
Course: **Quantum chemistry**
Course code: Chem. 244

Second term
Second level(Chemistry students)
Date: June 2010
Time allowed: **2** hours
Full Mark: **80** Marks

Answer the Following Questions

Q1) 1) When a metal surface is irradiated by light of wave length **4 Å** the stopping potential found to be **0.5eV**. Calculate the work function and the threshold frequency that characterize this metal. **[8 Marks]**

2) Calculate the minimum basis set that could be used to build the molecular orbitals for the following molecules.

a) NH_3 **b)** CH_3OH **[8Marks]**

3) A monochromatic X-ray beam whose wave length is **0.558 Å** is scattered through an angle of **46°**. What is the wave length of the scattered beam? **[8 Marks]**

Q2) 1) Explain very briefly the following:

i-Two operators do commute with each other. **[4 Marks]**

ii-The Hamiltonian operator is hermitian. **[4 Marks]**

2) State the **Heisenberg uncertainty principle** and explain it **from the quantum mechanics point of view**. **[8Marks]**

3) For a photon with momentum **2.4×10^{-19}** gm cm/sec , calculate the **wave length and the energy** of this photon. **[8 Marks]**

4) Write the secular equations and the secular determinant for the **ethylene**($CH_2=CH_2$) molecule. **[8 Marks]**

Q3) 1) For the $^{1}H^{35}Cl$ molecule:

Calculate the **first four rotational energy levels** and the **first four vibrational energy levels** and comment on the separation between these rotational and the vibrational energy levels. **[8 Marks]**

2) For the butadiene molecule ($CH_2=CH-CH=CH_2$) and on basis of a particle in a one-dimensional box, calculate the **energy difference** between the **HOMO and LUMO** knowing the **C-C** bond distance is **1.39×10^{-10} m** **[8 Marks]**

(mass of the electron $m_e=9.1\times10^{-31}$ kg, $h=6.62\times10^{-34}$ j.s)

3) i- what are the possible total angular momentum values of the corresponding **Z-component** value for the orbital

a) 3d **b) 2p** **[4 Marks]**

ii-Predict the Hamiltonian operator for the following:

a) H_2^+ Molecular ion **b) He** atom **[4 Marks]**

Best wishes, **Dr. Ahmed El Defrawy**

المستوى الثاني رياضيات بحتة (ر ٢٠١)   برامج (ك - ك ح - ك ن - ك ح ب - ميكرو - ك ح ع - علوم بيئة - ج)

الفرقة: الثانية المادة: ر ٢٠١ – رياضيـــات بحتة (تفاضل عالي ومعادلات تفاضلية)	كلية العلوم – قسم الرياضيات	دور مايو ٢٠١٠ الزمن: ســــــاعتان التاريخ: ٢٠١٠/٦/١٧

الشُعب : كيمياء-كيمياء حيوية-كيمياء ونبات-ميكروبيولوجيا-كيمياء وحيوان-علوم البيئة -جيولوجيا

أجب على الأسئلة الآتية: (٢٠ درجة لكل سؤال)

[1]أ اختبر وجود النهايات المتكررة و النهاية العامة للدالة $f(x,y)=\dfrac{x^2-y^2}{x^2+y^2}$ ، وذلك عندما $(x,y)\to(0,0)$

ب. باستخدام نظرية أويلر للدوال المتجانسة اثبت أنه إذا كانت $u(x,y)=\tan^{-1}\left(\dfrac{x^3+y^3}{x-y}\right)$

، فإن : $x u_x + y u_y = \sin 2u$.

[2] حقق نظريـــــة "جرين" للتكامل : $\oint_c (x^2-y)\,dx+(x-y^2)\,dy$ حيث c هو المنحنى المحصور بين المستقيم $y=x$ و القطع المكافئ $y^2=x$ مأخوذاً في الاتجاه ضد عقارب الساعة .

[3]أ. إذا كان $I_n=\int_0^{\pi/2}\sin^n x\,dx$ ، فاثبت أن: $I_n=\dfrac{n-1}{n}I_{n-2}$, $(n=2,3,4,\dots)$ ،

ومن ثم استنتج قيمة التكامل: $\int_0^{\pi/2}\sin^6 x\,dx$.

ب. حل مسألة الشروط الابتدائية: $xy'-y^2=1$, $y(1)=1$.

[4] حل المعادلات التفاضلية الأتية :

(i) $\ln(y^2+1)\,dx+\dfrac{2y(x-1)}{y^2+1}\,dy=0$

(ii) $4xy'-y=4xy^5\ln x$

مع التمنيات بالتوفيق ?