



Handwritten Arabic text: 'كلية العلوم' and 'جامعة طنطا'.

PLEASE ANSWER THESE QUESTIONS

1-: Complete the following sentences.

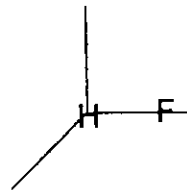
(40 marks)

1. If a catalyst lowers the activation energy, it is called catalyst and the phenomenon is called
2. The possible structures of micelle are spherical, and
3. adsorbent will tend to adsorb adsorbates weakly.
4. and are examples of surface tension.
5. is defined as the phenomenon involving the precipitation of a colloidal solution on addition of
6. catalytic reactions can be explained on the basis of intermediate compound formation.
7. In adhesional wetting, the area of liquid-gas interface
8. is the application of pressure or suction to force the solvent and small particles across a membrane.
9. is the pH at which the surface possesses zero surface charge.
10. The extent of adsorption increases with in pressure .
11. From potential energy curves the is a most important feature for chemisorption.
12. is the ability of catalysts to direct reaction to yield particular products.
13. Polar solutes will tend to be adsorbed strongly from solvents.
14. When the support is suspended in a volume of the solution of the active precursor larger than the pore volume of the support, the process is called
15. If the interfacial tension between two liquids is reduced to a sufficiently low value on addition of a surfactant will readily take place.
16. Sea water looks blue due to by the colloidal impurities present in sea water.
17. Increasing, the hydrophobic unit of the surfactant molecules lowers the CMC. This is probably the result of
18. Beyond CMC, the surface tension of surfactant solution
19. The activity of iron catalyst is destroyed by the presence of in the synthesis of ammonia by Haber's process.
20. The surface tension of a liquid γ is defined as



- I- Using the data of the matrix, Draw the correlation diagram for the formation of HF molecule. Show the type of overlap, hybridization and electronic distribution in each molecular orbital. (At.No. H=1, F=9) (10 Marks)

	1	2	3	4	5
2s	0.8	0.5	0.0	0.0	-0.2
2p _x	-0.2	-0.7	0.0	0.0	-0.8
2p _y	0.0	0.0	1.0	0.0	0.0
2p _z	0.0	0.0	0.0	1.0	0.0
1s _H	0.1	0.5	0.0	0.0	-1.0



- b- Explain the bond between the H and F atoms. (2 Marks)
- c- Define the HOMO and LUMO orbitals and the importance of the difference between them. (2 Marks)
- d- Explain the effect of hybridization on the overlap. (2 Marks)
- e- Differentiate between non-bonding and bonding overlaps in HF molecule. (2 Marks)
- f- Define the electronic excitations in HF molecule. (2 Marks)
- II- Explain the relation between each of the following: (20 Marks)
- The Hamiltonian operator and the wave function.
 - The bond order and overlap.
 - The angular momentum quantum number and the shape of orbitals.
 - The Eigen value of Harmonic oscillator and principle quantum number.
 - The effect of light and σ and π -electrons in N₂ molecule.
- III- Explain, why? (20 Marks)
- Wave function has a complex conjugate.
 - σ overlap is stronger than π overlap.
 - Variables of the wave function of H-atom can not be separated.
 - Principle quantum number (n) will not equal zero for a particle in box.
 - Beryllium will not exist as a molecule.

- IV- a- From Symmetry of molecules; Differentiate between symmetry elements and symmetry operations. (5 Marks)

- b- For the linear molecule, $O=C=O$, Define symmetry elements and symmetry operations (15 Marks)

- V- Complete the multiplication Table for H₂O molecule. (20 Marks)

	σ_2	σ_1	C ₂	E
σ_2	E	C ₂		σ_2
σ_1	C ₂		σ_2	σ_1
C ₂		σ_2	E	
E			C ₂	

Good Luck

Prof. Dr. Mohamed K. Awad



COURSE TITLE:	Physical Organic Chemistry	COURSE CODE:	CH 3113
DATE:	JANUARY, 2017	TERM:	FIRST
TOTAL ASSESSMENT MARKS:		100	
TIME ALLOWED:		2 HOURS	

Answer the following questions:

1-Mark (✓) for the correct and (X) for the wrong statements. Please correct the wrong one. [10Marks].

- Ionization of p-substituted phenols in water at 25 °C is the standard reaction for evaluation of σ^+ constants.
- Aromatic molecules must have 4n number of electrons in the π cloud (with n an integer).
- Methyl radical is stabilized radical.
- Cyclobutadiene is an aromatic compound.
- Hammett reaction constant (ρ) is independent on the nature of the chemical reaction as well as the reaction conditions.

2- Which of the following carbocations are likely to rearrange?

(explain your answer). [6Marks].

- CH_3^+CH_2
- $\text{CH}_3\text{CH}_2^+\text{CH}_2$
- $(\text{CH}_3)_3\text{C}^+\text{CHPh}$
- $(\text{CH}_3)_3\text{C}^+$
- $(\text{CH}_3)_3\text{C}^+\text{CHCH}_3$

3- Complete the following equations: [5Marks].

- $\text{PhCO-OO-COPh} \xrightarrow{\text{heat}}$
- $\text{PhCH}_2\text{CH}_3 + \text{Br} \rightarrow$

4- Indicate which of the following is (are) aromatic, homoaromatic, nonaromatic or antiaromatic : (explain your answer). [10Marks].

- Cyclopropenyl cation.
- [18] Annulene.
- Cyclooctatrienyl cation.
- Cyclooctatetraene.
- cyclopentadienyl anion.

5- Explain with equations: [5Marks].

A mixture of two isomeric ethers is obtained from $\text{S}_{\text{N}}1$ solvolysis of 3-chloro-1-butene in ethyl alcohol.

6- Indicate the sign of σ for each of the following substituents

(explain your answer): [10Marks].

- m- OCH_3 , p- OCH_3 , p- NO_2 , m- NO_2 , p- $(\text{CH}_3)_3\text{C}$ -

7- Discuss in details the reactions of free radicals. [6Marks].

باقي الأسئلة في خلف الورقة



Tanta University
Faculty of Science
Department of Chemistry

Final Exam. for 3rd year students (General)

Quantum Chemistry

Course Code: CH3141

Jan.4th 2017 Term: First Total Assessment Marks: 50

Time Allowed: 2 Hours

Answer the following questions:

I- On the basis of molecular orbital theory sketch the correlation diagram for the formation of NH₃ molecule. Show the different types of overlap and the electronic distribution for each atomic and molecular orbital. **(12 Marks)**

ATOM	X	Y	Z	N	EXP	S	COUL	N	EXP	P	COUL
N 1	.00000	.00000	.00000	2	1.6237	-19.0000	2	1.6170	-14.0000		
H 2	1.50000	.00000	-1.00000	1	1.2000	-13.0000	0	.0000	.0000		
H 3	.00000	.00000	1.50000	1	1.2000	-13.0000	0	.0000	.0000		
H 4	-1.50000	.00000	-1.00000	1	1.2000	-13.0000	0	.0000	.0000		

DISTANCE MATRIX

	1	2	3	4
1	.0000	1.5000	1.5000	1.5000
2	1.5000	.0000	.0000	.0000
3	1.5000	.0000	.0000	.0000
4	1.5000	.0000	.0000	.0000

ENERGY LEVELS (EV)

E(1) =	16.00000	0
E(2) =	10.00000	0
E(3) =	7.00000	0
E(4) =	-14.00000	2
E(5) =	-17.00000	2
E(6) =	-23.00000	2
E(7) =	-30.00000	2

ENERGY= -131.90074095 EV.

MO'S IN COLUMNS, AO'S IN ROWS

	1	2	3	4	5	6	7
1	1.2000	.0000	.0000	.0000	.0000	.0000	-6009
2	.0000	.0000	1.0000	.0000	-5000	.0000	.0000
3	.0000	.0000	.0000	-1.0000	.0000	.0000	.0000
4	.0000	-1.0000	.0000	.0000	.0000	.6000	.0000
5	-.7000	-.2000	-.9000	.0000	-.4000	-.3000	-.2000
6	-.7000	.8000	.0000	.0000	.0000	.5000	-.2000
7	-.7000	-.7000	.6000	.0000	.4000	-.2000	-.2000

REDUCED OVERLAP POPULATION MATRIX, ATOM BY ATOM

	1	2	3	4
1	3.9387	.7613	.7613	.7612
2	.7613	.0193	-.0267	-.0067
3	.7613	-.0267	.0092	-.0067
4	.7612	-.0267	-.0267	.0192

ATOM NET CHG. ATOMIC ORBITAL OCCUPATION

ATOM	NET CHG.	S	X	Y	Z
N 1	-.08064	1.12890	.97589	2.00000	.97586
H 2	.02683	.97317			
H 3	.02689	.97311			
H 4	.02693	.97307			



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H 3	.00000	.00000	1.50000	1	1.2000	-13.0000	0	.0000	.0000		
H 4	-1.50000	.00000	-1.00000	1	1.2000	-13.0000	0	.0000	.0000		

DISTANCE MATRIX

	1	2	3	4
1	.0000	1.5000	1.5000	1.5000
2	1.5000	.0000	.0000	.0000
3	1.5000	.0000	.0000	.0000
4	1.5000	.0000	.0000	.0000

ENERGY LEVELS (EV)

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E(5) =	-17.00000	2
E(6) =	-23.00000	2
E(7) =	-30.00000	2

ENERGY= -131.90074095 EV.

MO'S IN COLUMNS, AO'S IN ROWS

	1	2	3	4	5	6	7
1	1.2000	.0000	.0000	.0000	.0000	.0000	-6009
2	.0000	.0000	1.0000	.0000	-5000	.0000	.0000
3	.0000	.0000	.0000	-1.0000	.0000	.0000	.0000
4	.0000	-1.0000	.0000	.0000	.0000	.6000	.0000
5	-7000	-2000	-9000	.0000	-4000	-3000	-2000
6	-7000	.8000	.0000	.0000	.0000	.5000	-2000
7	-7000	-7000	.6000	.0000	.4000	-2000	-2000

REDUCED OVERLAP POPULATION MATRIX, ATOM BY ATOM

	1	2	3	4
1	3.9387	.7613	.7613	.7612
2	.7613	.0193	-.0267	-.0067
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4	.7612	-.0267	-.0267	.0192

ATOM NET CHG. ATOMIC ORBITAL OCCUPATION

ATOM	NET CHG.	S	X	Y	Z
N 1	-.08064	1.12890	.97589	2.00000	.97586
H 2	.02683	.97317			
H 3	.02689	.97311			
H 4	.02693	.97307			

Answer the following questions :

1] a- Write short note on the following:

- i) Kerosine zone
- ii) API – Gravity
- iii) Defects of inorganic hypothesis
- iv) Heavy gas oil zone
- v) Aniline point and quality of crude oil.

b- Hydrogen sulphide gas is one of the most poisonous gases, show with equations the petrochemical reactions of this gas.

(20 marks)

2] Show with equations how the following compounds were obtained from petroleum.

- i) Ethylene glycol
- ii) Teflon
- iii) Adipic acid
- iv) Nylon 6,6 and nylon 4,6.
- v) Linear alcohols.
- vi) DDT
- vii) Hydrazine
- viii) Ammonia nitrate fertilizer
- x) Urea
- xi) Black carbon

(20 marks)

3] Discuss the following :

- i) Pour point
- ii) Gasoline zone.
- iii) Olefins in crude oil.
- iv) CI-Index
- v) Caprolactam production from petroleum.

(10 marks)



TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF CHEMISTRY
EXAMINATION FOR THIRD LEVEL STUDENTS – CHEMISTRY SECTION

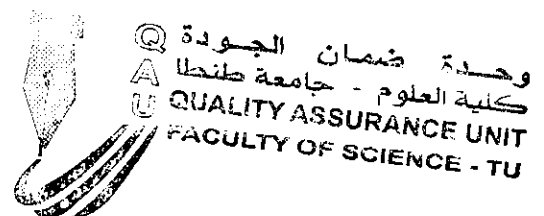
COURSE TITLE: INSTRUMENTAL ANALYSIS II COURSE CODE: CH3109
DATE: JAN., 21, 2017 TOTAL ASSESSMENT MARKS: 150 TIME ALLOWED: 2 HOURS


Answer the following questions:

- 1- Give reasons for; (5 marks for each)**
- (i) The chromatogram is an important term in analytical chemistry.
 - (ii) In liquid chromatography, peak resolution depends mainly on the properties of both stationary and mobile phase.
 - (iii) Dilatometry is a suitable technique for testing of the mechanical properties of materials.
 - (iv) The properties of both analyte and resin affect the sensitivity of IEC.
 - (v) The nature of stationary phase and pH of the buffer affect separation by electrophoresis.
 - (vi) Thermo-analytical techniques are good techniques for controlling quality of foods and polymers.
 - (iv) Gel exclusion is a good chromatographic technique for determination of molecular weights of bio-macromolecules.
- 2- (a) A GC separation was conducted on a sample containing polyhalogenated compounds, what detector is recommended? and how you can identify and estimate these analytes. (15 marks)**
- (b) Enumerate procedures for separation and estimation of RNA & DNA mixture using low voltage electrophoresis. (15 marks)**
- 3- (a) What are the requirements of normal phase HPLC technique? Sketch a block diagram for Such technique. (10 marks)**
- (b) Explain the effect of gas atmosphere on the thermal decomposition of CaCO_3 , refer to the principle of the used technique. (15 marks)**
- (c) Sketch a well labeled GC chromatograph, referring to the basis of separation in GLC. (10 marks)**
- (d) Explain how HPLC improve column resolution. (10 marks)**
- 4- (a) Illustrate with graphs how you can identify and estimate o- and p-aminobenzoic acid in a mixture separated by ascending TLC. (15 marks)**
- (b) Discuss one application for GC in food and pharmaceutical industries. (10 marks)**
- (c) Enumerate the procedures of separation of samples mixture by using two dimensions TLC. (15 marks)**

(Wishing you all success)

EXAMINERS	PROF. TAREK A. FAYED
	PROF AHMED F. REHAB

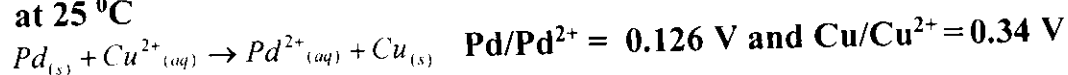


	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY			
	EXAMINATION FOR THIRD YEAR-STUDENTS OF CHEMISTRY			
	COURSE TITLE:	electro chemistry		Course code CH3105
DATE: 11 - 1- 2017	JAN, 2017	TERM: FIRST	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS

Answer the following questions:

- 1) Draw the following diagrams: (30 Marks)
 a- metal-metal ion electrode
 b- gas-ion electrode
 c- Metal-insoluble-salt anion electrode .

- 2) Calculate the equilibrium constant for the following reaction (20 Marks)
 at 25 °C



- 3) Select the right answer of the following (50 Marks)

- a) When Cu (II) is reduced to Cu the oxidation number is
 1- 0 2- 1 3- 2 4- -1
- b) Car battery is a(n) cell
 1- electrolytic 2- voltaic 3- secondary galvanic 4- primary galvanic
- c) Salt bridge contains solution
 1- $Mg(NO_3)_2$ 2- KNO_3 3- $NaNO_3$ 4- $LiNO_3$
- d) The value and sign of electrode potential al depends on
 1- nature of metal 2- current 3- cathode 4- anode
- e) The end of the battery is called anode
 1- positive 2- bottom 3- neutral 4- negative

- 4) Correct the following sentences (50 Marks)

- a) When Manganese ion changes from oxidation number of +2 to +7, Mn^{2+} must lose 3 electrons.
- b) The H_2-O_2 fuel cell is a flow battery and is a secondary galvanic cell ..
- c) When molten NaCl is electrolyzed the product at anode is hydrogen
- d) In a car battery the anode is PbO_2 and the electrolyte is HNO_3 ..
- e) Zn/Zn^{2+} is a gas -anion electrode .

Good luck

EXAMINER	PROF. DR. YOUSSEF MOHARRAM
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