




## المستوى الثالث كيمياء/ميكرو

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY			
	FINAL EXAMINATION FOR ALL DOUBLE MAJOR THIRD LEVEL STUDENTS			
COURSE TITLE:	(Coordination Chemistry)		COURSE CODE: CH3246	
DATE:	1, JUNE 2017	TERM: SECOND	TOTAL ASSESSMENT MARKS 50	TIME ALLOWED: 2 HOURS

**Answer the following Questions:**

1-) For each complex define the following: (Total marks 20)

- |   |  |
|---|--|
| 1- Name   | 2- The type of isomerism                           |
| 3- The type of hybridization                                | 4- Calculate the magnetic moment                   |
| I-) $[\text{Mn}(\text{H}_2\text{O})_6]\text{Cl}_2$ (5marks) | II-) $\text{K}_2[\text{Zn}(\text{CN})_4]$ (5marks) |
| III-) $\text{K}_2[\text{Ni}(\text{NO}_2)_4]$ (5marks)       | IV-) $\text{Na}_3[\text{CoCl}_6]$ (5marks)         |

2-) A-) Iron ion forms an inner diamagnetic complex ion containing the cyano ligand.

Derive the formulae of the complex. (4marks)

B-) Discuss the effect of central metal ion and its charge on  $\Delta_o$  value. (4marks)

C-) Manganese (II) ion forms inner complex ion with cyano ligands. Calculate the magnetic moment value of the complex. (4marks)

D-) Discuss the hydration isomerism with example. (3marks) (Total marks 15)

3-) A-) Write full account on Jahn-Teller effect with examples (5marks)

B-) What is the formula of the following complex: (2marks)  
Tetrammine copper (II) hexachloro copperate (II)

C-) For the two complexes: 1-) Hexammine cobalt(III) chloride (8marks)

2-) Potassium hexacyano ferrate (II)

a-) Draw the d-orbital splitting indicate the number of electrons in  $t_{2g}$  and  $e_g$


b-) Calculate the CFSE value and magnetic moment for each complex. (Total marks 15)

Note : (Atomic number for Mn 25, Fe 26, Co 27, Ni 28, Cu 29 & Zn 30)

**Good Luck**

Examiners: Prof. Dr : Kamal Elbaradie, Prof. Dr: Ekhlas Abd Elhay



	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY INORGANIC CHEMISTRY		
	COURSE TITLE:	Coordination Chemistry	COURSE CODE: CH 3210
DATE:	4 JUN , 2017	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS

Answer the following Questions

- I) a- Pt(IV) ion form an ionic octahedral complex (A) containing 5H<sub>2</sub>O molecules, bromide and sulphate ions. This complex reacts with BaCl<sub>2</sub> and give complex (B) and white precipitate.

What are the formulae of complexes A and B (10 MARKS)

b- Draw the splitting of d<sup>5</sup> and d<sup>7</sup> of octahedral complex (10 MARKS)

c- For complex K<sub>3</sub>[Mn(CN)<sub>6</sub>],  $\mu = 2.82$  BM . Define the type of complex (Mn 25). (10 MARKS)

- II) a- Define the ambidentate ligands (6 MARKS)

b- What are the formula of the following complexes: (9 MARKS)

1-  $\mu$ - hydroxo-bis {penta-amine nickel(II) } bromide.

2- Tetra amine copper(II) hexa-chloro copperate(III).

3- Dinitro Tetra amine manganese (III) ion

c- Nickel ion forms diamagnetic complex ion with cyano ligands (Ni 28)

Derive the formula and the geometry of the complex. (15 MARKS)

- III) For Fe<sup>2+</sup> the electron pairing energy (P) is 210 KJ/mol. The values of  $\Delta_0$  for the complexes [ Fe(H<sub>2</sub>O)<sub>6</sub>]Cl<sub>2</sub> and K<sub>4</sub>[Fe(CN)<sub>6</sub>] are 120 and 390 KJ/mol., respectively.

i- What is the name of each complex? (4 MARKS)

ii- Calculate the CFSE for the outer complex (Fe=26). (13 MARKS)

iii- Calculate the magnetic moment value for the inner complex. (13 MARKS)

- IV) For the complex Di Nitrito tetra aqua iron(III) sulphate

1- What are: a) Formula b) Isomers c) types of Isomerism (25 Degree)

2- Calculate the EAN ( Fe 26) (5 MARKS)

- V) Discuss the following:


a- The important uses of CFSE values. (15 MARKS)

b- The factors affecting the value of  $\Delta_0$ . Give examples. (15 MARKS)

**Examiners**

Prof. Dr. Mohamed Gaber Abu-Elazm

Prof. Dr. Kamal El-Baradie

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY			
	Final Examination of for third year students (Double major)			
COURSE TITLE	Organic Spectroscopy		COURSE CODE: CH3248	
DATE:	JUN. 2017	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions: (100 marks) (Each question 20 marks)

1] a) Discuss the chemical shift of hydrogen attached directly to a  $\Pi$ -bonded carbon and give the relative order of downfield shift of:

Acetylenic, vinylic, aldehydic and aryl hydrogen compared to alkyl hydrogens.

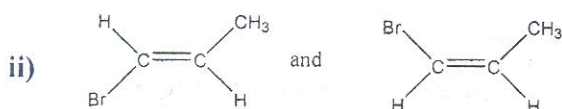
b) Is the  $\delta$  value of a given kind of hydrogen proton a constant value? Find the  $\delta$  value and the observed shift from TMS in HZ of a signal in a 100-MHZ instrument? That is 162 HZ in a 60-MHZ instrument.

2] a) Draw the  $^1\text{H}$ NMR spectra with multiplicity, peak accounting and showing relative chemical shifts for the following structures:

- i)  $p\text{-CH}_3\text{-C}_6\text{H}_4\text{-CH(CH}_3)_2$       ii)  $\text{C}_6\text{H}_5\text{-O-CH}_2\text{-CH}_2\text{Cl}$   
 iii)  $o\text{-CH}_3\text{-O-C}_6\text{H}_4\text{-COOH}$       iv)  $\text{CH}\equiv\text{C-CH}_2\text{-O-CH}_3$

b) Use  $^1\text{H}$ NMR spectroscopy to distinguish between the following geometric isomers:

i) Cis-stilbene and trans-stilbene.



3] a) 4-Heptanone shows two important characteristic peaks in its mass spectrum due to ions at  $m/e = 86$  and  $m/e = 58$ . Explain the fragmentation pattern of the compound.

b) How do you explain that  $m/e = 57$  and  $m/e = 44$  ions is formed in the mass spectrum of pentanal.

c) Give the typical fragmentation pattern in *n*-propyl benzene.

4] Explain the following by using the mentioned spectroscopic methods:

- a) *o*-Nitroacetanilide is deep yellow but the *p*-nitroacetanilide is yellow (UV & IR).  
 b) The ketonic and enolic forms of ethyl benzoyl acetate (UV, IR and  $^1\text{H}$ NMR).

c) Benzamide and acetamide (IR &  $^1\text{H}$ NMR).

d) How will you distinguish between benzaldehyde and cinnamaldehyde (UV, IR and  $^1\text{H}$ NMR).

e) The effect of solvent on the absorption spectro of propanal and propanone (UV & IR).

f) How could you distinguish between the following compounds ; propanoic acid, propanoic unhydride and propanamide.

5] An organic compound with molecular formula  $\text{C}_4\text{H}_8\text{O}$ , having the following spectroscopic data:

UV:  $\lambda_{\text{max}}$  276(nm),  $\epsilon$  43 (n-hexane)

$\lambda_{\text{max}}$  242(nm),  $\epsilon$  37 (ethyl alcohol)

IR:  $\nu$  in  $\text{cm}^{-1}$  1715 (s) and 2988(m) (solid phase).


$^1\text{H}$ NMR:  $\tau$  (tau) values in  $\text{CDCl}_3$  and TMS as standard reference 7.52 (q), 7.88(s), 8.93(t), in the ratio 3:3:2 ( $J= 7.1$  HZ).

Mass data:  $M^+$  = 72 (61 %);  $m/e = 57$  (100%) ;  $m/e= 29$  (41%) and a broad peak at  $m/e= 14.75$  (2.1%).

Find out the structure of the above compound, and explain all the given spectroscopic data.

Good Luck

*Prof. Dr. Mohamed A. El- Borai & Ass. Prof. Dr. Sahar El-khalafy*

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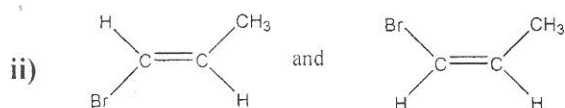
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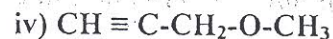
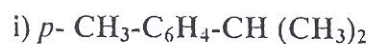
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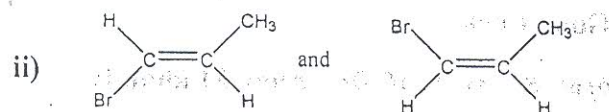
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