المستوى الثالث

كيمياء /الجيولوجيا

	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-) $[Mn(H_2O)_6]Cl_2$ **(5marks)** II-) $K_2[Zn(CN)_4]$ **(5marks)**

III-) $K_2[Ni(NO_2)_4]$ **(5marks)** IV-) $Na_3[Co\ Cl_6]$ **(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 Δ_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-) Wite 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

Chemistry Department Faculty of Science Tanta University	**Final Examination** **For 3rd grade students** **(Double Major Students)** May 2017, Spring semester	Course title: Natural Products Course Code: CH3250 Exam time: 2 hours Assessment Mark: 100 M

Answer ALL the following questions

Q1. Discuss briefly the following.(Total 28 marks, each point 7 marks)

1- Properties and uses of Ephedrine.
2- One synthetic method of Piperine.(use chemical equations ONLY to describe your answer)
3- Synthesis of Caffeine from Urea.(use chemical equations ONLY to describe your answer)
4- Synthesis of Cocaine. (use chemical equations ONLY to describe your answer)

Q2. Write shortly about the following. (Total 28 marks, each point 7 marks)

1- Clinical significance, antioxidant activity, and synthesis of Vitamin E.
2- Synthesis of both Vitamin K_1 and Vitamin K_3(use chemical equations ONLY to describe your answer).
3- The different chemical structures and the synthesis of Vitamin B_6.
4- Synthesis of Vitamin C (Ascorbic acid).

Q3. Answer the following points. (Total 24 marks)

a- Mark the following statements as True or False, correcting the false statement. (10 marks, each point 2 marks)

1- Myrcene is cyclicmonoterpenoid with three conjugated double bonds, forming an adduct.
2- Formaldehyde, acetone, and ketodialdehyde arethe products of ozonolysis of ∝-Terpineol.
3- Hydration of Geraniol in the presence of sulphoric acid give Citral.
4- Geraniol is an optically active cyclic monoterpenoidalcohol.
5- The reduction of Citral in the presence of sodium ethoxide give Geraniol.

b- Convert the following by using chemical equations. (14 marks, each point 7 marks)

1- Pentane 1,3,5-tricarboxylic acid to Limonene
2- P-Toluic acid to ∝-Terpineol.

Q4. Complete the following equations by chemical structures, naming your answer. (Total 20 marks, each point 5 marks)

1- Cholesterol **A** $\xrightarrow[\text{(ii) reduction}]{\text{(i) dehydration}}$ **B**

2- Cholestanol **A** $\xrightarrow{\text{Oxidation / } CrO_3}$ **B** $\xrightarrow{\text{Grignard reagent / methyl-magnesium iodide}}$

3- Cholesteryl acetate **A** $\xrightarrow[\text{byChromium trioxide}]{\text{Complete Oxidation}}$ **B**

4- Cholest-4-en-3-one **A** **B** $\xrightarrow{\text{Potassium permanganate / } KMnO_4}$ $\xrightarrow[\text{Zn-Hg /HCl}]{\text{Reduction}}$

---------- انتهت الأسئلة ----------

Good Luck

Examiners: Prof. Dr. Mohamed Reda Berber, Prof.Dr. Yehia Hafez

1969	Tanta University Faculty of Science Department of Chemistry			
	Final exam. for Juniors students of doubled branches			
	Course title:	Molecular Photochemistry		Course Code: CH3244
Date:	May 30, 2017	Term: second	Total assessment Marks: 50	Time allowed: 2 H

Answer the following questions

1) Differentiate between each of the following: (16 marks)

a. El-Sayed's rule and Kasha's rule

b. E- and P- types of delayed fluorescence

c. 1,2 addition and 1,2-1,4 addition of photodimerization of olefinic compounds.

d. Radiative natural and observed fluorescence lifetimes.

2) Draw each of the following: (12 marks)

a. Triplet-triplet mechanism of energy transfer action according to the Dexter mechanism.

b. Possible transitions causing energy transfer processes in Biacety, Pyrene and Naphtalene system.

c. Singlet-singlet mechanism of energy transfer action according to Förster mechanism.

d. Jablonski Diagram for electronic transitions between ground and excited states.

3) Write down the following statements. Show whether each of the following statements is true or false, if false, please, write down the true. (14 marks)

a. The energy gap value, $\Delta E(T_1 \sim So)$ is a factor which determines the relative magnitudes of k_f and k_{isc} $(S_1 \sim T_1)$.

b. Each decay process represented by k_f, k_{ic}, k_r and k_{et} is bimolecular rate constant.

c. Promotion of an electron to an antibonding molecular orbital upon excitation takes about (10^{-10}–10^{-12}s), which is very quick compared to the characteristic time for molecular vibrations (10^{-15} s).

d. The rate of fluorescence can be enhanced relative to the other processes by using heavy atoms.

e. Excimers are dimers in the excited state. They are formed by collision between two excited molecules.

f. Intersystem crossing (ISC) is an iso-energetic radiationless transition between two electronic states of same multiplicity.

g. In Jablonski diagram, the triplet state(↑↓) is always of lower energy than the energy of the corresponding singlet state(↑↑).

4) Give short notes on the following: (8 marks)

a. Quantum yield of fluorescence and of phosphorescence, Φ_f, Φ_p.

b. Wigner spin conservation rule.

Good Luck

The examiners : 1. Prof. Dr. Samy el-Dally
2. Prof. Dr. Shakir T. Abdel-Halim

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Tanta University
Faculty of Science
Chem. Dept.

Final Exam for 3rd year students (Dual specialization) (All specialties)
Electrochem. II CH 3242.
June 2017 Time allowed 2 hrs. Total Marks ''100''

Answer the following questions:

1- **(a)** What is the nature of electrode reaction?.
(b) Draw the I-E diagram of ideal polarized and ideal non-polarized electrodes – Give example?
(c) Write down the potential-current relationship for the redox reaction

$$O + n\bar{e} \rightleftharpoons R$$

When both O and R initially present. **(20 Marks)**

2- **(a)** What are the variables affecting the rate of electrode reactions?
(b) Give an example of coupled chemical reaction.
(c) Mention some methods used for measuring corrosion rate. **(20 Marks)**

3- **(a)** Discuss the mechanism of O_2- reduction and methanol oxidation at metal electrode surfaces.
(b) What are the methods applied for corrosion protection of metals and alloys?
(c) Give the diagnostic tests for reversible cyclic voltammograms. **(20 Marks)**

4- **(a)** Explain the mechanism of Cu^{2+} ion reduction process in aqueous sulphate solution.
(b) Mention the principles of DC-polarographic analysis in relation to the ILKOVIC equation.
(c) What are the different methods of mass transport? **(20 Marks)**

5- **(a)** Write down the Butler-Volmer equation and the Tafel equations. Show the log I vs η plot.
(b) Explain briefly the energy level diagram of the redox process: $A + \bar{e} \rightleftharpoons A^-$.
(c) Calculate the current value at 0.50 V for the reaction:

$$Cu_{aq}^{2+} + 2\bar{e} \rightarrow Cu_{(s)}$$

($E^\circ = +0.34$ V) at 298 K when the bulk concentration of Cu^{2+} ion is 10^{-4} mol L^{-1} and the limiting current density is 10^{-2} A cm^{-2}. **(20 Marks)**

Best Wishes

Prof. Dr. Mohamed Abd Elmoteleb **Prof. Dr. Ibrahim Shebel**

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	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 Π- bonded carbon and give the relative order of downfield shift of:

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

b) Is the δ value of a given kind of hydrogen proton a constant value? Find the δ 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.

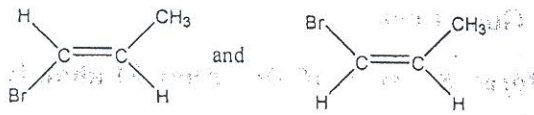
2] a) Draw the ^{1}HNMR spectra with multiplicity, peak accounting and showing relative chemical shifts for the following structures:

i) *p*- CH_3-C_6H_4-CH $(CH_3)_2$ ii) C_6H_5-O-CH_2-CH_2Cl

iii) *o*-CH_3-O-C_6H_4-COOH iv) CH ≡ C-CH_2-O-CH_3

b) Use ^{1}HNMR spectroscopy to distinguish between the following geometric isomers:

i) Cis –stilbene and trans-stilbene.

ii) 

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}HNMR).

c) Benzamide and acetamide (IR & ^{1}HNMR).

d) How will you distinguish between benzaldehyde and cinnamaldehyde (UV, IR and ^{1}HNMR).

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 C_4H_8O, having the following spectroscopic data:

UV: λ_{max} 276(nm), ε 43 (n-hexane)

λ_{max} 242(nm), ε 37 (ethyl alcohol)

IR: υ in cm^{-1} 1715 (s) and 2988(m) (solid phase).

^{1}HNMR: τ (tau) values in $CDCl_3$ 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: $M^{\cdot+}$ = 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

	TANTA UNIVERSITY, FACULTY OF SCIENCE, DEPARTMENT OF CHEMISTRY		
	FINAL EXAM FOR THIRD YEAR SPECIAL CHEMISTRY STUDENTS		
COURSE TITLE:	SOLID STATE CHEMISTRY		COURSE CODE: CH 3208
DATE:28-5-2017	TERM: SECOND	TOTAL ASSESSMENT MARKS: 50	TIME:2 HOURS

Answer the following questions:

Question 1 (8 marks)

The room temperature polymorph of iron exists in the bcc unit cell. Given its density as 7.86 g/cm^3, then calculate the radius (r) of an iron atom in this crystal. The atomic mass of iron is 56 g/mol and Avogadro's number N = 6.02 × 10^{23}mol^{-1}. [Hint for bcc, $(4r)^2 = 3a^2$].
Above 910°C, iron exists in fcc unit cell. Using the above data, calculate also the density of this high temperature form. Answer also the following questions:
i- Give the names of the bcc and fcc forms.
ii- Which form has the higher density?
iii- Write the balanced chemical equation for Haber reaction in which Fe is used as a catalyst.
iv- Which plane of iron has the highest catalytic action. Using a cubic unit cell, draw this plane.

Question 2 (8 marks)
Using tables, compare each pair of the following terms:
a- Amorphous and crystalline materials.
b- Intrinsic and extrinsic semiconductors.
c- Martensitic and non-martensitic phase transformation.
d- Hygroscopic and deliquescent materials

Question 3 (16 marks; 2 marks per point)
Draw and carefully label each of the following:
(a) The phase diagram of the cationic surfactant cetyl- trimethylammonium bromide (CTAB) in water showing the hexagonal, cubic and lamellar liquid crystal phases.
(b) The chemical structure of montmorillonite clay
(c) Reactivity of different polymorphs of cinnamic acid.
(d) Energy bands, electronic and chemical processes occurring in TiO_2 nanoparticles upon use as photo-catalysts in the mineralization of industrial waste water.
(e) The effect of light on different crystal forms of trans - cinnamic acid crystals illustrating the topochemical postulate.
(f) Energy diagram of photovoltaic solar cells based on p-n junction.
(g) Energy diagram of semiconductor laser and light emitting diodes (LED) based on p-n junction.
(h) Different types of liquid crystals.

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Question 4 (6 marks; 2 marks per point)

Discuss briefly each of the following (*3 marks each*):

(a) Application of nanomaterials in DNA sequencing study

(b) Application of polymerized crystalline colloidal arrays (PCCA) in medical sensing of sugar and biomarkers.

(d) Point defects: their types, effect on stress-strain curves and explanation of color centers.

Question 5 (6 marks; 1 mark per point)

In not more than two lines, define each of the following terms (4 marks):

(a) A plasmon (b) Fermi level (c) An exciton (d) Quantum dots (QDs) (e) The fracking process in shale oil extraction (f) Exciton Bohr radius a_{ex}.

Question 6 (6 marks; 1 mark per point)

In not more than two lines, give reason for each of the following (5 marks):

(a) In lyophilization, dilute solutions are usually applied

(b) Non- fluorescent ZnS becomes fluorescent upon heating

(c) In zone refining, the middle part of the tube is the purist part

(d) Swelling occurs in clays but not in zeolites

(e) Quantum dots are not common in organic compounds

(f) A polycrystalline Cd sample is harder than Cd single crystal

End of Exam

Examiners: Prof. Dr. El-Zeiny Mousa Ebeid and Dr. Wael Amer