الحرفة الثالثة

Assiut University
Faculty of Science
Chemistry Department
Final Examination in Biochemistry and Natural Products (312 C) for the 3th Level Students (Chemistry Major) , (Summer Course)

Date: Sunday , 20/08/2017 Time: 3 hours.

Answer the following Two Sections : **(50 Mark)**

(Section A: Biochemistry):

Answer the following questions:

1- Discuss the reaction of MANNOSE with **Four** of the following reagents:-
Acetic anhydride , Phenyl hydrazine , Dimethyl sulphate , NaoH (dil) and HCl (dil).

2- Discuss **Six only** of the following:-

(i) Inversion of sucrose. (ii) Conversion of ribose to fructose.
(iii) Estimation of amino acids. (iv) The Ninhydrine reaction.
(v) Determination of the sequence of amino acids in a polypeptide.
(vi) Distinction between normal soap and synthetic detergents.
(vii) Rancidity of edible fats.

(Section B: Natural Products):

Answer Four Only from the following questions :-

1. a) Starting from Vitamin A1 how can you prepare Vitamin A2 ?
   b) Discuss by equation the elucidation of ring system and function group in cholesterol ?
2. Discuss by chemical equations the synthesis of the following:
   Adrenalin Hygrine Nicotine
3. a) Starting from acetone how can you prepare the Citral?
   b) Describe by chemical reactions, How can convert Camphor to Bornane?
4. a) Discuss by equation the Diel's Alder reaction of Myrcene?
   b) Proof function group in α-Terpinol ?
5. a)) Starting with cholesterol how can you prepare 5β-cholanic acid and progesterone?
   b) Differentiate between α-Farnesene and β- Farnesene , then show by equations the reaction of Farnscene with ozone

Good Luck

Examiners:
Prof Dr. Morsi M Ali & Prof. Dr. Kamal I Aly

Assiut University
Faculty of Science
Chemistry Department

August 2017
Time : 3 hours
Marks: 50

Final Examination on Physical Chemistry C-332

Question 1

Answer **Two Only** from the following: **(17 marks)**

a- Derive the distribution law of a gas given by Maxwell in three dimensions.
b- From the operator concept in Quantum mechanics, discuss and drive the validity of the following:
   1- Heisenberg uncertainity principle
   2- The angular momentum component in the Z-direction given by Bohr.
c- Derive the values for both average speed and average kinetic energy of gas molecules from their distribution law.

Question 2

Answer **Two Only** from the following: **(16 marks)**

a- Derive the complete and exact solution of Schrödinger equation for an electron confined in one dimensional box.
b- Derive an expression for the laminar viscous flow to obtain the value of gas viscosity coefficient.
c- Define the following:
   i) Mean free path.
   ii) Hamiltonian operator.
   iii) Equipartion principle of energy and its application for monoatomic and polyatomic gas molecules.
   iv) Eign value and eign function.

See the next page

Question 3

Answer **Five Only** of the following questions: **(17 marks)**

1- Which of the following molecules can show pure rotational spectra and which can show pure vibrational spectra **HF, $H_2C = CH_2$, CCl_4, H_2O, C_6H_5OH, BF_3, SO_2, N_2**

2- The equilibrium frequency of $^{12}C^{16}O$ corresponds to 2143 cm^{-1}. Calculate of $^{13}C^{16}O$ using integer mass numbers.

3- Draw the change in dipole moment during vibrations and the polarizability changes for the linear CO_2 molecule, and show when the CO_2 molecule will be infrared active and when Raman active.

4- Show how the electron charge cloud is distorted when light is absorbed or emitted by an atom or molecule.

5- The ESR frequency for a free electron is 9000 MHz. Calculate the magnetic field at which the ESR spectrometer is working, (Bohr magneton $\beta = 9.273 \times 10^{-24}$ JT^{-1}, g value = 2).

6- Explain the origin of Raman effect by only one mechanical concept.

With Our Best Wishes

Examiners:- **1- Prof. Dr. Rabei Gabr**
2- Dr. Mostafa Farrag

Assiut University
Faculty of Science
Chemistry Department

August, 2017
Time: 3 hr.

Final Examination For 3rd year Students (Inorganic Chemistry, C-321).

Answer the following questions

Question 1: (17 Marks)

a) Answer only one of the following:

(i) Write the name of the following complexes.

$K[CrF_4O]$ and $[CuCl_4]^{2-}$

(ii) What kind of isomerism the following complexes can possess?

$[PtCl_2(SCN)_2]$, $[Cr(H_2O)_4NH_3SO_4]Cl$, $[Cr(NH_3)_6][Co(CN)_6]$

b) Write the formula of the following complexes.

- Dicyanotetrammineplattinum(IV)tetrachloroplatinate(II).
- Hexammine- μ -hydroxo- μ-amidodicobalt(II) chloride.
- Sulfatobis(ethylenediamine)Cobalt(III)nitrate
- Sodium μ-dihydroxo-tetra oxalato dichromate(III).

c) Give the formula, number of charges, and number of particles for all the possible complexes which agree with $CoCl_3.6NH_3$ solutions in various molar conductivities and constant concentration.

d) In the light of HSAB concept, predict which direction the following reactions will go.

$AlI_3+3NaF \rightleftharpoons AlF_3+3NaI$

$CoF_2+HgBr_2 \rightleftharpoons CoBr_2+HgF_2$

$HgO+H_2S \rightleftharpoons HgS+H_2O$

Question 2: (16.5 Marks)

A- Comment for only four of the following: (6 marks)

1- TiO_2 is white but $TiCl_3$ is violet.

2- Transition metals form much more complexes than s and p- block elements.

3- Some transition metals and their compounds have catalytic properties.

4- The Atomic radius of Ti <Zr but that of Zr=Hf.

5- Density and enthalpy of sublimation increase for the transition metal series in the periodic table from left to right.

B- Give the results of the reaction of V_2O_5 with the following: (6 marks)

SO_2; F_2; H_2& Δ ; conc. HCl and conc. H_2SO_4.

C- Compare briefly the alkali metals and the coinage metals in four of the following: (4.5 marks)

1- Physical properties. 2- Electronic structure. 3- Reactivity

4- Basic properties of their oxide. 5- Position in the electrochemical series.

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Question 3: **(16.5 Marks)**

Answer three only of the following questions.

a) How can the chromous (Cr^{++}) ion be stabilized?

b) What is the difference between comproportionation and disproportionation reaction? (give an example for each)

c) What is the relationship between the A and B members of group (VII)?

d) What is meant by rusting of iron? and what are the factors inducing such a process?

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Best wishes

Examiners

Prof. Dr. Said Ibrahim, Dr. Zaher Khafagy and Dr. Mohamed Abdelmegeed

Assiut University
Faculty of Science
Chemistry Department

August, 2017
Time: 3 hr.

Final Examination For 4th year Students (Inorganic Chemistry, C-324).

Section (I)

Give reason(s) for only Eight of the following: (16 Marks)

1. It is not easy to separate the Ln^{3+} ions chemically.
2. The standard reduction potential of Ln^{3+} is highly negative.
3. The magnetic moment of Ln^{3+} ions is higher than that of the corresponding transition metal ions having the same number of unpaired electrons.
4. The colors of Ln^{3+} ions are faint.
5. It is easy to separate Ce^{3+} from monazite ore.
6. Ln^{3+} ions give sharp absorption spectral bands while transition metal ions give broad absorption spectral bands.
7. Heavier Ln^{3+} ions form more stable complexes than the lighter ones.
8. Upon oxidation of lanthanide metals only cerium gives CeO_2 while other lanthanides give Ln_2O_3.
9. Ion exchange method is the most efficient for Ln^{3+} ions separation.
10. For only few lanthanides oxidation states (+II) and (+IV) are stable.

Section (II)

Answer only Three of the following questions. (34 Marks)

1. a) Magnetic moment value of $[MnBr_4]^{2-}$ ion is 5.9 B.M. On the basis of VBT predict the type of hybridisation and geometry of the ion.

   b) Which of the following geometries can Ag(III) diamagnetic complexes have: inner orbital octahedral, outer orbital octahedral, tetrahedral or square planar?

2. a) Predict the number of unpaired electrons and magnetic moment for each of the following: i) Tetrahedral d^6 ion, ii) $[Co(H_2O)_6]^{2+}$ and iii) Square-Planar d^7

   b) Compare between the VBT and CFT.

3. a) Give reason for the following: i) inner orbital octahedral complexes of Ni^{2+} ion are not formed, ii) $[Ni(CO)_4]$ is tetrahedral while $[Ni(CN)_4]^{2-}$ ion is square planar.

   b) What are the factors influencing the magnitude of Δ_o?

4. a) Show with a labelled diagram, the distribution of six d-electrons in Co^{3+} ion in t_{2g} and eg orbitals of the complex ion pairs $[CoF_6]^{3-}$ and $[Co(NH_3)_6]^{3+}$.

   b) Which complex of the following pairs has the larger value of Δ_o:

   i) $[Co^{3+}(CN)_6]^{3-}$ and $[Co^{3+}(NH_3)_6]^{3+}$ ii) $[Co^{2+}(H_2O)_6]^{2+}$ and $[Co^{3+}(H_2O)_6]^{3+}$

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Best Wishes

Examiners: Dr. Zaher Khafagy and Dr. Mohamed Abdel megeed

Faculty of Science
Chemistry Department

August 29, 2017
Time : 3 Hours

Photochemistry and Reactive Intermediates (313C)

Final Examination

Answer on the Following Two Sections: (50 Marks)

Section A : Photochemistry: (25 Marks)

Answer the Following Questions:

I]- Answer **only Four** of the following : (2 X 4 =8 Marks)

1- What criteria should be fulfilled by a compound to be a photosensetizer ?, how can you prove the process of photosensitization in a chemical reaction?.

2- Explain the role of Chemical Actinometer in Photochemistry? give an example.

3- Discuss briefly the Franck –Condon principle ?.

4-Explain the role of cis-Retinal in the photochemistry of vision

5-Describe the mechanism of interaction of polar material with Microwave Radiation.

II] – Mark right (√) or wrong (X) on **only four** of the following statements, and explain your answer : (2 X 4 =8 Marks)

1- Filters absorbing $\geq$ 400 nm radiations can be used in Visible light photolysis of organic compounds. ( )

2- Photochromism is a nonreversible process. ( )

3- Singlet $\rightarrow$ Triplet transition is a Symmetry allowed transition. ( )

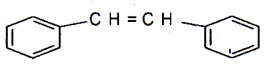
4- Photopolymerization of Ethylene can be carried out successfully in the presence of Nitrogen. ( )

5-Vision is a photochemical process initiated by Emission of light. ( )

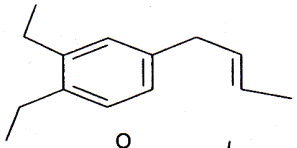
ملحوظة هامة : الأسئلة 3 صفحات

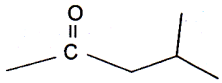
III] Complete **only Four** of the following reactions and discuss the reaction mechanism: [9 Marks]

a - 1,3-Cyclohexadiene + $^3O_2$ $\xrightarrow[\text{sensetizer}]{h\nu}$? (2 Marks)

b -  $\xrightarrow{h\nu,\ O2}$? (3 Marks)

c - PhCOPh + C6H5CH3 $\xrightarrow{h\nu}$? (2 Marks)

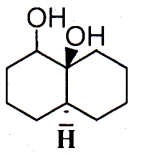
d -  $\xrightarrow{h\nu}$? (2 Marks)

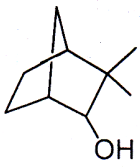
e -  $\xrightarrow{h\nu}$? (2 Marks)

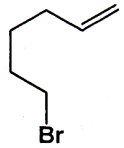
Section (B) Reactive Intermediates: (25 Marks)

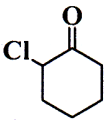
Answer the following questions:

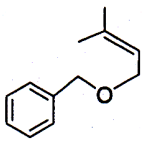
1) Provide a complete stepwise reaction mechanism for ONLY FIVE of the following reactions: (15 Marks)

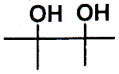
a)  (1) TsCl/ pyridine; (2) KOBu/ tBuOH

b)  $\xrightarrow[-H_2O]{H_3O^+}$

c)  $\xrightarrow[C_6H_6]{Bu_3snH,\ AIBN}$

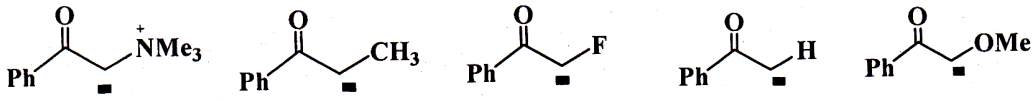
d)  $\xrightarrow{NaOH}$

e)  $\xrightarrow[H_3O^+]{n\text{-Buli}}$

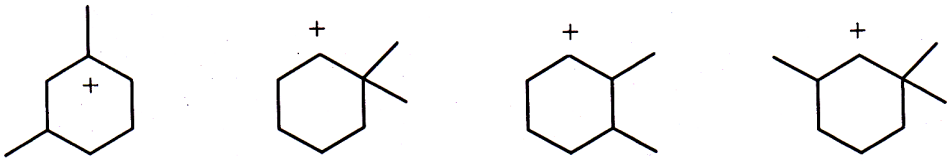
f)  $\xrightarrow{H_2SO_4}$

2) Answer the following: **(10Marks)**

i) Arrange the following carbanions according to decreasing order of their basicity:



ii) Arrange the following carbocations according to decreasing order of their stability:



1 2 3 4

iii) Describe the properties of carbene intermediates showing the difference between singlet and triplet carbenes.

iv) Explain the methods of generation of nitrenes.

Good Luck

Prof. A.A Abdel-Wahab & Prof. Y. A. Abdel Moez

امتحان نهاية الفصل الدراسي الصيفي :جميع المستويات المقرر: أخلاقيات المهنة والسلامة المهنية رقم المقرر ورمزه: F300	كلية العلوم	الزمن: ساعتان ٢٤ أغسطس ٢٠١٧ الاجابة في نفس الورقة

السؤال الأول: ضع علامة ✓ أو X امام العبارات التالية : **(١٠ درجات)**

١ـ مقرر أخلاقيات المهنة لا يتعلق فقط بالجوانب الفنية في عمل ما وإنما أيضاً بالأساس الأخلاقي لهذا العمـل.( )
٢ـ تدخل السلامة والصحة المهنية في كل مجالات الحياة . ( )
٣ـ وجود ميثاق أخلاقي للمهنة هام لحل اي خلافات او جدل في مجال المهنة ( )
٤ـ الأنشطة الطلابية تسهم في اكساب الطلاب عديد من الأخلاقيات . ( )
٥ـ من اهم اهداف تدريس هذا المقرر تنمية القدرة على التقييم الأخلاقي للأفعال والأقوال في إطار العمل. ( )
٦ـ أخلاقيات المهنة تعني فقط الالتزام بالقوانين الحاكمة للعمل. ( )
٧ـ الالتزام الأخلاقي يسهم في شيوع الرضا الاجتماعي. ( )
٨ـ من مبررات إفشاء الأسرار المختبرية الخاصة بالمريض حماية النفس والدفاع عن شرف مهنته . ( )
٩ـ تسهم السلامة المهنية في مواقع العمل في ابعاد المخاطر عن العاملين. ( )
١٠ـ المواليد المستنسخة تعيش عادة لفترة أطول . ( )

السؤال الثاني: اكتب باختصار خمسا من المبادئ الأساسية لأخلاقيات البحث العلمي **(٥ درجات)**

١ـ	٢ـ
٣ـ	٤ـ
٥ـ	

السؤال الثالث: أنت في جميع الأحوال قدوة للآخرين بفعلك وإن لم تقصد . علق في خمس نقاط **(٥ درجات)**

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انظر خلفه