Ministry of Higher Education & Scientific Research
Al-Muthanna University
College of Science
Department of Chemistry

Subject: Advance Organic Chemistry
Stage: Postgraduate

Date: / /
Time: 3.30 Hours

02. 09. 2019

45

((Assessment of the final Exam for the first semester))
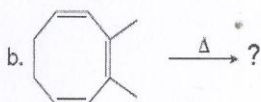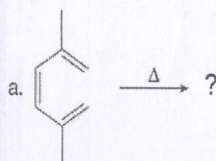**Academic year 2018-2019**

Q1: Compare between the following types of pericyclic reactions: (14 Marks)
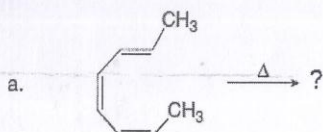
    A- Electrocyclic reaction   and   Cycloaddition reaction

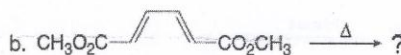   B- Group transfer reaction   and   Sigmatropic reaction

Q2: Draw the product of each reaction and determine its type of pericyclic reaction. Give the type of rotation of FMOs.   (9 Marks)
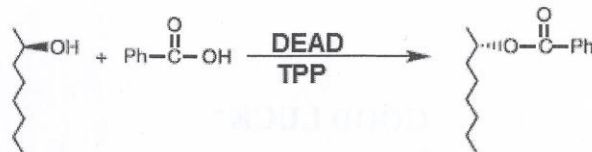

a. $\xrightarrow{\Delta}$?   b. $\xrightarrow{\Delta}$?   c. $\xrightarrow{\Delta}$?

Q3: Draw the product of each electrocyclic ring closure.   (8 Marks)

a. $\xrightarrow{\Delta}$?

(2E,4Z,6Z)-2,4,6-octatriene

b. $CH_3O_2C\text{—}\diagup\diagdown\text{—}CO_2CH_3 \xrightarrow{\Delta}$?

Q4: Give the mechanism of the following reaction.   (8 Marks)

$\text{OH} + Ph\text{—}\overset{O}{\underset{||}{C}}\text{—OH} \xrightarrow{\text{DEAD} \atop \text{TPP}} \text{O—}\overset{O}{\underset{||}{C}}\text{—Ph}$

Q5: What cycloaddition products are formed in each reaction? Indicate the stereochemistry of each product.   (6 Marks)
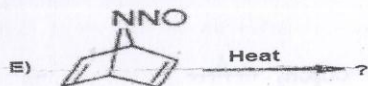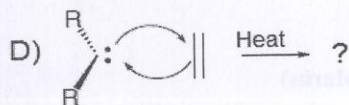
a. 2 $\xrightarrow{h\nu}$?   b. 2 $\xrightarrow{h\nu}$?
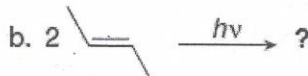
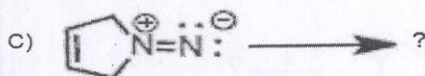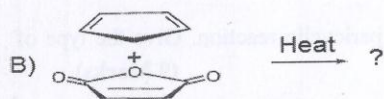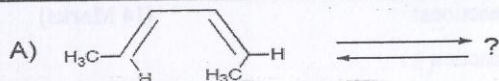**Q6:** Complete the following reactions and give the type of pericyclic reaction. Use FMO to explain your answer.   (20 Marks)

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A) H$_3$C —— H , H$_3$C —— ⇌ ?

B) (structure) $\xrightarrow{\text{Heat}}$?

C) (structure) N=N: $\longrightarrow$?

D) (structure) $\xrightarrow{\text{Heat}}$?

E) (structure) NNO $\xrightarrow{\text{Heat}}$?

Q7: What product would be formed by the disrotatory cyclization of 1,3,5-cyclononatriene? Would this reaction occur under photochemical or thermal conditions?

(5 Marks)

GOOD LUCK

The Examiner

Assist. Prof. Dr. Riyadh J. NAHI

Head of the Department of Chemistry

Assessment of the Final Exam for the First Semester
Academic Year 2018 – 2019

Q.1/ Give reason for the following   (14 Marks)

1. Melting point of Nacl is higher than that of $AlCl_3$.
2. KCL_2 is not formed .
3. The resonance phenomenon leads to increased stability of the compounds .
4. Cu^{+2} is more stable than Cu^{+1} .
5. Orbitals p and d have not spherical symmetry .

Q.2/ (A) What is type of hybridization , geometry shap , magnetic properties and magnetic moment for (1) Co_2 (2) SF_4
Atomic number for (C = 6 , S = 16)   (8 Marks)

(B) Write down the resonance structure of Boron trifluoride (Atomic number for B = 5 , F = 9)   (6 Marks)

Q.3/ (A) Calculate lattic energy of sodium chloride if you know madelung constant is 1.74 and Born constant 9 and the potential energy 4×10^{-10} KJ / Mol .   (10 Marks)

(B) Give the name for compound $H [AuCl_4]$ (4 Marks)

Q.4/ (A) Discuse the following complex in the light of my theory .
(1) MoT   (2) CFT
The complex $[Co (NH_3)6]^{+3}$ atomic number for Co = 27   (8 Marks)

(B) Calculate the ionization energy of the He^+ when $n_1 = 1$ to $n_2 = $ infinty .   (6 Marks)
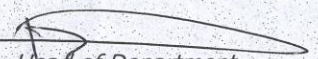

Q.5/ Explain the following (14 Marks)

1. What is the effect Lig and on the stability of the metal in the complex .
2. Discuse partial decomposition with reaction .
3. Give an example of all that comes .
   (a) Isomer Link   (b) Bridge ligand (Bidentate)

Good luck

Lecturer
Assist. Prof. Dr. Hassan Sabih
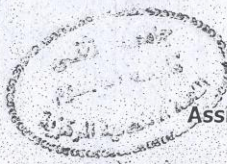
Head of Department
Assist. Prof. Dr. Riyadh Jaleel Nahi

((Assessment of the final exam for the first semester))
Academic year 2019 - 2018   45

Q1// A-: (10 ml) of (0.02M) $KMnO_4$ is required to oxidize (20ml) of oxalic acid of certain strength.(25ml) of the same oxalic acid is required to neutralize (20ml) of NaOH of unknown strength. Find the amount of NaOH in a liter of the solution .

Q1// B- what are the different types of titration?   (10Marks)

Q2// A:-Sample containing (0.4671g) NaHCO3 (FW = 84.01 mg/mmol) was dissolved and titrated with (0.1067 M) HCl requiring (40.72 mL). Find the percentage of NaHCO3 in the sample.

Q2// B-What are the classifications of of solutions according to amount of solute and particle size?

                                                                              (15Marks)

Q3// A :- Calculate the molality of one litre solution of 93% H_2SO_4 (weight/volume). The density of the solution is (1.84g/ml).

Q3// B-What are the factors affecting the solubility of precipitates?

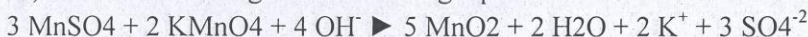   (10Marks)

Q4// A:- Aplant virus is found to consist of uniform cylindrical particles of (150 A°) in diameter and (5000 A°) long. The specific volume of the virus is (0.75cm^3 /g). If the virus is considered to be a single particle , calculate its molecular mass.

Q4// B:- How does an adsorption indicator work in the Fajans method?   (10Marks)

Q5// A:-Find the pH of a (50 mL) solution of (0.10 M)HOAc (ka = 1.75×10^{-5}) after addition of 0, 10, 25, 50, 60 and 100 mL of 0.10 M NaOH?

Q5// B:- Explain the main impact of bioanalysis?   (15Marks)

Q6// A:- Find the volume of (0.100 M) KMnO4 that will react with (50.0 mL) of (0.200 M) MnSO4 according to the following equation:
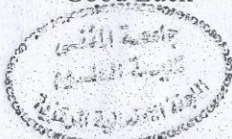
3 MnSO4 + 2 KMnO4 + 4 OH⁻ ▶ 5 MnO2 + 2 H2O + 2 K^+ + 3 $SO4^{-2}$

Q6// B:- What is statistical analysis ?

                                                                              (10Marks)

Good Luck

Lecturer
Dr.khawla.kani.jassim

Head of Department
Assistant Prof. Dr. Riyadh Jaleel Nahi

Ministry of Higher Education
& Scientific Research
Al Muthanna University
College of Science
Department of Chemistry

Subject: Selective topics in Biochemistry
Stage: Post graduate
Date: /   / 2019
Time: 3 hours

11. 09. 2019

45

((Assessment of the final exam for the second semester))
Academic year 2019 - 2018

Q1. (20 Marks)
a. What is the major regulatory step in the entire synthesis of cholesterol? Write initial activation steps in the cholesterol synthesis.
b. Prepare vitamin D_3 from Lanosterol. Then clarify the effect of lack of vit D_3.
c. Why does cholesterol require special mechanisms for transport in the bloodstream?
d. How to separate the plasma lipoproteins? Write the circumstances can help to recognize the differences between them?
e. Clarify and write the enzymatic reaction of cholesterol esterification at the surface of HDL.

Q2. (20 Marks)
a) Explain (with scheme) the multiple transport proteins that involved in the bile acid cycling.
b) What are the developmental stages of an atherosclerotic lesion?
c) Mention the strategies that are considered a key objective in the clinical management of atherosclerosis by lowering cholesterol.
d) Show the transportation pathways of fatty acids across mitochondrial membranes.
e) Express the degradative pathway of propionyl-CoA with the enzymes in reponse.

Q3. (20 Marks)
a. Why does membrane depolarization trigger the insulin secretion in β–Cell?
b. Show that K_{ATP} channels regulate the strength of muscle contraction.
c. What are metabolic effects of glucocorticoid hormones on the inflammation and immune responses?
d. Clarify (by scheme) the effect of insulin on glycogen synthesis.
e. Define: A receptor tyrosine kinase and clarify its functional domains.
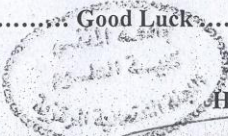
Q4. (20 Marks)
a) How does lack of insulin affect the cAMP level, which result in metabolic dysregulation in diabetes mellitus?
b) Show in diagram that glucose accumulation in the liver leads to ketogenesis and lipoprotein synthesis.
c) What are the long-term complications of insulin-requiring diabetes? Explain that HbA1C as a long-term parameter of glucose control.
d) What is the effect of the injected insulin at high concentrations into the tissue instead of intravenously?
e) What are the typical symptoms and history in a new case of type 1 diabetes?

Q5. (20 Marks)
a. How does drug metabolism facilitate drug elimination in the liver and kidney?
b. Clarify by an equation that the metabolism of isoniazid starts with a phase II reaction.
c. Plot the scheme that explain the mode of action of cytochrome P450 enzymes are involved in drug metabolism.
d. Write an equation represents the detoxification of benzopyrene epoxide derivatives by epoxide hydrolase or glutathione-S-transferase.
e. What is xenobiotics and the functional significance of metabolism of drugs and xenobiotics?

.... Good Luck ....

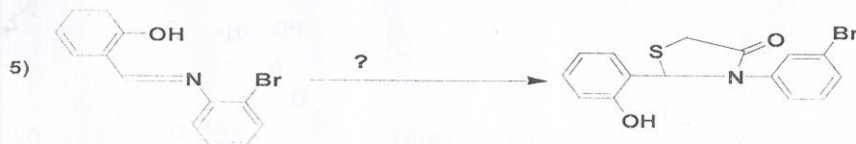Lecturer   Head of Department

Ministry of Higher Education
& Scientific Research
AlMuthanna University
College of Science
Department of Chemistry

Subject: Adv. Organic Synthesis
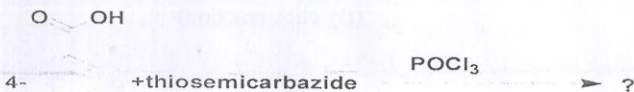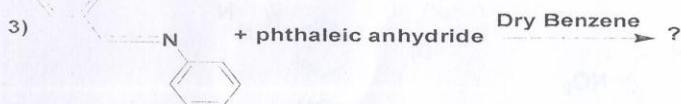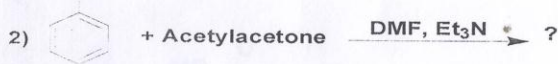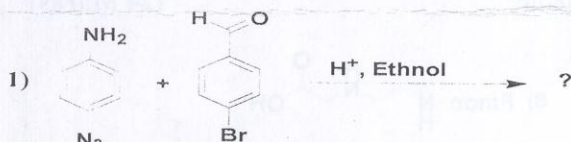Stage: MSc students
Date: / /2019
Time: 3 hours

14. 09. 2019

45

((Assessment of the final exam for the second semester))
Academic year 2019 - 2018

Q1// Complete the following reactions and give the general name the products: **(12 Marks)**

1) + $\xrightarrow{H^+, Ethnol}$?

2) + Acetylacetone $\xrightarrow{DMF, Et_3N}$?

3) + phthaleic anhydride $\xrightarrow{Dry\ Benzene}$?

4- + thiosemicarbazide $\xrightarrow{POCl_3}$?

5) $\xrightarrow{?}$

6) Acetone + Thiourea $\xrightarrow{I_2}$?

Q2: Explain the following scientific statements:

1- Alkylation of adenine nucleobase occurs at N9 not at the exocyclic amino functional group.
2- In the Fmoc-solid phase peptide synthesis strategy, the amino group of side chain of lysine has to be protected with acidic protect ring group.
3- 2-Amino-6-chloro-purine used as precursor for the synthesis of the PNA monomer of guanine rather guanine nucleobase.
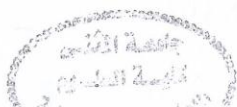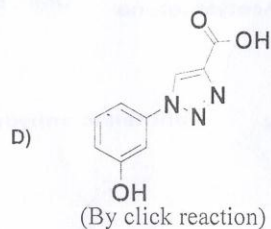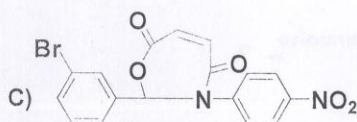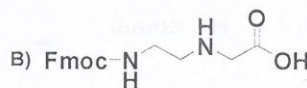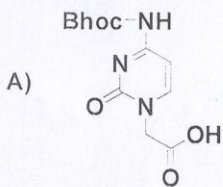
(9 Marks)

Ministry of Higher Education
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Subject: Adv. Organic Synthesis
Stage: MSc students
Date: /   /2019
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14. 09. 2019

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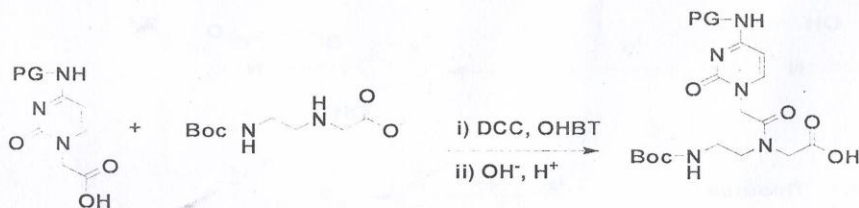**((Assessment of the final exam for the second semester))**
Academic year 2019 - 2018

Q3// Show by a mechanism how to synthesize the following compounds by using the chemicals that are commercially available: **(24 Marks)**

A)

B)

C)

D)
(By click reaction)

Q4// Give the mechanism of the following reaction: **(10 Marks)**

i) DCC, OHBT
ii) OH⁻, H⁺

Q5/ If you have a Boc-protected resin, show by mechanisms how to couple the Boc-protected glycine to this resin. Draw a general scheme for the solid phase peptide synthesis.   **(15 Marks)**

Good Luck

Lecturer
Assist. Prof. Dr. Riyadh J. NAHI

Head of the department
Assist. Prof. Dr. Riyadh J. NAHI

((Assessment of the final exam for the second semester))
Academic year 2019 - 2018

Q1// A:- A chromatographic analysis for the chlorinated pesticide Dieldrin gives a peak with a retention time of (8.68 min) and a baseline width of (0.29 min). What is the number of theoretical plates? Given that the column is (2.0 m) long, what is the height of a theoretical plate in mm?   (5Marks)

Q1// B:- In a chromatographic analysis of low molecular weight acids, butyric acid elutes with a retention time of (7.63 min). The column's void time is (0.31 min). Calculate the retention factor for butyric acid?   (5Marks)

Q2// What is the meaning of the following terms:-
 1- Partition Coefficient   2- Retention Volume   3- Dead Volume   4- Separation Factor
 5-Guard Column   6- Rate Theory   7- Paper Electrophoresis 8- Resolution
 9-HETP   10- Mobile Phase (HPLC)   (10Marks)

Q3//A:- What type of solvents are generally employed in chromatography?   (5Marks)
Q3// B:- What are the factors affecting on Separation by Electrophoresis ?   (5Marks)

Q4// A:- What are the most common technical problems when doing HPLC?   (5Marks)
Q4// B:- What is the importance of chromatography?   (5Marks)

Q5// Classify the kinds of chromatography according to:-
 1-Specific method   2- Stationary Phase   3- Mobile Phase   4- Type of equilibrium
                                                                                                                   (15Marks)

Q6//A:- Give a good reason for all these questions:-   (15 Marks)

   1- Why (HPLC) use packed column, while GC use open column?

   2- Why is silica polar in(HPLC) columns?

Q6//B:- What is a Chromatogram? What information can be obtained from a chromatogram?

Good Luck

Lecturer
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Head of Department
Assistant Prof. Dr. Riyadh Jaleel Nahi

Assessment of the Final Exam for the Second Semester
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Q.1/ (A) Explain the following terms (6 Marks)
     1. Life time broude   2. spin-lattic relation   3. Molecular ion

(B) What is the Molecular of nuclei in lower energy to higher energy for proton at 25C° in the field strength is 1.98 tasla . (8 Marks)

Q.2/ (A) Give reason (6 Marks)
1. The mass spectra depends on Molecular ion A^+ only .
2. appear phenoxid at frequency 2043 cm^{-1} in IR .
3. ^{13}C Spectra less sensitive from NMR spectra .

(B) Acetyl acetone solution in cyclohaxn find the absorbance value of that transmittance 15% of the beam falling on it and information you can obtain from that fact discuss . (8 Marks)

Q.3/ (A) A diffraction has a ruled area is 10.4 cm wide , has 600 grooves per millimeter and has is blazed an angel of 45 C° . What is the wavelength of radiation in the first , fourth and ninth order . (8 Marks)
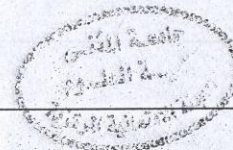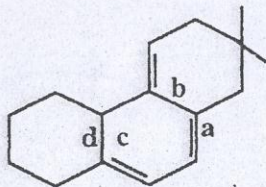
(B) Frequency of vibration stretching for C-O in the IR spectra of the two compounds is different ph-OH (1225 cm^{-1}) , CH_3 (CH_2)$_5$—OH (1050 cm^{-1}) ? Why . (6 Marks)

Q.4/ (A) It the fundamental frequency of vibration for $C^{12}O^{16}$ Molecular is 1.15×10^{12} Hz . Calculate value constant force . (7 Marks)
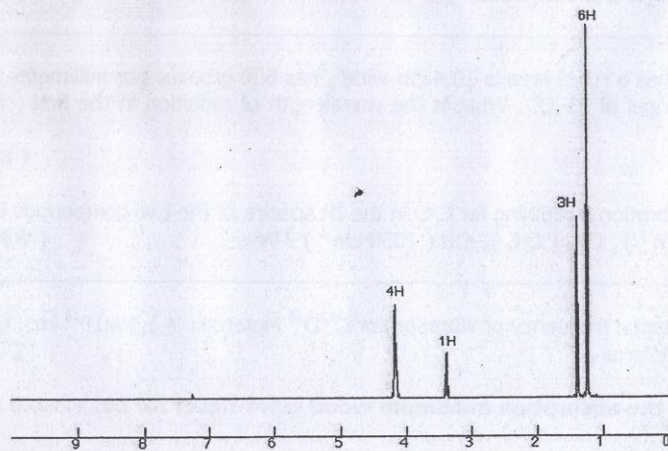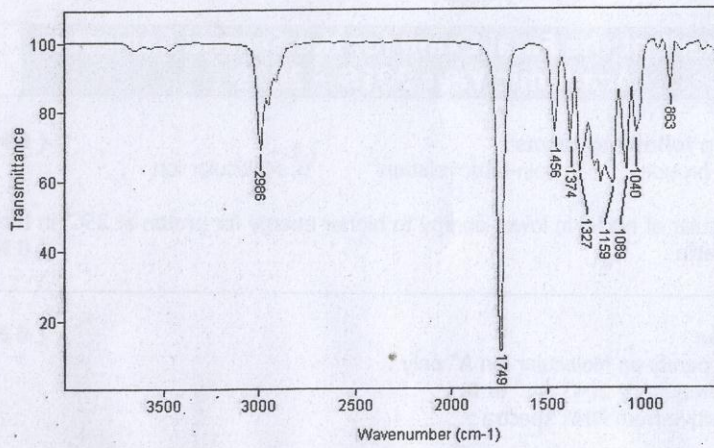
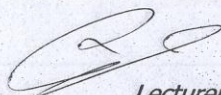**(B) Estimation of the absorption maximum wood ward-fieser for compound** (7 Marks)
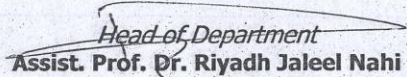
Q.5/ Explain the functional group and structure formula $C_8H_{14}O_4$ FT-IR and H-NMR spectrum .

(14 Marks)

IR spectrum labels:
- Transmittance vs Wavenumber (cm-1)
- 2986
- 1749
- 1456
- 1374
- 1327
- 1159
- 1089
- 1040
- 863
- x-axis: 3500, 3000, 2500, 2000, 1500, 1000

H-NMR spectrum labels:
- 6H
- 3H
- 4H
- 1H
- x-axis: 9, 8, 7, 6, 5, 4, 3, 2, 1, 0

Good Luck

Lecturer
Assist. Prof. Dr. Hassan Sabih

Head of Department
Assist. Prof. Dr. Riyadh Jaleel Nahi