# الفرقة الثانية

Assiut University
Faculty of Science
Chemistry Department

Date: 27/08/ 2017
Time: 3 hours

**Final Examination of Second Level Chemistry Students (Reaction mechanism and Carbonyl Compounds) (210C) for Credited Hours Students**

**Answer the following questions:** الامتحان من ورقتين ( ثلاثة صفحات) **(50 Marks)**

**Part A: Reaction mechanism** **(25 Marks)**

**Question One:** **(13 Marks)**

(a) Mark Five Only (√) or (×) for the following sentences and then correct the wrong one: **(5 Marks)**

1- In heterolytic fission, one electron of the shared pair is given to each of the covalently linked atoms. ( )

2- carbanion stabilized by alkyl substituents by inductive effect and hyperconjugation. ( )

3- Reactive intermediates are involved free radicals and carbenes only. ( )

4- Boron trifluoride is neutral nucleophile. ( )

5- Addition of HCl to 2-methylpropene is stereoselectivity. ( )

6- Singlet carbene is a diradical. ( )

7- Water is more basicity and nucleophilicity than $OH^-$. ( )

(b) For the following reaction, suggest a reaction mechanism and explain how you can confirm your mechanism? **(3 Marks)**

$$PhCONH_2 \xrightarrow{Br_2/NaOH} Ph\text{-}NH_2$$

(c) Choose the correct answer from the following sentences: **(5 Marks)**

1- Carbenes are usually trapped as:

a. cyclobutane derivatives, b. triptycene, c. cyclopropane derivatives, d. cyclopentane derivatives

2- Which of the following statements apply to E1 reaction of alkyl halides

a. Rate = K[base][RX] , b. Rate = K[base], c. Rate = K[RX]

3- Isotopes used to find out:

a. type of the reagent, b. type of intermediates, c. which bond is broken,

4- Which of the following compounds contain chiral carbon atom?

a. $Cl_2C{=}CHCH_3$, b. $(CH3)_2C{=}CH_2$, c. $CH_3CHBrCH_2CH_3$, d. $(CH_3)_2CHBr$

5- The addition of bromine to cyclohexene is

a. Stereoselectivity, b. stereospecificity, c. chemoselectivity



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**Question Two:** (12 Marks)

**(a) Show by equations the reaction mechanism of Three Only the following and explain how you can confirm your mechanism?** (9 Marks)

1- $(CH_3)_2C=CHCH_2Cl \xrightarrow{NaOH}$

2- $CH_2=CH-CH=CH_2 \xrightarrow{Br_2}$

3- S-1-phenyl-1-chloro ethane $\xrightarrow{H_2O/acetone}$

4- $(CH_3)_3CCHBrCH_3 \xrightarrow{H_2O/acetone}$

**(b) Arrange the following alkenes in order of their relative stabilities:** (3 Marks)

1-hexene, cis-2-hexene, 2-methyl-2-pentene, , 2.3-dimethyl-2-butene, , trans-2-hexene

**Part B: Carbonyl compounds:** (25 Marks)

**Question Three:** (13 Marks)

**(a) Draw the chemical structure of Four Only of the following compounds:** (4 Marks)

1) 3-Isopropylcyclopentanone 2) 3-Oxobutanoic acid 3) 2-Chloro-3-methylbutanal

4) Vinyl acetate 5) δ-Valerolactone

**(b) Starting with 1,3-Dithiane show by equations, how to synthesis Two Only of the following:** (3 Marks)

1) butanal 2) cyclohexyl methyl ketone 3) acetophenone

**(c) Show by equations the reaction mechanism of Three Only the following:** (6 Marks)

1- $(CH_3)_2C=CHCOCH_3 \xrightarrow{CH_3NH_2}$

2- $CH_3CHO \xrightarrow{NaOH}$

3- PhCOOEt + $CH_3COOEt \xrightarrow{NaOEt/H_3O^+}$

4- PhCH=CHCOPh $\xrightarrow[piperidine]{(CH_2)_2COOEt}$

**Question Four:** (12 Marks)

**(a) What products, would you expect from the reaction of phenyl lithium with Three Only from the following:**

1- Benzoic acid 2- Cyclohexanone

3- Ethyl benzoate 4- Benzyl nitrile



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(b) Complete <u>Six Only</u> of the following: (6 Marks)

1) PhCOOH $\xrightarrow{(COCl_2)}$ (1) $\xrightarrow{NH_3}$ (2) $\xrightarrow{LiAlH_4}$ (3)

2) $CH_2$=$CHCH_3$ $\xrightarrow{SeO_2}$ (4) $\xrightarrow{LiAlH_4}$ (5)

3) $CH_2(CN)_2$ $\xrightarrow{H_3O^+}$ (6) $\xrightarrow{CH_2N_2}$ (7)

4) $CH_3COCH_2CH_2CH_3$ $\xrightarrow{NaCN}$ (8) $\xrightarrow{H_2O/H^+}$ (9)

5) $CH_3COCH_2CH_2CH_2COOH$ $\xrightarrow{NaBH_4}$ (10) $\xrightarrow{H_2O/H^+}$ (11)

6) PhCH=$CHCH_2CH_3$ $\xrightarrow{KMnO_4}$ (12) + (13)

7) $PhCH_2CN$ $\xrightarrow{CH_3MgBr}$ (14) $\xrightarrow{H_3O^+}$ (15)

(c) Arrange the following according to increase in acidity and Why? (3 Marks)

$(CH_3)_2CHCOOH$, $CHCl_2COOH$, $(CH_3)_3CCOOH$, $ClCH_2COOH$, $CCl_3COOH$

GOOD LUCK,,,,,,,,,

Examiner : Dr. Mohamed Gamaleldin



انظر بالخلف

Assiut University
Faculty of Science
Chemistry Department

Summer Semester 2017
Time: 3 hours

**The Final Physical Chemistry-II Examination (C-232) for 2nd Level Students**

Answer *All* the following questions (I, II and III)

## *I- Phase Rule*

(17 Marks)

A) Explain briefly ***Only Two*** from the following: (10 Marks)

*i)* Sodium sulphate- water system.

*ii)* Ferric chloride- water system and its uses as freezing mixture.

*iii)* The ternary system $NH_4NO_3$- $AgNO_3$- $H_2O$ at 30° C, in which the binary compound $NH_4NO_3$- $AgNO_3$ is formed.

B) What are the main differences between the phase diagram of Pb- Ag system and that of KI- water system? (4 Marks)

C) Complete each of the following: (3 Marks)

*i)* The concentration variable in a one component system is not taken into account owing to .....

*ii)* For a pure gas and a mixture of two gases ($O_2$ &$N_2$), degrees of freedom are .....and .....respectively.

*iii)* A saturated solution of sodium chloride has the number of phases and the number of of components equal to ..... and ..... respectively.

## *II- Electrochemistry*

(17 Marks)

Answer ***Only Four*** from the following questions:

A) For the following galvanic cell, write the anode and cathode half-cell reactions, the overall cell reaction then calculate the standard cell potential.

$Mn^{2+}_{(aq)} + 2e^- \rightarrow Mn_{(s)}$, $E^0_{red} = -1.18$ V, $Cr^{3+}_{(aq)} + 3e^- \rightarrow Cr_{(s)}$ $E^0_{red} = -0.74$ V

B) $Zn/Zn^{2+}$ half-cell was coupled to a hydrogen electrode with $P_{H_2} = 1.0$ *atm.*, $[Zn^{2+}] = 0.10$ M, $E_0$ ($Zn^{++}$ / Zn) = – 0.76 V, and the cell potential was 0.54 V. Calculate the pH in the cathode compartment.

C) Compare between dry battery and mercury battery.

D) Why sodium sulfate was preferred than sodium chloride during electrolysis of water?

E) Describe the construction of the calomel electrode, and then deduce the relationship between the potential of calomel electrode and its anion concentration.

***Turn over*** →

## *III- Colloids*

**(16 Marks)**

**Answer *Only Four* from the following questions:**

**A) Write a short note on the following:**

***i)* Tyndall effect.** ***ii)* Peptization.**

**B) Describe a method for the preparation of the following:**

***i)* Arsenous sulphide sols.** ***ii)* Platinum sols.**

**C) Define each of the following:**

***i)* Ultrafiltration.** ***ii)* Sedimentation.** ***iii)* Diffusion of sols.**

**D) What is meant by the following?**

***i)* Dialysis.** ***ii)* Emulsifying agents.**

**E) Discuss briefly the electric properties of colloids.**

**Good Luck**

***Prof. Dr. Maher M. A. Hamed & Dr. Gamal Abdel-Wahab***

Assiut University
Faculty of Science
Chemistry Department

Aug. 2017
Time : 2 hours

Final Exam. for ( 211C )( Student not Chemistry ,, Summery Term)

***Write the name of all compounds.***

**Answer for the following questions:**

**1)** *A- What mining by* ( give examples):- (**8 only**)---------- ( **10** marks):

1- Quinone 2- Anilide 3- Oxime 4- Toludine.
5- Sec. amine 6- Markonikov- rule 7- Ozone 8- THF
9- TFA 10- DMS.

2) *A-Give examples for the following reactions* (**Three only**)--(**10** marks):
1- polymerisation reaction. 2- Ald-ol Condensation.
3- Esterification reaction. 4- Electophilic Sub. reaction.

B- Write one method to prepare the following compounds (**Three only**):
saccharin * Gammexane * tetra- hydronaphthaline * Salicylic acid.

3) *A- How do you convert* : (**Two only**)---------- (**10** marks):
1- Acetylene → Tolune. 2- Nitrobenzene → phenol.
3- Benzaldhyde → Benzoin → Benzil

*B-Write on* **two only**:
1- Vohils method to convert aldohexose to aldopentose.
2- Synthesis of $1^{o}$, $2^{o}$, $3^{o}$ alcohols by using Grignard reagent.
3- Addition of conc.$H_2SO_4$ to 1- propene.

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4)- *A- complete the following equations* (**Four only**)---------- (**20** marks)

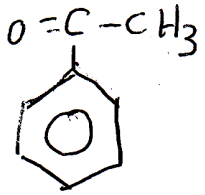
1- Phthalic anhydride + 2. resorcinol /$H_2SO_4$ → a + NaOH → b
2- Anline + $CH_3COCl$ → a + $Br_2$ → b + $H_2SO_4$ 70 % → c + d
3- Benzene + $3O_3$ → a + $H_2O$ → b
4- Acetic acid + $SOCl_2$ → a + b + c
5- Toluene + $Cl_2$ / Fe ( dark ) → a + b
6- Glucose + 5.$Ac_2O$ → a + b

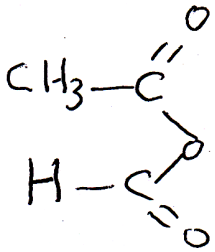
*B- Write the name of the following compounds .*

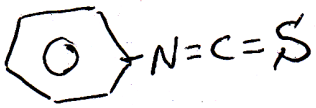
1) $CH_3(CH_2)_5CH_2Cl$

2) $C_2H_5 - C \equiv C - C_3H_7$

3) $Br- C_6H_4 - CO - C_6H_4 - Br$

4) 

5) 

6) 

*C- Draw the structural formula of the following compounds:*

cyclooctatetraene * N-bromosuccinemide
sodium salcylate * m- cresole

**********

*Good Luck*
*Prof. Dr Osama Shehata Moustafa*
*Aug. 2017*

Assiut University
Faculty of Science
Chemistry Department

27 August 2017
Time: 3 hours

**Final Examination of Environmental and Green Chemistry (214C) for Credited Hours Students**

**Answer the following questions:** **(50 Marks)**

**First question:** **(15 Marks)**

**(A)** "Herbicides, also commonly known as weed-killers, are chemicals important for improving both the quality and quantity of agricultural crops. They can be selective or total herbicides."

I. What are the properties of suitable herbicides? **2 Marks**
II. Give the meaning of weeds and its harmful effects on the agricultural crops. **2 Mark**
III. Show the difference between selective and total herbicides. **1 Mark**
IV. Give the different mechanisms for designing a selective herbicide illustrating your answer by examples. **4 Marks**
V. How can total herbicides be used safely? **1 Mark**
VI. "In March 2015, the World Health Organization's International Agency for Research on Cancer classified glyphosate (herbicide) as "probably carcinogenic in humans" (category 2A) based on epidemiological studies, animal studies, and in vitro studies". Give, by equations, the biodegradation of glyphosate. **2 Marks**

**(B)** Give the different methods of manufacturing the following chemicals (**Only One**) and choose the green method giving the reason? **3 Marks**

1- Methyl Methacrylate 2- Resorcinol

**Second question:** **(10 Marks)**

**(A)** How can you synthesize **Only Two** of the following fungicides giving their agricultural application? **(5 Marks)**

1- Captan 2- Benomyl 3- Dimethirimol

**(B)** Give the reason **Only Two** of the following **(5 Marks)**

1- Ethephon can be used as a plant hormone?
2- The plant growth hormone Indolylacetic acid (IAA) cannot be used as a herbicide?
3- Production of polyhydroxyalkanoates from corn is a green process?

**Third question:** **(15 Marks)**

**(A)** How can you estimate the degree of organic pollutants in water? **(4 Marks)**

**(B)"Ozone layer is an important component of the atmosphere and protects the biosphere from the harmful ultraviolet radiation"**

I. What are the harms of the higher levels of ultraviolet radiation on the troposphere? **2 Marks**
II. What is the chemical composition of ozone and where is it present in the atmosphere? **1 Marks**
III. What are the chemicals that are responsible for the depletion of ozone layer? **2 Marks**

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Examination comprises 3 pages

**IV.** What are the chemicals that can protect the skin from ultraviolet radiation? **2 Marks**

**(C)** Give the meaning **Only Four** of the following? **(4 Marks)**

**1-** Flue gas desulfurization **2-** Supercritical Carbon Dioxide

**3-** Avermectins **4-** Pyrethrum **5-** Gibberellins

**Fourth question:** **(10 Marks)**

**Give and illustrate** the green chemistry principals achieved in the following published papers

***1- First paper***

Researchers of University of Cambridge prepared a supramolecular polymer–colloidal hydrogel (SPCH) composed of 98wt%water that can be readily drawn into uniform (~6-μm thick) "supramolecular fibers" at room temperature. Functionalized polymer-grafted silica nanoparticles, a semicrystalline hydroxyethyl cellulose derivative, and cucurbit[8]uril undergo aqueous self-assembly at multiple length scales to form the SPCH facilitated by host–guest interactions at the molecular level and nanofibril formation at colloidal-length scale. The fibers exhibit a unique combination of stiffness and high damping capacity (60–70%), the latter exceeding that of even biological silks and cellulose-based viscose rayon. The remarkable damping performance of the hierarchically structured fibers is proposed to arise from the complex combination and interactions of "hard" and "soft" phases within the SPCH and its constituents. SPCH represents a class of hybrid supramolecular composites, opening a window into fiber technology through low-energy manufacturing.

*Proceedings of the National Academy of Sciences*, **2017** DOI: 10.1073/pnas.1705380114

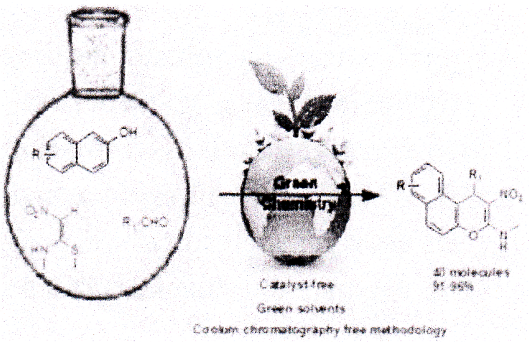
**2-** ***Second paper***

Nasrollahzadeh *et al* reported the green synthesis of copper nanoparticles (Cu NPs) using *Ginkgo biloba L.* leaf extract as a reducing and stabilizing agent under surfactant-free conditions. The formation of Cu NPs is monitored by recording the UV–vis absorption spectra. The green synthesized Cu NPs are characterized by TEM, EDS, FT-IR and UV–visible techniques. According to UV–vis results, the synthesized Cu NPs by this method are quite stable even after one month indicating the stability of Cu NPs. In terms of environmental impact and economy, metallic Cu NPs offer several advantages over homogeneous and traditional heterogeneous catalysts. In addition, due to the increased metal surface area, Cu NPs shows very high catalytic activity for the Huisgen [3 + 2] cycloaddition of azides and alkynes at room temperature. Furthermore, the catalyst can be simply recovered and reused several times with almost no loss in activity

Journal of Colloid and Interface Science 457 (**2015**) 141.

***3-Third paper***

A highly efficient and environmentally benign protocol has been developed for the construction of various potentially biologically active N-methyl-2-nitro-aryl-1*H*-benzo[f]chromen-3-amine derivatives using one-pot, multi-component cascade reaction of various naphthalen-2-ol, aldehydes, and (*E*)-N-methyl-1-(methylthio)-2-

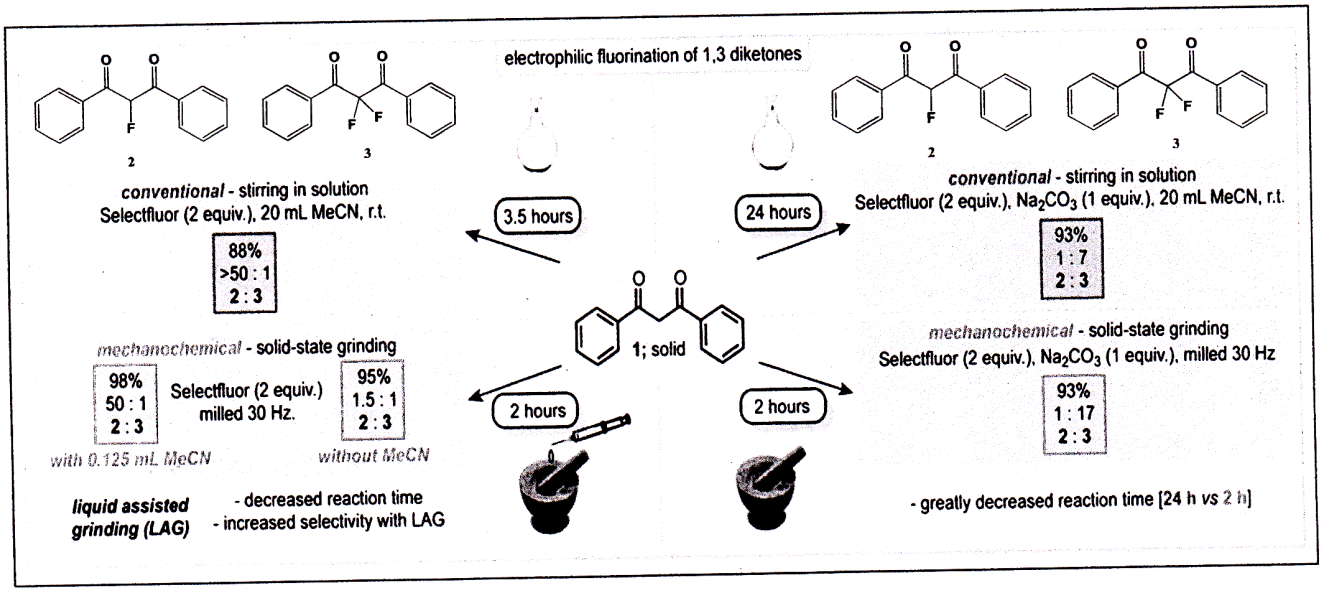



Go to Next

nitroethenamine under catalyst-free conditions in the presence of green solvent medium (ethanol–water) is described. The significant features of this protocol are short reaction times; provide excellent yields, avoidance of toxic solvents and catalysts, no column chromatographic purification, atom-economy and uses ethanol–water as a green solvent which is considered to be relatively environmentally benign. This is the first example of the condensation of naphthalen-2-ol, aldehydes, and (*E*)-N-methyl-1-(methylthio)-2-nitroethenamine to provide a novel series of 1*H*-benzo[f]chromen-3-amine derivatives.

Tetrahedron 72 **(2016)** 6484e6491

***4- Fourth paper***




*Green Chem.*, **2016**, *DOI: 10.1039/c6gc03139k*

**GOOD LUCK,,,,,,,,,,** **Examiner : *Dr. Awad Said***



**Examination comprises 3 pages**

Chemistry Department

Faculty of Science

Assiut University

Aug., 2017

Time: 3 hours

50 Marks

## Final Exam of Organic Chemistry (212C)

**Section (A): (Aromatic Chemistry)** (25 Marks)

**1) Answer the following:** (13 Marks)

**a) Illustrate by equations the preparation of only three of the following compounds from benzene:**
**i) 1,3,5 Trinitrobenze ii) 4-Acetyl-2-chlorobenzoic acid iii) 3-Bromo-5-ethylphenol** (6 Marks)
**b) Describe in details the reaction mechanism for sulphonation of toluene.** (4 Marks)
**c) Predict the major product(s) that will be obtained upon mono nitration of the following compounds.**
**i) Benzophenone ii) Benzanilide iii) Benzene sulfonic acid** (3 Marks)

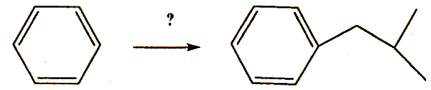
**2) Answer the following:** (12 Marks)
**a) Provide the major product(s) of the following reactions:** (3 Marks)

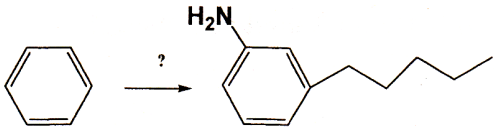
1) 1,3-Dinitrobenzene $\xrightarrow{(NH_4)_2S}$ ?

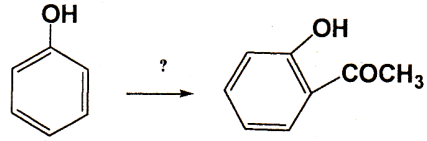
2) 3-Methoxybenzaldehyde $\xrightarrow{Cl_2 / FeCl_3}$ ?

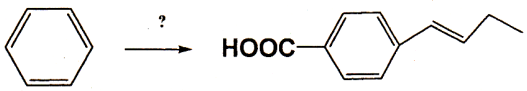
3) Toulene $\xrightarrow[AlCl_3 \text{ anhydrous}]{CH_3(CH_2)_3Cl}$ ?

**b) Provide the reagents and steps necessary for only three of the following conversions** (6 Marks)

1) 

2) 


3) 


4) 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c) Give reason for the following: (3 Marks)

1) Benzaldehyde cannot be gave Aldol condensation when heated with dilute NaOH.

2) 4- Methoxy aniline is more basic than aniline.

3) Aniline cannot be nitrated directly with nitric acid.

**Section (B): Heterocyclic Chemistry)** (25 Marks)

**Answer the following questions:**

1) Show how the disconnection approach can rationalize the synthesis of the following compounds:

i) 2, 5-Dimethylpyrole ii) 2, 4, 5 Trimethyloxazole iii) 2, 4-Dimethylthiazole (6 Marks)

2) Write on only two of the following: (6 Marks)

a) Electrophilic substitution reactions of pyrrole, thiophene and furan ( give examples).

b) Mannich reaction for thiophene and indole

c) Anion Chemistry of oxazole, imidazole and thiazole

3) Provide in details Vilsmeier reaction mechanism on furan (3 Marks)

4) Describe the electrophilic and nucleophilic substitution reactions of quinoline and pyridine (4 Marks)

5) How can you synthesize only three of the following compounds? (6 Marks)

i) 7-Methylquinoline ii) 2, 3, 5-Trimethylimidazole

iii) 5-Amino-3-methylisothiazole iv) 2-Phenylindole

**GOOD LUCK**

*Prof. Dr. Yasser A. Elossaily*