

(1)

Final Examination in Selected Topics in Organic Chemistry (414 C)
4th Level Credit Hour System

Answer the following Three sections:

Section 1: Biochemistry (30 Marks)

Answer **two only** of the following:

- (a) Illustrate with equations, the reactions involves in Krebs cycle (citric acid cycle) indicating the names of enzymes used. (15 Marks)
- (b) Write on three of the cases in which sugars appear in urine. (15 Marks)
- (c) Write on β -oxidation of a fatty acid containing five carbon atoms. (15 Marks)

Section 2: Food Chemistry (30 Marks)

Answer **five only** on the following questions:

- a) Write by equation, interesterification using basic catalyst? (6 Marks)
- b) Starting by L-xylose, how can you synthesize vitamin C? (6 Marks)
- b) Peroxide value (POV) and its importance. (6 Marks)
- c) Discuss the types of vegetables, fruit, and spice flavors and the methods of flavors analysis? (6 Marks)
- d) The diseases fighting antioxidants and the methods of antioxidants protect from that diseases? (6 Marks)
- e) Effect of boiled concentrated HCl on ascorbic acid? (6 Marks)

Section 3: Nucleic acids (30 Marks)

Answer the following questions:

- 1- Give an account on the following terms: (**four only**) (12 Marks)

(2)

- (i) The types of RNA.
- (ii) The genetic code.
- (iii) The differences between RNA and DNA.
- (iv) The function of mRNA.
- (v) The termination step in the protein synthesis.

2- The following section of DNA is used to build mRNA for a protein:

-GAA-CCC-TTT-

(5 Marks)

- (i) What is the corresponding mRNA sequence?
- (ii) What is the amino acid order in the peptide?
- (iii) What are the anticodons on the tRNAs?

3- Draw the structures of the following species: **(four only)**

(8 Marks)

- (i) Cytidine.
- (ii) Deoxythymidine.
- (iii) Deoxyguanosine 5'-monophosphate (dCMP).
- (iv) Adenosine 5'-monophosphate (AMP).
- (v) Uridine 5'-monophosphate (UMP).

4- Arrange the following statements in order of their occurrence in protein synthesis:

(5 Marks)

- (a) The ribosome moves along a mRNA to add amino acids to the growing peptide chain.
- (b) m RNA attaches to a ribosome.
- (c) DNA produces mRNA.
- (d) t RNA brings an amino acid to its codon on m RNA.
- (e) A completed polypeptide is released.

Good Luck

Examination of Organic Chemistry (411C) for 4 th Level Students
(Petroleum chemistry, Petrochemicals and Chromatography)

Answer the following three sections

(50 mark)

Section (A): Petroleum chemistry

(17 Marks)

Answer the following questions:

1- (I) Answer three only of the following questions:

(6 Marks)

- Discuss the characteristics of nitrogen-compounds present in the crude oils?
- Describe in details the thermal conversion processes (Visbreaking & Delayed coking)?
- What are the definitions of API-gravity and Watson factor (UOP)? How can their values useful in determining oil quality?
- Describe fully the functions of batch and continuous distillation columns?

(II)- Detail the purpose and relative merits of hydrocracking processes of heavier feedstocks? (3 Marks)

2- (I)- Explain briefly two only of the following:

(4 Marks)

- Desalting of crude oils
- Octane number & Oxygenate additives
- Propane deasphalting

3- Answer two only of the following questions:

(4 Marks)

- Describe the lead doctoring of gasoline and catalytic desulfurisation processes?
- Explain briefly atmospheric distillation of crude oil and vacuum distillation of reduced crude oil?
- Discuss the principles of solvent extraction and dewaxing processes of lubricating oils?

Section (B): Petrochemistry

(17 Marks)

Answer the following questions:

1- Answer three only of the following questions:

(6 Marks)

- Outline the important petrochemicals based on isobutylene?
- Describe in details the production mechanism of methanol over heterogeneous catalyst?
- Explain by equations the preparation of ethanolamines by amination process?
- Describe the acetaldehyde manufacture steps by air oxidation of ethylene?

12,

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three only of the following items:

(6 Marks)

- a) Methanation process
- b) Single Cell Protein (SCP)
- c) Degussa process
- d) Teijin oxychlorination method

3- Answer two only of the following:

(5 Marks)

- a) Briefly describe the manufacture of acetic acid over rhodium catalyst?
- b) Discuss the production of hydrocarbons from methanol (MTG-Process)?
- d) Outline the *n*-Butanol synthesis by Aldol condensation of acetaldehyde?

Section C Chromatography

(16 mark)

Write on Only Four of the following:

- 1-Ternary system, Coloumbs law and Van demeeter Equation..
- 2-Instrumentation, advantages, disadvantages and methods of location of organic compounds in thin layer chromatography (TLC)
- 3-Three methods of open column chromatography.
- 4-Instrumentation, derivatisation and applications gas chromatography (GC).
- 5-Instrumentation of high performance open liquid chromatography (HPLC) and high voltage electrophoresis apparatus (HVE).

Good Luck



Assiut University
Faculty of Science
Chemistry Department



Jan. 2015
Time: 2 hours
(50 Marks)

First semester for Biological Students
Subject: Analytical Chemistry (C- 460)

Answer the following questions:

1- Answer two only from the following: (12.5 marks)

a- Write on the following:

i- Electrochemical cells.

ii- Half wave potential and factors affected on it.

b- Show how can you prevent silver chloride from its interaction with silver thiocyanate ions in Volhard"s method.

c- Define the following:

i- Reducing agents and oxidizing agents.

ii- Fajan method.

2- Answer two only from the following: (12.5 marks)

a- An unknown solution containing lead gives a diffusion current of 11,7 μ A. What is the concentration of lead ions in this solution? The diffusion coefficient for lead 1.01×10^{-5} cm²/sec and the mercury drop characteristics are m=1.9mg/sec and t= 3.47 sec/drop.

b- Complete:

i- In the titration of strong acid with strong base the indicator is -----, while the indicator ----- is used in the titration of week acid with strong base and -----are used in the titration of week acid with week base.

ii-The adsorption indicator are acidic dyes ----- or basic dyes ----- In Mohr method the indicator is -----while in Volhard method ----- or ----- used as indicator.

c- Give the reason for:

i- Nitric acid is used in Volhard method.

ii- Supporting electrolyte is used in polarographic analysis.

3- Answer two only from the following: (12.5 marks)

a- Write on:

i- Limitation of argentometric titration.

ii- Concentration cell with an example.

b- Determine the potential of platinum indicating electrode if dipped in a solution containing 0.1 M Sn⁺⁴ and 0.01 M Sn⁺². $E^\circ = - 0.15V$

c- Compare between the equivalent weight for KMnO₄ in acidic and basic medium and the equivalent weight for K₂Cr₂O₇.

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4- Answer two only from the following: (12.5 marks)

a - Write the relation between $E_{1/2}$ and i_d in polarographic technique.

b- Write on:

i - The application of potentiometric titration.(three only).

ii- Nernst equation

c- Show how you can use polarographic technique in qualitative and quantitative analysis.

d- Drive the pH for the titration of 100ml 0.1 N NH_4OH with 0.1N HCl at the following: $k_b = 1.35 \times 10^{-5}$

- at the beginning

- at the end point

- after the end point

-----Good Luck-----

Examiner : Azza M.M. Ali

Final Examination of Petroleum and Petrochemicals Students (451C)

Answer the Following Questions

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1. Write short notes of the following: (10 marks)
- Octane number and its importance.
 - The advantages of hydrocracking process.
 - Draw and discuss of visbreaking process.
2. Give an account on the following: (10 marks)
- Aniline point and its significant.
 - Write by equations Doctor sweetening of oil products?
 - Draw and discuss of delay coking process
3. Discuss the following: (10 marks)
- Give an examples, the nitrogen compounds as petroleum compositions.
 - Draw and discuss vacuum distillation for residual products.
 - The reasonable cause of migration of petroleum crudes?
4. Explain the following points: (10 Marks)
- Effect of sulfur compounds on kerosene fractions.
 - Paraffin-Base crude oils as type of crude oils.
 - Freezing point of aviation fuels and its importance
5. Write on the following: (10 Marks)
- H_2SO_4 as solvent extraction for sulfur reduction and the problems of its use.
 - Discuss by equation, effect of hydrogenation process on naphthalene in one route?
 - Draw and discuss of the Thermoform cracking process.

مع تحياتي بالنجاح والتوفيق
أ.د. عبدالعال جابر



Department of Chemistry

C-441: Anal Chem II (Analytical and Bioanalytical Chemistry), Jan 2015

Final- Term examination

Time Allowed: 2 Hours

Answer **Only five** of the following questions: **(50 Marks)**

- A. Define the following terms: **(10 Marks)**
Chemometrics- Quality control measures- Quality assurance vs. Quality control.
- B. Explain how you can use capillary electrophoresis to calculate zeta potential.
(10 Marks)
- C. State the different methods of sample ionization applied to mass spectrometric analysis. **(10 Marks)**
- D. Explain how can mass spectrometry help biochemists? **(10 Marks)**
- E. Write the equation relating the electrophoretic mobility, electrophoretic velocity and the electric field strength for capillary electrophoresis. What are the important features to be deduced from this equation? **(10 Marks)**
- F. Complete: **(10 Marks)**
- The initial calibration verification (ICV) is evaluated to assess
 - Mass spectrometry is an analytical tool used for measuring theof a sample, mass spectrometers are used in industry and academia for both routine and research purposes, the major mass spectrometric applications are in,,,, and.....
 - Environmental monitoring programs are to resist and have a known effect.
 - The first step in understanding the potential biological impact of ECs in the environment is to, innovative need to be coupled with which can confirm the identity of targeted and unknown chemicals at trace concentrations in complex environmental samples.
 - In surface water analysis, common samplers include, and
 - In HPLC, Changes in flow rate can influence bothand analysis. If these change as a result of flow rate changes, especially during the analysis of complex mixtures, component location and identification becomes

Good Luck

Prof. Nagwa Abo El-Maali

Answer the following questions (17 Marks)

1. Explain the following:
 - i) The mechanism of coupling reaction in azo dye production in industry.
 - ii) Cyanine chromogen and color formation.
 - iii) Important grinding variables in mechanical pulping in paper industry.
 - iv) Donner –acceptor rule for disperse azo dyes used for dyeing synthetic fibers.
 - v) General characteristics of Kraft pulping.
 - vi) White liquor, black liquor and green liquor in papermaking process.
2. Answer the following (12 Marks)
 - i) Discuss the composition and properties of **TWO** of the following whiteware ceramics: Earthenware – Porcelain – Bone china
 - ii) Suggest the probable products produced upon hydration of dicalcium and tricalcium silicates, tricalcium aluminate and tetracalcium aluminoferrite in cement industry.
3. Answer the following (12 Marks)
 - i) "Rolling" and "float" are two processes used for sheet or flat glass. Sketch a diagram for **ONE** of these two processes giving a comment on the diagram.
 - ii) " Manufacture of simple superphosphate fertilizer includes two stages followed by ageing and neutralization of the product". Discuss each stage giving chemical equations when possible.
4. Give in details the manufacture of **ONE** of the following (9 Marks)
 - i) H_2SO_4 by the contact process
 - ii) Na_2CO_3 by the Solvay process

Good Luck

Examiners: Prof. Dr. Soud Abd El-Monem

Prof. Dr. Aref A. M. Aly



Assiut University

Surface Chemistry & Electrochemistry for 4th Levels students (Chem.432)
(Chemistry Major)



Faculty of Science
Chemistry Department

Time: 3 hrs.
Date : Jan. 2015

Answer the Following Questions:

Section (I) Surface Chemistry

1. Answer the following question:

Define the following terms:

(3 $\frac{1}{3}$ Marks)

- a) Adsorption isotherm b) Catalyst deactivation c) Monolayer
d) Promoters e) Frenkel defects f) Ionization energy.
g) Turnover number

2. Answer only five questions from the following:

(6 Marks for each)

- a) Explain the role of non-stoichiometry in the solid compounds on their electrical conductivity.
b) Mention the factors affecting thermal conductivity of solids and derive an equation that be used for calculation of specific heat of solids.
c) What is meant by catalyst support and mention its desirable characteristics.
d) Explain the factors responsible for the deactivation of the catalysts.
e) Compare between physical and chemical adsorption.
f) Apply the BET equation for calculation of specific surface area of a catalyst from the adsorption isotherm.

Section (2) Electrochemistry

Answer three only of the following:

(16 $\frac{2}{3}$ Marks)

- (1) Determine the corrosion rate by two methods ?
(2) Discuss the main causes of corrosion process ?
(3) Explain how you can select the proper metal to be used from active –passive parameters (by drawing and discussion) ?
(4) Write on the type of inhibitor from Evan's diagram ?

(Good Luck)

Examiners: Prof Prof. Abd El-Aziz A. Said & Prof. Mostafa .H. Wahdan

Final Examination of Biomolecules 413 C (First Group)

Answer All the following questions

Question No. 1 (12.5 Marks)

Write briefly on Five only of the followings:

- | | |
|---------------------------|--------------------------|
| (a) Derived lipids | (b) Types of Cholesterol |
| (c) Essential fatty acids | (d) Zwitter ion |
| (e) Cellulose Xanthate | (f) True waxes |

Question No. 2 (12.5 Marks)

Draw the structural formula of Five only of the following biomolecules:

- | | |
|--------------------------|--------------------------------|
| (a) Cytidine | (b) Adenosine 5'-Monophosphate |
| (c) Guanosine | (d) Ergosterol |
| (e) 1-Stearo-2,3-diolein | (f) ∞ - Cephalin |

Question No. 3 (12.5 Marks)

Show by equations how the following transformations are carried out:

- (a) Arabinose to Ribose
- (b) Fructose to Isoglucosamine
- (c) Glucose to Glucouronic acid
- (d) Glucose phenylosazone to Glucose phenylosotriazole
- (e) Glucose to Fructose

Question No. 4 (12.5 Marks)

- (a) Lipids are important dietary constituents. Comment.
- (b) Explain using equations both of Gabriel's method and its modification for preparation of alanine and aspartic acid respectively

GOOD LUCK

أ. د. / عطيفى عبد الغفار

Final examination in **the Chemistry of Biomolecules 413 C** (Carbohydrates, Proteins, Lipids and Nucleic acids) for 4th level students

Answer the following questions----- 50 Marks

Question 1 Answer **five** only of the following----- **17.5 Marks**

- a- Determination of the structure of D-glucose
- b-Descent of the sugar series(whole method)
- c-Oxidation of sugars to aldonic acids(suggest a mechanism)
- d-Epimerisation of aldohexoses in alkalies
- e-The biosynthesis of glycogen from D-glucose
- f-Put the sign(✓) on the right sentence and sign(x) on the wrong one
- i-D-fructose exists in the pyranose structure
- ii-Sucrose classified as reducing sugar
- iii-Oxidation of sugars by nitric acid gives uronic acids


Question 2 Answer **five** only of the following----- **17.5 Marks**

- a-Reduction of fructose
- b-Give a brief account about the following –i Rayon(regenerated cellulose)
ii-Acid hydrolysis of maltose
- c-Synthesis of L-phenylalanine amino acid
- d- What are the conjugated proteins ?
- e- Show by equation, what the amino acid when heated with barium hydroxide solution gives histamine
- f-Preparation of amino acids using Gabriel's method

Question 3 Answer **five** only of the following ----- **15 Marks**

- a- What are the essential fatty acids?
- b- The structure and importance of phosphatidic acids
- c- Draw the structure of the following i-Cetyl palmitate , ii-Sphingomyelins
- d- What is the nucleoside?
- e- Saponification of fats and oils
- f- Components of nucleic acids and show their base catalyzed hydrolysis

Good luck

Prof.Dr.Sh.M.Radwan 



Assiut University
Faculty of Science
Chemistry Department



Date: Jan. 2015
Time allowed: 3 hrs.

11

Final Examination of Chemical Instrumental Analysis Course (C-445)
Subject: Final Exam of (C-445)
Students: Fourth level students, Faculty of Science

-
- 1- Write on **Only Two** of the following: (12.5 Marks)
- Stripping Voltammetry.
 - i- Solvent extraction technique in chemical analysis.
ii- The distribution coefficient for X between n-hexane and water is 9.6. Calculate the concentration of X remaining in the aqueous phase after 50 ml of 0.150M X is treated by extraction with the following quantities of n-hexane:
(a) one 40.0 ml portion.
(b) two 20.0 ml portions.
(c) differential pulse polarography.
- 2- Write on **Only Two** of the following: (12.5 Marks)
- Amperometric titration.
 - i- Ilkovic equation.
ii- If the flow rate of mercury is 15 mg/ drop and the drop time is 4.0 seconds per drop; Calculate the expected diffusion current for the reduction of 5.0×10^{-4} M Zn^{2+} which has a diffusion coefficient of 0.72×10^{-5} cm²/sec.
c) Application of Masking reagents in chemical analysis.
- 3- Answer **Three Only**: (12.5 Marks)
- Define: absorbance, transmittance, absorptivity and molar absorptivity.
 - Write briefly on photometric titrations.
 - Calculate the dissociation constant of 2-nitro-4-chlorophenol in water at 25°C from the data taken at 427 nm. The absorbance of undissociated phenol measured in 0.01 M HCl was 0.062, the absorbance of the fully ionized phenol measured in 0.01 M NaOH was 0.855 and in a buffer solution of pH 6.22 the absorbance was 0.356.
 - The drug tolbutamine (M.wt=270) has a molar absorptivity of 703 at 262 nm. One tablet is dissolved in water and diluted to a volume of 2L. If the solution exhibits an absorbance of 0.687 at 262 nm in a 1-cm cell, how many grams tolbutamine are contained in the tablet?

(2)

4- Answer **Three Only:** (12.5 Marks)

- a) Define: chromophore, auxochrome, hypochromism, and isosbestic point.
- b) Write briefly on the spectrophotometric determination of the stoichiometric ratio of a complex.
- c) 0.1 mg of anthracene ($C_{14}H_{10}$), dissolved in 100 cm^3 of dry cyclohexane and placed in 1-cm cell, gave an absorbance of 1.01 at 256nm: If one gram of dry soil was extracted with 100 cm^3 of dry cyclohexane and gave an absorbance of 0.32 under the same conditions, what was the concentration of anthracene in the soil in mg/kg?
(At. wt. C=12, H=1)
- d) Compounds X and Y absorb in the UV region. X exhibits an absorption maximum at 267 nm ($a=157$) and a tailing shoulder at 312 nm, ($a=12.6$). Y has an absorption maximum at 312 nm ($a=186$) and does not absorb at 267 nm. A solution containing the two compounds exhibits absorbances (using 1-cm cell) of 0.726 and 0.544 at 267 and 312 nm respectively. What are the concentrations of X and Y in mg / L ?

Good Luck,,,

Examiners: Prof. Dr. Mahmoud A. Ghandour.

Prof. Dr. Hasan M. Sedaira.