



Final Exam. of Instrumental Analysis of BSc 4<sup>th</sup> year students (C-445)

Section: A

(Mark: 25)

I) Choose the correct answer of the Following questions:

(Mark: 5)

- 1) The turbidity produced by suspended solution is given by:  $S = \dots\dots\dots$   
a)  $h\gamma c$     b)  $Kbc$     c)  $mgC$
- 2) The wavelength (nm):  $\lambda = \dots\dots\dots$   
a)  $Cx\gamma$     b)  $\frac{C}{\gamma}$     c)  $nh\gamma$
- 3) In nephelometric measurements is the light source and receptor at  $\dots\dots\dots$   
a) left angle    b) zero angle    c) right angle

Complete the Following questions:

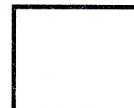
- 4) The total power radiated by the atom in flame AAS technique  $P_T = \dots\dots\dots$
- 5) The Boltzmann distribution equation in AAS:  $\frac{N_i}{N_0} = \dots\dots\dots$

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II) Deduce the fundamental of Beers-Lambert laws in Analytical Absorption Spectroscopy (UV-Visible absorption spectroscopy)

(Mark: 5)

**Second Question: Answer Only Two from the following: (12.5 Marks)**



**(1) Write on the following:**

**(a) The principle of electrochemical biosensor (Give an example).**

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**(b) Role of auxiliary electrode: (with drawing)**

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**(2) (a) The drug gatifloxacin (GTFX) gives an adsorptive stripping voltammetric peak at a carbon-paste electrode. A 50.0 mL sample containing GTFX yielded a peak height of 0.37  $\mu$ A. When 2.0 mL of 3.0  $\mu$ M GTFX was spiked to the sample, the peak increased to 0.80  $\mu$ A. Find the concentration of gatifloxacin in the sample.**

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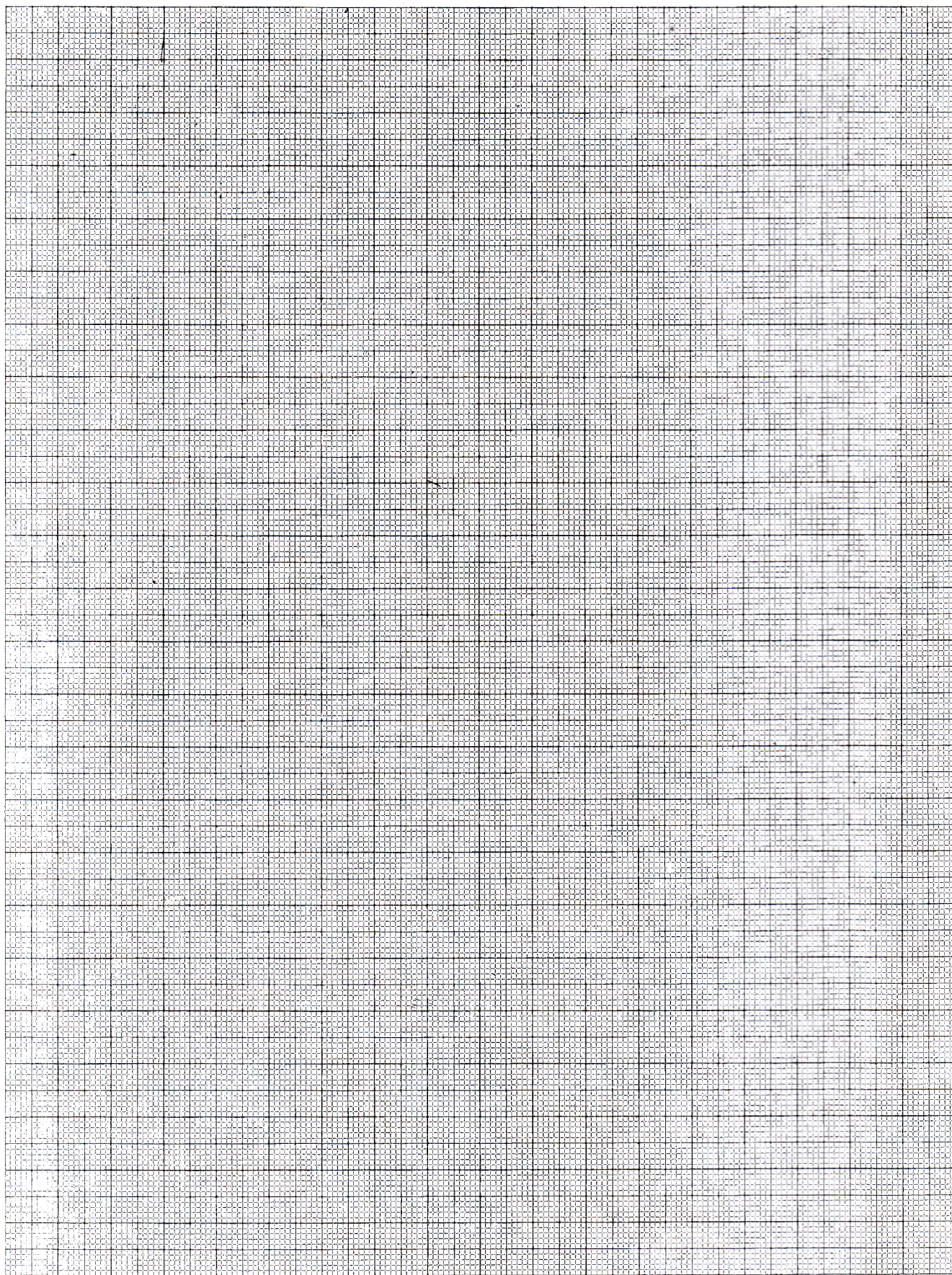
**(3) Write on the following:**

**(a) Ilkovic equation**

**(b) Randles-Sevcik equation**

**(c) Advantages to measuring the difference current in square wave voltammetry**









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**(3) Write on the following:**

**(a) Amperometry.....**

### (b) Anodic stripping voltammetry

### (c) Adsorptive stripping voltammetry

♥♥ GOOD LUCK ♥♥

**Examiner: Dr. Hossieny Ibrahim**



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)

1- Choose the correct answer for five only of the following: (tabulate your answer)

1- The characterization factor of a crude oil is calculated as 12.5. It means that; it is

- a) paraffinic      b) naphthenic      c) intermediate      d) none of these

2- In distillation technique, when vapour of boiling oil is cooled and condensed, the condensate will contain

- a) the more volatile components  
b) the less volatile components  
c) a mixture of two components  
d) the original mixture will contain less volatile components

3- Nitrogen content occur in crude oil in simple form of rings

- a) pyridines & pyrroles      b) pyrazoles & phenols      c) esters & ketones      d) fluorenes & BTXs

4- Which of the following is the most important property for a jet fuel?

- a) Cloud point      b) Pour point      c) Colour      d) Freezing point

5- Isomerization converts the \_\_\_\_\_ to *t*-paraffin's.

- a) paraffins      b) olefins      c) naphthenes      d) none of these

6- Doctor's solution used for sweetening of petroleum products is

- a) sodium plumbite      b) sodium sulphite      c) sodium thiosulphate      d) lead sulphate

2- Explain briefly three only of the following: (6 Marks)

- a) Octane number & Oxygenate additives      c) Alkylation mechanism of isobutene  
b) Solvent dewaxing & Propane deasphalting      d) Visbreaking & Delayed coking

3- Answer two only of the following questions: (6 Marks)

- a) Describe the Correlation index and Watson factor (UOP)? How can their values useful in the determination of oil quality?  
b) Discuss in detail, the catalytic reforming process? What are the various reactions involved in catalytic reforming?  
c) Outline the functions of batch and continuous distillation columns? State the classification of continuous distillation columns?

Section (B): Petrochemistry

(17 Marks)

1- Choose the correct answer for five only of the following: (tabulate your answer)

1- Rashig process used in  $\text{NH}_2\text{NH}_2$ -production by oxidation of ammonia using

- a)  $\text{NaOCl}$  catalyst      b)  $\text{H}_2\text{O}_2$  catalyst      c)  $\text{KMnO}_4$  catalyst      d) Air- $\text{O}_2$  catalyst

باقي الأسئلة في الصفحة التالية

- 2- Problems encountered in the Oxirane process for ethylene glycol synthesis are
- corrosion caused by acetic acid
  - incomplete hydrolysis of the acetates
  - separation of glycol from unhydrolyzed monoacetate is hard
  - all of the above
- 3- Which of the following polymer is made from terephthalic acid and ethylene glycol?
- Dacron
  - Nylon 66
  - Rubber
  - Lexan
- 4- Catalytic oxidation of *n*-butane at 490° over a cerium chloride, Co-Mo oxides catalyst produces
- acetic anhydride
  - maleic anhydride
  - phthalic anhydride
  - succinic anhydride
- 5- TAME can also be produced by the reaction of
- methanol and isoamylene
  - ethanol and isobutene
  - methanol and isobutene
  - methanol and ethylene
- 6- The production process using a zinc-chromium oxide catalyst at a high-pressure 270–420 atms applied for
- butanol production
  - acetaldehyde production
  - methanol production
  - acetic acid production
- 2- Explain briefly *three* only of the following: (6 Marks)
- Hydration of ethylene
  - Uses of propylene oxide
  - Wacker process
  - TAME & MTBE synthesis
  - Propane chemicals
- 3- Answer *two* only of the following questions: (6 Marks)
- Outline the important petrochemicals based on Isobutylene?
  - Describe in details acetic acid synthesis by newer process uses a rhodium complex catalyst?
  - Outline three methods for manufacturing adiponitrile?

### Section (C): Chromatography

Write on only *four* of the following:

(16 Marks)

- Ternary system, Coloumb,s law and Van Deemter equation.
- Instrumentation, advantages, disadvantages of thin layer chromatography (TLC) and methods of location of the separated organic components on it.
- Organic resins, gel and flash chromatography of open column chromatography (HPLC).
- Instrumentation, derivatisation and applications of gas chromatography
- Instrumentation of high performance liquid chromatography (HPLC) and high voltage electrophoresis (HVE).

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*Good Luck*





**Selected Topics in Inorganic Chemistry C-423 (Final Examination)**

**Question # 1 (Metallurgy Section):**

**(17 Marks)**

**A. Explain the following using thermochemical equations**

**(4 Marks)**

1. Aluminium should be able to reduce  $\text{Cr}_2\text{O}_3$ .
2. In the Ellingham diagram, the line of formation of CO has the reverse slope to metal oxide lines.

**B. Comment for Three only of the following**

**(3 Marks)**

1. Cryolite is added to bauxite in the electrolytic extraction of aluminium.
2. Ferrosilicon process is used in the recovery of tin from slag.
3. The chief impurities of tin can be removed by its liquation.
4. The electrolytic refinery of copper is not as expensive as the other metals.

**C. Write the chemical equations explaining the extraction of Five only of the following metals from their ores**

**(10 Marks)**

1. Iron from haematite.
2. Magnesium from dolomite.
3. Tin from cassiterite.
4. Copper from chalcopryite.
5. Aluminium from bauxite.
6. Titanium from rutile( $\text{TiO}_2$ ).
7. Chromium from chromite.

**Question # 2 (Inorganic Biochemistry Section):**

**(17 Marks)**

**A. Define the following terms:**

**(5 Marks)**

- Ionophore
- Homeostasis
- Holoenzyme
- Biom mineralization
- Hard cations

**B. Discuss Three Only of the following:**

**(12 Marks)**

1. The dose - response curve of an essential element.
2. The function and composition of the protein transferrin.
3. The reason why zinc is considered the most common Lewis acid in bioinorganic chemistry.
4. The protein secondary structure.

**Question # 3 (Structural Inorganic Chemistry):**

**(16 Marks)**

**A. Answer Three only of the following:**

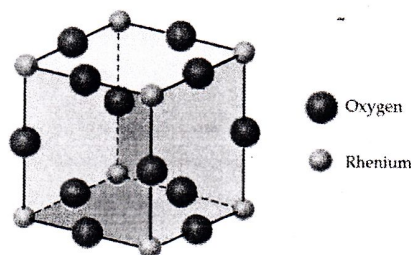
**(12 Marks)**

1. What is the linear density of metal atoms along the [100] direction in a primitive cube lattice? Consider a lattice constant of 0.2 nm.
2. Magnesium sulfide crystallizes in the sodium chloride structure. If the radius of  $\text{Mg}^{2+}$  ion is 72 pm and the radius of  $\text{S}^{2-}$  ion is 184 pm, Calculate the MgS density in  $\text{g/cm}^3$ ?
3. In zinc blende structure, how many zinc and sulfide ions are present in each unit cell and what kind of packing do these ions adopt.
4. What is meant by?
  - Anisotropy
  - Isotropy
  - Allotropy
  - polymorphism

**B. According to the picture, answer the following questions.**

**(4 Marks)**

- How many rhenium atoms are in each unit cell?
- How many oxygen atoms are in each unit cell?
- What is the formula of rhenium oxide?
- What is the geometry around each rhenium atom?



**Good Luck**

**The Examiners: Prof. Dr. Zaher Abd-Elmohsen & Dr. Ahmed Bayoumi.**





**Final Exam. of Petroleum & Petrochemicals course for (451C)  
Students**

Answer the following questions:

1- I- Answer **two only** of the following:

(10 Marks)

- Oxygen compounds as petroleum compositions.
- Write by equations hydrotreatment process of thiophene.
- Starting with ethane, how can you prepare of polyvinyl chloride?

II- Draw and discuss fluid catalytic cracking process.

2- I- Discuss **two only** of the following points:

(10 Marks)

- Engler theory of petroleum in nature and its advantages.
- Importance of Hydrocracking processes.
- Starting by benzene, how can you prepare of DDT as pesticide industry?.

II- Write by equations, if you have n-hexane as feedstock and catalyst, what are the three basic functions in the catalytic cracking processes for n-hexane?

3- I- Explain **two only** of the following:

(10 Marks)

- Freezing point for aviation fuels and its significant.
- Asphaltic base crude oils.
- Effect of sulfur compounds in gasoline.

II- Draw and discuss of isomerization process for n-pentane.

4- I- Give an account **two only** on the following:

(10 Marks)

- Conc.  $\text{H}_2\text{SO}_4$  as solvent extraction method for desulfurization process and its problems..
- Starting with methane, how can you prepare formaldehyde and its uses?
- Viscosity index and its examples.

II- Draw and discuss delayed coking process and types of coke.

5- I- Write a short notes **two only** of the following:

(10 Marks)

- If you have conc.  $\text{H}_2\text{SO}_4$  as catalyze, propylene and isobutane, write by equations, what the alkylation process for them?
- Difference between Conc.  $\text{H}_2\text{SO}_4$  and HF alkylation processes.
- Importance of desalting processes for crude oils.

II- Draw and discuss visbreaking process and its significant.

مع تحياتي بالنجاح والتوفيق  
أ.د. عبدالعال جابر



Faculty of Science  
Chemistry Department



Time: 2 hours  
Jan 2018

**Analytical and Bioanalytical Chemistry (C-441) Final Exam**

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

- 1- Define the following Terms: (10 Marks)**
- Quality assurance in analytical Labs - Factors influencing quality
  - Standard operating procedures- Proficiency testing- Internal standard.
- 2- Write on chromatography basics, its types, how separation occurs and factors affecting the separation process. (10 Marks)**
- 3- State: (10 Marks)**
- a- The general factors increasing resolution in chromatography.
  - b- Why does separation of amino acids a challenge.
  - c- Why do we purifying genomic DNA?
  - d- The basis of Electrophoretic Separations.
  - e- Methods for DNA isolation from human blood.
- 4- Write On: (10 Marks)**
- a) The functions of RNA.
  - b) Denaturing agents.
  - c) DNA Transcription
  - d) RNAs as enzymes.
- 5- A certain solution in a capillary has a electroosmotic mobility of  $2.1 \times 10^{-6}$  m<sup>2</sup>/Vs at pH 2.5 and  $9.3 \times 10^{-6}$  m<sup>2</sup>/Vs at pH 11. How long will it take a neutral solute to travel 52 cm from the injector to the detector with 23 kV applied across the 63 cm long tube? (10 Marks)**
- 6- Discuss how you can analyze quantitatively both DNA and RNA. (10 Marks)**

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**Good Luck**

*Examiner: Prof. Nagwa Abo El-Maali*



Assiut University  
Faculty of Science  
Chemistry Department



January : 2018  
Time : 2 hours

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

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

**Q1) Answer Only Two from the following: (12.5 Marks)**

**a) Write on the following:**

- i - Buffer solutions.      ii - Half wave potential and factors affected on it.

**b) Define the following :**

i - Ilkovic equation. Calculate the diffusion current ( $i_d$ ) for the reduction of  $5 \times 10^{-4} \text{ M Zn}^{2+}$  which has diffusion coefficient ( $D$ ) =  $0.72 \times 10^{-5} \text{ cm}^2 \text{ sec}$ ,  $m = 15 \text{ mg/sec}$ , and  $t = 4 \text{ sec/drop}$ .

ii - Specific conductivity, molar conductivity and equivalent conductivity.

c) Show how you can prevent silver chloride from its interaction with silver thiocyanate ions in Volhard's method

**Q2) Answer Only Two from of the following: (12.5 Marks)**

**a) If you are provided with 0.1M  $\text{NH}_4\text{OH}$  (100 ml) and titrated with 0.1M  $\text{HCl}$ .**

Drive the pH value: ( $k_b = 1.35 \times 10^{-5}$ )

- i - at the beginning of the titration,      ii - during the titration and      iii - at the end point.

**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 the indicators ----- are used in redox titration.

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

**c) Define the following:**

i – Beer- Lambert law.

ii- Acid -base indicators.

iii - The oxidizing agent and the reducing agent.

**Q3) Answer Only Two from the following: (12.5 Marks)**

**a) Compare between the equivalent weight for  $\text{KMnO}_4$  in acidic and basic medium and the equivalent weight for  $\text{K}_2\text{Cr}_2\text{O}_7$ .**

**b) Write on the following:**

- i - Limitations of argentimetric titrations.      ii - Standard hydrogen electrode.

c) Lingane equation and show how you can use polarographic technique in quantitative analysis.

**Q4) Answer Only Two from the following: (12.5 Marks)**

**a) Define Nernst equation. Determine the potential of platinum indicating electrode if dipped in a solution containing 0.1 M  $\text{Sn}^{+4}$  and 0.01 M  $\text{Sn}^{+2}$ .  $E^\circ = 0.15 \text{ V}$**

**b) Write on the following:**

i - The applications and the determination of equivalent point in potentiometric titration.

ii - Limitation of volumetric precipitation titration reaction.

**c) Give the reason for:**

i - Supporting electrolyte is used in polarographic analysis.

ii - Mohr method is applicable in neutral solution.

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

Examiner: Prof. Dr. Azza M.M.Ali



- 4) Reaction of glycine with nitrous acid gives:  
 a) Hippuric acid.      b) Nitrogen gas.      c) Glycolic acid      d) b & c.
- 5) The sequence of amino acids in a polypeptide chain is called:  
 a) Primary structure    b) Secondary structure    c) Tertiary structure    d) Quaternary structure
- 6) Which of the following fats has the highest iodine value?  
 a) Tripalmitin.      b) Stearo-diolein.      c) Palmito-oleo-stearin.      d) Triolein.
- 7) Rancidity increases as:  
 a) The molecular weight increase.      b) The molecular weight decrease.  
 c) The number of double bonds increases.      d) The number of double bonds decreases.
- 8) Which of the following fatty acids has the **lowest** melting point?  
 a) Palmitic acid      b) Oleic acid      c) Linoleic acid      d) Linolenic acid
- 9) Alkaline hydrolysis of oils leads to the formation of:  
 a) Metallic salt of fatty acids and glycerol    b) Fatty acids and metallic salt of glycerol  
 c) Metallic salt of fatty acids and metallic salt of glycerol    d) Soap only
- 10) The complementary base sequence for matching strand in the following DNA section:  
 -A-G-T-C-C-A-A-T-G-C- is:  
 a) -T-C-A-G-G-T-T-A-C-G-      b) -C-A-G-G-T-T-A-C-G-T-  
 c) -C-G-T-C-A-G-G-T-T-A-      d) -A-C-G - G-G-T-T-A-C-G-

**V. Put (✓) in the front of the correct Statement and (X) in the front of the wrong one: (10 Marks)**

- 1- D-glucose and D-galactose are epimers and give the same osazone.
- 2- Reduction of fructose gives sorbitol and mannitol.
- 3- The gradually change of rotation of  $\alpha$ - and  $\beta$ -D-glucose to equilibrium value is called mutarotation.
- 4- The cyclic structure of glucose is formed by interaction of -CHO with -OH on C4.
- 5- The type of the peptide glycyl-L-alanyl glycine is dipeptide.
- 6- The antiparallel strands of DNA are not identical, but are complementary.
- 7- Deoxyadenosine-5'-phosphate is nucleotide of RNA.
- 8- Acid value is a measure of rancidity.
- 9- Oils with high acetyl number are toxic.
- 10- Dialysis is a property which used to separate proteins from small molecular weight compounds.

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**Good luck**

Prof. Dr. Etify A. Bakhit & Prof. Dr. Mohamed S. Abbady

Final exam of Chemistry of biomolecules (413C) for double major-chemistry Students  
(Chemistry of carbohydrates, amino acids & proteins, Lipids and nucleic acids)

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Answer the following questions:

I. (10 Marks)

A) Define the following terms:

- 1) Epimers. 2) Isoelectric point of amino acid. 3) Acid value. 4) Anomers. (4 Marks)

B) Conduct a comparison between:

- i) Waxes and fats & oils. ii) DNA and RNA. (6 Marks)

II. (10 Marks)

A) Write short notes on: (6 Marks)

- i) Hazards of rancid fats ii) Disadvantage of soap iii) Disadvantage of hydrogenated oils.

B) A simple triglyceride has molecular weight 879.38 and iodine value equal to 173.3:

a- calculate the number of double bonds in the molecule of this oil.

b- Calculate the saponification of this oil.

[A.Wt. of iodine =127; potassium=39; oxygen=16; hydrogen=1] (4 Marks)

III. Show how can you do only four of the following: (10 Marks)

- a- Conversion of glucose to fructose.
- b- Conversion of fructose to glucose.
- c- Synthesis of aspartic acid by modified Gabriel's synthesis.
- d- Reaction of glycine with formaldehyde and with benzoyl chloride.
- e- Conversion of arabinose to glucose.

IV. Choose the correct answer of the following: (10 Marks)

1) Oxidation of glucose with nitric acid gives:

- a) Saccharic acid b) Gluconic acid c) Glucuronic acid d) Glycolic acid

2) Lactose is a reducing sugar and consists of:

- a) Glucose + fructose, linked 1-2'. b) Two glucose units linked 1-4'.  
c) Galactose + glucose linked 1-4'. d) Two glucose units linked 1-5'.

3) The presence of solid  $\alpha$ -amino acids as Zwitter ion explains:

- a) Its high melting points. b) Low solubility in organic solvents.  
c) a & b. d) None of them.

- انظر خلفه باقي الاسئلة -

- 4) Reaction of glycine with nitrous acid gives:  
 a) Hippuric acid.      b) Nitrogen gas.      c) Glycolic acid      d) b & c.
- 5) The sequence of amino acids in a polypeptide chain is called:  
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**Good luck**

Prof. Dr. Etify A. Bakhit & Prof. Dr. Mohamed S. Abbady



جامعة اسيوط

كلية العلوم- قسم الجيولوجيا

الزمن ساعتان

امتحان مقرر عمليات تكوين الخامات (438ج)

للمستوى الرابع (شعبة كيمياء - جيولوجيا)

العام الدراسي 2016/2017

الفصل الدراسي الاول

**Answer FOUR questions only of the following (50M)**

**Q1 (12.5 M)**

Give short notes about the following?

- i- Black smokers
- ii- Taconites
- iii- Oil Shale

**Q2 (12.5 M)**

- i- Explain the mechanism of formation of the volcanogenic massive sulfide deposits?
- ii- Discuss the importance of coal as a type of energy resources?

**Q3 (12.5 M)**

- i- Write on the hydrothermal mineral deposits?
- ii- Compare between residual deposits and evaporite deposits?

**Q4 (12.5 M)**

- i- Mention the general characteristics of the banded iron formations?
- ii- Explain the importance of pegmatites?

**Q5 (12.5 M)**

- i- Write on the characteristics of stratabound deposits?
- ii- Discuss the useful mineral associated with placers?

Chemistry Department

Dec. 2017

Faculty of Science

Time: 3h

Assiut University

Final exam for the 4<sup>th</sup> level students in "Industrial Chemistry" (course 453C)

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Part I

1. Answer the following (18 Marks)
  - i) Give short notes on the following items from the glass industry:  
Annealing of glass – chemical reactions occurring during glass formation – soda-lime glass.
  - ii) Write on the major environmental impacts caused by glass industry.
  - iii) Give the properties and uses for **TWO** of the following ceramics:  
chemical stoneware – porcelain – Bone china
2. Answer the following (17 Marks)
  - i) Illustrate (using equations and comments) the main hydration reactions that calcium aluminate ( $C_3A$ ) experiences in absence and presence of gypsum upon mixing Portland cement with water.
  - ii) Give in details the manufacture of  $Na_2CO_3$  using the Solvay process.
  - iii) Describe the wet process (sulphuric acid process) used for the production of phosphoric acid.

أنظر خلفه حيث بقية الأسئلة

## Part II

Answer the following ( 15 Marks)

1. Explain the relation between color and structure in organic molecules.
2. Discuss the reaction mechanism of the diazotisation reaction of primary aromatic amines in the industrial production of azo dyes referring to the effects of substituents on the diazotisation and stability of the resulting diazonium salt.

Good Luck

Examinars

Prof. Dr.Soud Abd Elmonem

Prof. Dr. Aref A. M. Aly





Final Examination for B.Sc. (Chemistry major)  
Applied Organic Chemistry (412 C): (Textiles & Dyes & Polymers & Material science)

Date: Tuesday , 9/01/2018

Time: 2 hours.

Answer the following Two Sections:

Section A: (Textiles and Dyes Chemistry).

(25 points)

Answer the following:

- 1) Discuss and write examples on alicyclic and cyclic Chromogenes.
- 2) Explain the reaction mechanism of coupling reaction for production of Azo dyes.
- 3) Write on the morphology of wool fiber and compare it with that of cotton.
- 4) Write on the physical properties of fibers related to hand and appearance.
- 5) What is required for colored substance to be a dye?

Section B : (Polymers & Material Science)

(25 Points)

Answer the following questions:

- 1) What are the three main types of degradable plastics? Why are they degradable?
- 2) There is another kind of nylon called nylon-6. What is the structure of its monomer ?
- 3) Why would a hole appear when a dilute alkali is spilt on a fabric made of polyester?
- 4) Three things make the polymers are different from the simple molecules. Explain?
- 5) What is a peptide linkage? Illustrate your answer with 2-aminopropanoic acid ?
- 6) Complete the following table:

| Polymer       | Structural formula of monomer | Structural formula of polymer | Uses  |
|---------------|-------------------------------|-------------------------------|-------|
| Nylon-6,6     | (i)                           | (ii)                          | (iii) |
| Kevlar        | (iv)                          | (v)                           | (vi)  |
| Dacron        | (vii)                         | (viii)                        | (ix)  |
| Urea-methanal | (x)                           | (xi)                          | (xii) |

Good Luck

Examiners:

Prof. Dr. Saud A Metwally & Prof. Dr. Kamal I Aly

Assiut University  
Faculty of Science  
Chemistry Department



Final Examination in Petroleum & Petrochemicals (451C) for the 4th Level (  
Petroleum – Geology Program)

Date: Tuesday, 9/1/2018

Time: 2 hours.

Answer the following questions:

(50 Mark)

Question 1.

- a) Explain by equations the Doctor's sweetening process ?
- b) Write short notes on :-Non-Hydrocarbons in crude Petroleum.

Question 2.

- a) Explain the Carbide Theory for origin of the Petroleum and its defects.
- b) Discuss the Catalytic hydro-desulfurization process.

Question 3.

- a) Discuss the effect of sulfur compounds upon the Gasoline Product?
- b) Describe the Solvent Extraction methods for sulphur reaction.

Question 4.

- a) Discuss the following terms:  
Aniline Point                      Additives                      Freezing Point of Aviation Fuels
- b) Starting from the following building blocks , discuss what are the petrochemicals can be produced from it :
  - a) Methane
  - b) Propene.

Good Luck  
Examiner  
Prof. Dr. Kamal Ibrahim Aly