Assiut University

Faculty of Science

Chemistry Department

January, 2020

Time: 2 hr.

Final Examination for Applied Industrial Chemistry Students (Chem 409C, Petrochemicals)

Answer the following questions

1- Mark (√) for the right statement and (X) for the wrong one:

a) Methane reacts with sulfur at high temp. to give carbon disulfide.

b) HCN is produced via Andrussaw process using ammonia and methane in air.

c) Vinyl chloride is an important monomer for poly vinyl chloride.

d) Carbon tetrachloride is recycled to perchloroethylene.

e) Oxidation of acole in produces acrylic acid.

f) Oxidation of cyclohexane produces cyclohexanone.

g) Ethylbenzene is produced by catalytic alkylation of benzene with ethene.

h) Benzene oxidation is the oldest method to give maleic anhydride.

i) Oxidation of propylene produces acrolein.

j) Toluene and xylene are substituted benzene.

2- Answer two only of the following:

a) Study the effect of addition of CO to isobutylene under high pressures and in the presence of acid. What is the effect of hydrolysis on the product?

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b) The preparation of glycerol via allyl alcohol.

c) Study the effect of acid catalyzed hydration of isobutylene.

3- Complete ten only of the following equations:

a) $NH_3 + CH_3OH + O_2$ ----------->

b) $CH_2= CH_2 + HCl$ ----------->

c) $CHCl_3 + 2HF$ ----------->

d) $CH_3CH_2COOH + H_2NCH_2CH_2OH$ ----------->

e) $CH_3CH=CHCHO + H_2$ ----------->

f) $CH_2=CHCH_3 + O_2$ ----------->

g) $CH_2=CHCHO + H_2O$ ----------->

h) $CH_3CH_2COCH_3 + CH = CH$ ----------->

i) $CH_3CH=CH_2 + HOCl$ ----------->

j) $CH_3CH=CH_2 + CH_3COOH$ ----------->

k) Benzene + $CH_2=CH_2$ ----------->

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

Prof. Ali Ahmed Abdel Hafez

Assiut University Jan 2020

Faculty of Science Time: 3h

Chemistry Department

Final examination of the "Industrial Chemistry" course (code 453 C) for the 4th level students

Section I (15 Marks)

Answer the following

1. Write on the reaction mechanism of coupling reaction in production of mordant azo dyes referring to some organic ligands.

2. Vat dyes are very important in dying cotton:

a) Write on the general features of vat dyes.

b) Write a short method for the production of Indigo in industry.

3. Explain the relation between colour and constitution of coloured organic molecules.

Section II (35 Marks)

1. Give reasons for **SEVEN** of the following (14 Marks)

i) Phosphatic rock calcination before use in phosphatic fertilizer manufacture.

ii) Marls are excellent raw materials for cement production.

iii) Glazing of earthenware ceramic objects.

iv) Addition of arsenic oxide to glass melt.

v) In the "Solvay process" for Na_2CO_3 manufacture, the first step is to mix limestone with coke while supplying air.

vi) Fiberglass resists compressive and tensile forces.

vii) Advantages of electrothermal process of phosphoric acid production.

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viii) Glass objects should be subjected to annealing.

2. Mark the following with (✓) for the correct statement and with (✗) for the false one (8 Marks)

i) Glass-ceramic is a glass converted partially to crystalline ceramic by controlled devitrification. ( )

ii) In phosphatic fertilizer manufacture, cradle-to-grave refers to the lifecycle assessment from source extraction to the factory gate. ( )

iii) Mullite is the only stable compound of alumina and silica at high temperature in ceramic industry.

iv) Devitrification of glass is more likely on the tin side of the glass manufactured by the float process.

3. Complete the following (6 Marks)

i) The extrusion process in ceramic industry demands a……raw material which then forced through the die of the……

ii) Alumina content from feldspars serves to….and to…in glass industry.

iii) Preheater in cement industry consists of……and ……..

4. i) Give four important properties of glass-ceramics. (2 Marks)

ii) Write on the different chemical reactions of kaolinite during heating raw materials in ceramic industry. (5 Marks)

Good Luck

Examiners

Prof. Dr. Soud Abd El-Monem

Prof. Dr. Aref A. M. Aly

Assiut University **Date: January 2020**
Faculty of Science **Time allowed: 2 Hours**
Chemistry Department

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

Answer the following questions:

I. Write short notes on: **(10 Marks)**

i) On the molecular scale, discuss the relation between Soap and Detergents.

ii) Hazards of rancid fats. **iii)** Dialysis of proteins. **iv)** Prevention of rancidity.

v) Disadvantages of hydrogenated oils.

II. Show how can you do only five of the following: **(10 Marks)**

a- Conversion of aldoses to ketoses. **b-** Conversion of ketoses to aldoses.

c- Conversion of glucose to arabinose. **d-** Preparation of aspartic acid by Gabriel's synthesis.

e- Conversion of triolein to tristearin. **f-** Preparation of tryptophan by Erlenmyer synthesis.

III. A) Compare between the following pairs: **(6 Marks)**

i) Waxes and fats & oils. **ii)** DNA and RNA.

B) Give reason(s) for: **(4 Marks)**

a- The Fisher open structure does not account for all the reactions of glucose.

b- Soaps have slight irritating reaction.

c- D-glucose and D-galactose are epimers but they give different osazone.

d- The high melting points and low solubility in organic solvents of solid amino acids.

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

1) Separation of amino acid mixture by Electrophoresis depends on:

a) Isoelectric point. b) Solubility. c) Melting point. d) Boiling point.

2) Which one of the following amino acids has no stereocenter (has no chiral carbon atom):

a) Glycine. b) Alanine. c) Aspartic acid d) Ttryptophan

3) Rayon is a:

a) Cellulose acetate. b) Cellulose nitrate c) Regenerated cellulose d) Cellulose xanthate

4) Carrying out the Strecker amino acid synthesis on acetaldehyde gives:

a) Glycine b) Alanine c) Aspartic acid d) glutamic acid

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 one of the following fats has the highest iodine value?

a) Tripalmitin. b) Stearo-diolein. c) Palmito-oleo-stearin. d) Triolein.

-P.T.O-

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7) Rancidity increases as:

a) The molecular weight increases. b) The molecular weight decreases.

c) The number of double bonds increases. d) The number of double bonds decreases.

8) 12) Polyunsaturated fatty acids:

a) Can be synthesized in human body. b) Cannot be synthesized in human body.
c) Their deficiency in diet leads to nutrition deficiency diseases. d) b & c.

9) Which of the following statements about waxes is not true?

a) They are esters of long chain monohydric alcohols with fatty acids
b) Have no nutritive value. c) Give glycerol on hydrolysis. d) Indigestible

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- The type of the peptide glycyl-L-alanyl glycine is dipeptide.
3- The antiparallel strands of DNA are not identical, but are complementary.
4- Reduction of fructose gives sorbitol and mannitol.
5- Acetylation of glucose gives two different penta- acetate derivatives.
6- The iodine value for tristearin is equal to 95.
7- In nucleic acids, the nucleotide monomers linked together via a phosphodiester linkage
8- Oils with high acetyl number are toxic.
9- Glucose can be converted to mannose by heating with organic base.
10- The saponification value is increasing as the molecular weight of oil decrease.

Good luck

Prof. Dr. Mohamed S. Abbady &Dr. Ahmed Mahmoud

Assiut University
Faculty of Science
Chemistry Department

Jan. 2020
Time: 2 hours
(50 Marks)

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

Answer the following questions: (50 Marks)

Q_1) Answer Only Two from the following: ..... (12.5 Marks)

a) Write on the following:
i) Limitation of volumetric precipitation titration reaction.
ii) Half wave potential and factors affected on it.

b) Drive the pH for the titration of 100ml 0.1 N NH_4OH with o.1 N HCl at the following :
i) at the beginning *ii)* at the end point *iii)* after the end point.
and mention the indicator used and why. ($k_b = 1.35x10^{-5}$)

c) Write on the following:
i) Standard hydrogen electrode. *ii)* Buffer solutions.

Q_2) Answer Only Two from of the following: ..... (12.5 Marks)

a) Define the following terms:
i) Ilkovic equation. *ii)* Electrochemical cell.

b) Complete:
i) The oxidizing agent is --------- and the reducing agent is --------.
ii) The indicator used in the titration of weak acid with strong base is ----- and the indicator used in the titration of strong acid with strong base are -------.
iii) The indicator in Mohr method is -------, while in Volhard method the indicators are ------ ------ and in Fajan method the indicators are -------- -------.

c) Write on the following:
i) Acid – Base indicators. *ii)* Nernst equation.

Q_3) Answer Only Two from the following: ..... (12.5 Marks)

a) Write on the following :
i) Determination the equivalent point in potentiometric titration and its advantages.
*ii)*Types of polarographic current.

b) During the titration of 100 ml of CH_3COOH (0.1N) using NaOH (0.1N) calculate pH:
i) before the titration, *ii)* after the addition of 50 ml NaOH, *iii)* at the end point and *iv)* after the addition of 110 ml NaOH. ($k_a = 1.86x10^{-5}$)

c) How you can prevent silver chloride from its interaction with silver thiocyanate in Volhard method.

Q_4) Answer Only Two from the following: ..... (12.5 Marks)

a) Write on the following :
i) Specific conductivity - Molar conductivity - Equivalent conductivity.
ii) Limitation of argentometric titration.

b) Show how you can use polarographic technique in quantitative analysis.

c) Give the reasons for the following:
i) Mohr method is applicable in neutral solution.
ii) Supporting electrolyte is used in the polarographic analysis.

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

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

Faculty of Science
Chemistry Department

Dec. 22. , 2019
Time : 2 hrs

Petroleum Chemistry & Petroleum Industries(408C)

Final Exam. For The 4th level Students

Note: Support your answer with Chemical Equations whenever possible.

Answer on the Following Four Questions : (50 Marks)

1] – Write Briefly on the Following: (3 X 4= 12 Marks)

1- The chemical composition of crude petroleum oil.

2- The smoke point –structure relation ship, and its significance in Jet fuel.

3- The effect of presence of sulfur compounds in Gasoline .

II]- Answer on the Following: (2 X 6= 12 Marks)

1-What are the Feed stock(s) of the following Refinary and Conversion processes:

a- Catalytic Hydrotreating , b- Catalytic Reforming , c- Alkylation processes.

2-Define only **Three** of the Following :

b- Flash point , b- Pour point , c- Asphaltic - Base crude oil , d- Visbreaking

III] – Discuss only Two of the following: (2X7= 14 Marks)

1- The chemical industries based on Benzene.

2-The possible Hydrocracking processes of Tetralin, discuss using chemical equations.

3- What are the Sulfur Sweetening operations with special reference to Doctor Method

IV] – Mark right (√) or wrong (X) on only Six the following statements and discuss your answer : (2 X6= 12 Marks)

1-The % of Nitrogen in all crude petroleum oils varies between 4.0% - 14.0% . ( )

2-Topped crude oils contain small amount of Diesel . ( )

3- n- Heptane has Cetane number = 100 ( )

4-Straight run Gasoline has only ~ 10% of Olefinic Compounds. ( )

5-Naphthenes have lower Octane Number than n-paraffins. ( )

6-Hydrocracking process can be carried out in the presence of Oxygen. ( )

7- Petroleum oil may be present in nonmarine rocks . ( )

Good Luck

Prof. A.A.Abdel-Wahab

Assiut University
Faculty of Science
Chemistry Department

2nd January 2020
Time: 3 Hours

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

Answer the following questions:

Section I (The extraction of metals):

1) Draw a simplified diagram showing changes in ΔG° [k Cal/ mole of O_2] standard free energy with temperature for the formation of the common oxides of the following elements:-
   - Mg, Al, Fe, Cu and C at 1 atmospheric pressure **(3 Marks)**
2) Write chemical and/or thermodynamic equations explaining five features of the above mentioned diagram. **(5 Marks)**
3) Write about two of the following processes:- **(4 Marks)**
   a. Mond b. Barkes c. Pidgeon
4) Complete the following equations:- **(5 Marks)**
   a) $Fe + CuSO_4 \rightarrow$
   b) $Ag_2S + 4\ NaCN \rightarrow$
   c) $4\ Au + 8\ NaCN + 2\ H_2O + O_2 \rightarrow$
   d) $2\ PbS + 3O_2 \rightarrow \quad + 2\ CO \rightarrow$
   e) $CaO + SiO_2 \rightarrow$

Section II (Inorganic Biochemistry):

1) **Discuss Four Only of the following:** **(16 Marks)**
   a) The high biological utilization of molybdenum in comparison to silicon, aluminum and titanium, despite of the rarity of molybdenum and the high abundance of silicon, aluminum and titanium in the earth's crust.
   b) The specific properties of iron that make it biologically suitable in comparison to other transition metals.
   c) The reason why some people develop dark lesions on their skin when they are in the sun.
   d) The factors that affect the hemoglobin's affinity to dioxygen.
   e) The role and structure of the protein hemerythrin.

Section III (Structural Inorganic Chemistry):

1) **Answer the following question:** **(5 Marks)**
   Explain the meaning of tetrahedral and octahedral interstices and explain their positions in an FCC array. Provide two examples in which all the octahedral/tetrahedral sites are occupied in an FCC lattice.
2) **Answer Three Only of the following:** **(12 Marks)**
   a) Give the reason why heptagonal unit cell objects are not possible in crystallography.
   b) Discuss the statement "Despite of the similar electronic configuration of carbon and silicon $\{nS^2np^2\}$, carbon dioxide is molecular and silicon dioxide is polymeric".
   c) Derive the APF value and locate the (0001) and $(1\bar{1}00)$ planes of an HCP unit cell.
   d) Tungsten (atomic mass = 183.84) has a density of 19.3 g/cm^3 and crystallizes in a cubic lattice whose unit cell edge length is 3.16 Å. Which type of cubic unit cell is it? Avogadro's constant is $6.02214 \times 10^{23}\ mol^{-1}$.

Good Luck

The Examiners: **Prof. Dr. Zaher Abdel-Mohsen & Dr. Ahmed Bayoumi.**

Faculty of Science
Chemistry Department

Time: 2 hour
Jan 2019

Analytical and Bioanalytical Chemistry (C-441) Final Exam

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

1- **Define the following Terms:** *(10 Marks)*
- Internal & External standards.
- Factors affecting the quality of analytical chemistry results.
- Electrospray ionization& Nanospray ionization.
- Method validation parameters.

2- What is mass spectrometry (MS)? How does a mass spectrometer work? How can mass spectrometry help biochemists? *(10 Marks)*

3- a) Mass spectrometers can be used in industry and academia for both routine and research purposes. What are the major mass spectrometric applications? *(5 marks)*
b) How you can use tandem mass spectrometry for peptide sequencing. *(5 marks)*

4- What are: *(10 Marks)*
- The basic modes of data acquisition for tandem mass spectrometry experiments.
- The basics of capillary electrophoresis.

5- a) The first step in understanding the potential biological impact of ECs in the environment- Discuss this statement.
b) Obtaining a sample of the matrix of interest is a vital component of any environmental monitoring program- Discuss this statement. *(10 Marks)*

6- Explain - in details - how to: *(10 Marks)*
a- Performing a GC separation of a *mixture* of A, B and C.
b- Purify DNA.
c- Quantify both DNA & RNA.

Good Luck

Examiner: Prof. Nagwa Abo El-Maali

Assiut University

Faculty of Science

Chemistry Department

Date: 5th January 2020

Time: 3 hours

Marks: 50

Wastewater Treatment Examination (C-410)

Answer the following questions: (50 Marks)

1- Discuss only Four of the following: (20 Marks)

a) The effect of oil pollution on aquatic life and the methods used to control its impact.
b) The impact of phosphate-based detergents on water bodies, and the best way to protect the environment from their pollution.
c) Mercury (Hg) is one of the most toxic heavy metals; however, its toxicity depends on its chemical state.
d) The determination of dissolved oxygen (DO) in wastewater effluents, and the relation between DO concentration and the degree of water self-purification.
e) Physical and chemical processing units used for treatment of industrial wastewater.

2- Differentiate between the following: (20 Marks)

a) Biological oxygen demand (BOD) and chemical oxygen demand (COD) for the determination of the organic content in wastewater.
b) Aerobic and anaerobic treatment of wastewater.
c) Temporary and permeant hardness.
d) Preliminary and primary treatment of domestic sewage wastewater.

3- Put (√) or (X) for the following sentences, and correct the wrong answer: (10 Marks)

a) Detergents that possess a linear chain are less biodegradable than those having branched carbon chain.
b) Lake at higher level will have a lower value of dissolved oxygen than one near the sea level.
c) The BOD value of industrial wastewater discharged from paper industry is usually higher than that of the food industry.
d) Plain sedimentation is more effective for the removal of total suspended matter than chemical precipitation.
e) Ultrafiltration could remove very fine particles even dissolved salts.
f) Carbon adsorption is selective toward the removal of certain organic contaminants such as volatile organic compounds (VOCs)

Good Luck

Dr. Haitham M. El-Bery

Chemistry Department
Faculty of Science
Assiut University

Jan. 2020
Time: 2 hours

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

Answer the following questions:

I- Sign (✓) and/ or (X) for the following statements and write the correct ones: **(10 Marks)**

a) Oil is thermally cracked at 150°F to natural gas ( ).
b) Surfactant was used to reduce corrosion in desalting process ( ).
c) Steam was used in towers at atmospheric distillation to lower the vapor pressure ( ).
d) The quenching in visbreaking process with cool gas oil to control the heating ( )
e) Cooking process produced straight-run cooker gasoline ( ).

2- I- Discuss *two only* of the following points: **(10 Marks)**

a) Alkenes hydrocarbons as chemical composition of petroleum Crude.
b) Effect of hydrotreating on kerosene and lub oil.
c) Starting by ethane, how can you prepare of different detergents?.

II- Draw and discuss Phillips as alkylation process and the difference between H_2SO_4 and HF acids as catalysts for this process.

3- I- Explain *two only* of the following: **(10 Marks)**

a) Significance of Isomerization process.
b) The difference between thermal and catalytic cracking.
c) Hybrid-Base crude oils

II- write by equations, hydrotreament for Indole and quinoline.

4- I- Give an account *one only* on the following: **(10 Marks)**

a) NaOH as solvent extraction method for desulfurization process and the difference between NaOH and KOH as alkali for this method.
b) Effect of sulfur on gasoline.

II- Draw and discuss of delayed cooking process and Decoking mechanically and hydraulic methods.

5- I- Write a short notes *one only* of the following: **(10 Marks)**

a) Starting by benzene, how can you prepare of styrene.
b) Cetane number and its additives and uses.

II- Draw and discuss of electric desalting process.

مع تحياتى بالنجاح والتوفيق
أ.د. عبدالعال جابر

Examination of Industrial Catalysis for 4th Level Student (Chem.401)

Assiut University

Time :2 h

Date: 12 / 1/ 2020

Faculty of Science
Chemistry Department

Answer the Following Questions:

1-) Complete the following sentences (14 marks)

(a)The catalyst increases the rate of reaction called .....

(b) For an industrial catalyst, the physical properties such as ..... , ... and ..... are usually of major importance.

(c) The activity of a catalyst depends upon the ..... of chemisorption bonds.

(d) A bifunctional catalyst provides ..... kinds of sites.

(e) The turnover number, is the ..... That react per site per unit time.

(f) All catalysts only in ..... amounts are required.

(g) Selective catalyst should proceed the reaction to .....

(h) The maximum rate of reaction is obtained when the bond strength between the adsorbed complex and the catalyst surface is .....

(i) A catalyst may lose its activity or its selectivity corresponding to ..... , ... , ... and .....

(j) A textural promoter is an ..... substance which inhibits the ..... of microcrystals.

(k) $NH_3 + C_3H_6 + 3/2\ O_2 \xrightarrow[?]{\text{Cat.}} ? + H_2O$

(L) $CH_3CH{=}CH_2 + O_2 \xrightarrow[?]{\text{Cat.}} ? + H_2O$

(m) $C_2H_4 + O_2 \xrightarrow[?]{\text{Cat.}} ?$

2- Answer three only from the following (27 marks)

(i) How is Cu/ ZnO/ Al_2O_3 prepared as an industrial active catalyst for synthesis of methanol.

(ii)Explain the precipitation method for synthesis of industrial catalyst and mention the parameters affecting the properties of the final precipitate.

(iii) Discuss how is iron molybdate catalyst apply industrially for production of methanol.

(iv) Why alumina is the most widely used as a carrier in industry and explain it's common manufacturing process.

3- Answer two only from the following (9 marks)

(i) What are the differences between homogeneous and heterogeneous catalysis.

(ii) " Effective catalysts for oxidation reactions fall into three categories", discuss this statement.

(iii) How is Wacker process applied for oxidizing of ethylene to acetaldehyde.

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

Prof. Dr. Abdel-Aziz A. Said

Assiut university

Faculty of science

Chemistry Department

Industrial chemistry level 4 (Cement Making)

Jan. 2020 **Time: 2 hrs.**

Read the following questions carefully and answer **five questions only**:

1. Define the following items:
   a- Cyclone and it's main function
   b- Type of fuels with the Kcal of each one.
   c- Material Factor

2. What is the chemical composition of:
   a- Clinker formation
   b- Gypsum
   c- Lime stone
   d- The 4 Oxides of clinker

3. Draw the general process diagram and the main objective of each item in the operation process including the (Preheater – Calciner – kiln – Cooler).

4. What is the physical and chemical test for the below items?
   a- Clinker
   b- Raw material
   c- Cement

5. What is the different between "Raw Mills" and "Cement mills" ?

6. State and compare between the 4 type of kilns.

Hope the excellence for all of you..

Essam Eldin Abd Ellatif

Cement Raw Material for 4th level Students (Chem 405)

Industrial Chemistry

Dec. 2019 Time: 2 hrs.

Answer ONLY FIVE of the following questions:

1) A - Put (True) or (False) against each statement: (5 marks)

1. Three-quarters of cement raw material composition is limestone
2. GBFS is a corrective material where BFS is a cement additive material
3. Moisture test for raw materials is a weight loss at 105 °C
4. Hydraulic Modulus (HM) = Acidic oxides / Basic oxide
5. Decabonization % is a measure of heating process and kiln stability

B - Answer the following: (5 marks)

What mean by; Raw Material Prospecting and pre-homogenization?

Calculate the calcination degree for kiln hot mail with LOI of 2.5 %, is it accepted?

2) A - Answer the following: (5 marks)

Calculate the total clay quarry reserve from the following data:

Quarry volume: 1 million M3, clay bulk density: 1.67 Ton / M3?

If the annual consumption in the last five years is 83,500 Tons, calculate the period of years will be covered by this reserve?

B - Give short account on: (5 marks)

1. Pozzolana and Kaolinite (Kaolin)
2. The important of deposit's geologic map elaboration

3) A- Answer the following: (5 marks)

What are the three gypsum forms used in cement fabrication? Which is the lowest SO3 %? Prove with calculation

B- Answer the following: (5 marks)

1. What mean by Superficial Geology and Quantitative Evaluation of a deposit?
2. Why we analyze Cement Raw Material?

4) A- Answer the following: (5 marks)

Which form of Iron ores is the richest in Fe %; Hematite, Pyrite or Magnetite? Prove with calculations

B- Answer the following: (5 marks)

1. What is the raw meal design? How do we analyze raw materials?
2. What are the minimum raw materials needed to correct the raw meal parameters; LSF and SM? State the formulation used?

5) A- Answer the following: (5 marks)

What is the difference between limestone and dolomite?

Calculate the purity %, SM and AM from this limestone analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO
1.36	0.22	0.14	53.36

B- Answer the following: (5 marks)

1. What is the difference between X-Ray fluorescence and X-Ray diffraction?
2. What is the dangerous effect of high alkalis and chlorine content in cement RM'S?

6) A - Answer the following: (5 marks)

In the SO_4 determination by $BaCl_2$, what is the precipitated and weighted forms?

Calculate the % SO_3 in 1 g cement if the ppt. weight is 0.0875 g

B – Answer the following: (5 marks)

1. What mean by; Qualitative Evaluation and Mineralogical analysis of a deposit?
2. What is the production process for clay and limestone? How does the size be reduced for each?

Considering the atomic weights: Ca= 40, O= 16, C= 12, S= 32, H= 1, Ba= 137, Fe= 55.85

(Good Luck)

Examiner: Chemist / Hassan Mohamed

Assiut University Faculty of Science Chemistry Department	First Semester Final Examination Instrumental Analysis (C-445) Credit Hours System	Dec 2019 Time: 2 hour

Section (A) (25 Marks)

Answer Only Four From the Following Questions:

Q.1: Write on the following:

(a) Advantages of solid electrodes based on carbon (Give examples) :

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(c) Ilkovic equation:

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Q.2: Mark (√) for the correct statement and (X) for the wrong statement

a) It is desirable to make electrochemical measurements without current flowing through the RE

b) Normal pulse is about 5-10 times more sensitive than differential pulse polarography

c) The half wave potential ($E_{½}$) can be used to identify the analyte concentration.

d) Current of polarizable electrode remains unchanged with changes in the electrode potential

e) Hg forms soluble amalgam with many metals hence lowers their reduction potentials

f) Non-faradaic currents exist in an electro- chemical cell are related to any redox reaction

g) In anodic stripping methods, the WE behaves as a cathode during the deposition step

a	b	c	d	e	f	g

Q.3: (a) A Pb^{2+} solution of unknown concentration yields a diffusion current of 1.00 µA. Then, to 10.00 mL of the unknown solution is added 0.50 mL of a standard solution of Pb^{2+} whose concentration is 0.04 M. The diffusion current with the spiked solution is 1.50 µA. Calculate the Pb^{2+} concentration of the unknown solution.

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(b) Write on limitations of dropping mercury electrode:

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Q.2: Mark (√) for the correct statement and (X) for the wrong statement

a) It is desirable to make electrochemical measurements without current flowing through the RE

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a	b	c	d	e	f	g

Q.3: (a) A Pb^{2+} solution of unknown concentration yields a diffusion current of 1.00 µA. Then, to 10.00 mL of the unknown solution is added 0.50 mL of a standard solution of Pb^{2+} whose concentration is 0.04 M. The diffusion current with the spiked solution is 1.50 µA. Calculate the Pb^{2+} concentration of the unknown solution.

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(b) Write on limitations of dropping mercury electrode:

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Q.5:(a) The oxidation of rutin (RU) is a $2e^-$ process. A cyclic voltammetric anodic peak current (I_p) of 2.2 µA is observed for 0.4 mM solution of RU in acetate buffer at glassy carbon electrode of 2.6 mm^2 with a scan rate (v) of 25 mV/s. What will I_p be for v =100 mV/s and 1.2 mM RU?

(b) Write on amperometry:

(c) Write on supporting electrolyte (Give examples):

Section (B) (25 Marks)

Answer the following question: (7 Marks)

Alcohol levels in blood can be determined by a redox titration with potassium dichromate according to the equation

$$C_2H_5OH + 2\ Cr_2O_7^{2-} + 16\ H^+ \longrightarrow 2CO_2 + 4\ Cr^{3+} + 11\ H_2O$$

$K_2Cr_2O_7$ (0.498 mM, 10.0 mL, Ɛ=3.1348 × 10^3 $M^{-1}cm^{-1}$ at 350 nm) was found to react completely with 50.0 mL of the blood sample. Calculate the ppm concentration of ethanol in the blood sample and the absorbance after addition of 10 and 25 mL of the ethanolic blood sample if $K_2Cr_2O_7$ only absorbs at 350 nm (Atomic weights: C=12.01, H=1.0079, O=15.9994).

Answer Three Only of the following questions: (18 Marks)

Q.1: Explain the differences between fluorescence and phosphorescence spectroscopy.

Q.2: In a complexation reaction between a metal salt (M) and a ligand (L), the continuous variation method indicated highest absorption maximum corresponding to mole fraction of 0.8 of the ligand. Show the stoichiometry of this reaction.

Q.3: Sketch the spectrophotometric titration curve for a reaction between a titrant (T) and an analyte (A) if the product (P) only absorbs.

Q.4: A sample was analyzed for Cu^{2+} (At.wt.=63.54) as follows: A 1.25 g sample of an ore was dissolved in a 250 mL volumetric flask and diluted to volume. A 20-mL portion of the resulting solution was transferred by a pipet to a 50-mL volumetric flask and EDTA was added to volume. The absorbance of the final complex solution was 0.453 ($\mathcal{E}$ = $95.2 M^{-1} cm^{-1}$ *at* 732 *nm*). What is the weight percent of Cu in the original sample?

Good Luck

Examiners: Dr. Hossieny Ibrahim & Dr. Ahmed Bayoumi

Chemistry Department
Faculty of Science
Assiut University

Jan, 2020
Time: 3 hours
50 Marks

Term Exam of Petroleum, Petrochemicals and Chromatography (411C) for the 4th Level Chemistry Students

Answer all of the following questions (50 Marks)

1- Choose the correct answer for *twenty four* only of the following: (24×1.5 = 34 M)

(Final exact answers must be outlined in the attached table below)

1- If crude oil has specific gravity of 0.8576 and characterization factor of 11.66 then its average boiling point in °C will be?

a) 238.8
b) 298.8
c) 398.8
d) 498.8

2- Straight run naphtha is converted into high octane number petrol (gasoline) by catalytic

a) reforming
b) cracking
c) polymerization
d) isomerization

6- Propane in petroleum refining is used for the removal of

a) asphalt
b) wax
c) sulphur compound
d) aromatics

4- Which of the following is a naphthene?

a) Butene
b) Butadiene
c) Cyclohexane
d) Acetylene

5- Solution used in Doctor's treatment for the removal of mercaptans is

a) sodium hydroxide
b) sodium plumbite
c) cupric chloride
d) potassium isobutyrate

6- Agreeable arrangements of petroleum fractions in order of their boiling points is

a) lubricating oil > Petrol > diesel > LPG
b) petrol > Lubricating oil > diesel > LPG
c) lubricating oil > diesel > Petrol > LPG
d) lubricating oil > Petrol > LPG > diesel

7- The H/C-ratio for the same number of carbon atoms is the highest in case of

a) aromatics
b) naphthenes
c) paraffins
d) olefins

8- Pick out the undesirable property for a solvent meant for dewaxing of lube oil?

a) Complete miscibility with oil.
b) High solubility of wax in the solvent.
c) Both (a) and (b).
d) Neither (a) nor (b).

1	2	3	4	5	6	7	8

ملحوظة: الأختبار مكون من أربعة صفحات

9- Degussa-process involves the reaction of ammonia with methane in absence of air in the presence of ----- to produce HCN.

a) platinum/aluminum/ruthenium alloy-catalyst at around 1200 °C
b) nickel-catalyst at 700-800 °C
c) activated alumina catalyst
d) zinc oxide-catalyst at high-pressure range of 270-400 atms

10- Choose the correct reagents used in the three-step production of glycerol from allyl chloride?

a) (a) H_2O_2. (b) NaOH, (c) $Ca(OH)_2$
b) (a) HOCl, (b) $Ca(OH)_2$, (c) H_2O
c) (a) NaOH, (b) $Ca(OH)_2$, (c) H_2O
d) (a) Cl_2/H_2O, (b) $Ca(OH)_2$, (c) HCl

11- Which of the following processes describe the conversion of ethylene into ethylene oxide by using $TlCl_3/H_2O$-catalyst?

a) Teijin process
b) Shell process
c) Wacker process
d) Andrussaw process

12- Oxidation of ethylene by using an aqueous solution of $PdCl_2$-catalyst will give

a) acetaldehyde
b) acetic acid
c) ethanol
d) ethylene oxide

13- Which of the following is an important intermediate for producing nylon 66?

a) Propylene chlorohydrin
b) Acrolein
c) Adiponitrile
d) Ethylene glycol

14- Vinyl chloride is resulted from the reaction of HCl with acetylene in the presence of

a) Pd^{2+}/Cu^{2+} catalyst
b) Zeolite catalyst
c) $HgCl_2$ catalyst.
e) iron powder catalyst

15- The best reagent for converting 1-butene into methyl ethyl ketone MEK is

a) O_2, excess H_2
b) O_2, $PdCl_2/CuCl_2$
c) O_2, red phosphorus
d) $LiAlH_4$ in ether

16- Acid-catalyzed ring opening of propiolactone in the presence of excess alcohol will produce mainly

a) allyl acetate
b) mesityl oxide
c) 2-ethylhexanol
d) acrylic esters

9	10	11	12	13	14	15	16

باقي الأسئلة في الصفحة التالية

17- In reverse phase chromatography, the stationary phase is made

a) non-polar
b) polar
c) either non-polar or polar
d) none of these

18- The parameter merely used to compare the relative column efficiencies for column having packing material with different particle size is

a) reduced plate height
b) partial diameter
c) HETP (height equivalent of a theoretical plate)
d) all of the above

19- Thin layer chromatography is

a) partition chromatography
b) electrical mobility of ionic species
c) adsorption chromatography
d) none of the above

20- In gas chromatography, the basis for separation of the components of the volatile material is the difference in

a) conductivity
b) partition coefficients
c) molecular weight
d) molarity

21- Ion exchange chromatography is based on the

a) electrical mobility of ionic species
b) adsorption chromatography
c) electrostatic attraction
d) partition chromatography

22- Retention factor, k', describe

a) The distribution of an analyte between the stationary and the mobile phase
b) The migration rate of an analyte through a column
c) The velocity of the mobile phase
d) both a and b

23- A new youth drink contains sugar, salt, alcohol and vitamin C. A GC could be used to determine the

a) concentration of all the ingredients in the drink
b) alcohol content only
c) alcohol and sugar content only
d) alcohol, sugar and vitamin C content of the drink

24- The solute molecules travel through a packed column while some molecules arrive at the end sooner than others simply that result in different travel distances. This is known as

a) Eddy diffusion
b) peak symmetry
c) Londons forces
d) Van Deemter

25- A mixture of polyacrylic acid (PAA, MW = 4500) and polymaleic acid (PMA, MW = 16000) is approximately 90% PMA and 10% PAA. The mixture is passed through a gel permeation column with a cut-off MW of 10,000. The chromatogram obtained is likely to show that, compared to PMA, polyacrylic acid has

a) longer retention time and greater peak area
b) shorter retention time and greater peak area
c) longer retention time lesser peak area
d) shorter retention time and lesser peak area

17	18	19	20	21	22	23	24	25

باقى الأسئلة في الصفحة التالية

2- Choose the correct answer for *seven* only of the following? (7×2 = 14 M)

(Final exact answers must be outlined in the attached table below)

1- Smoke point of kerosene is the

a) time after which smoking starts on burning
b) temperature at which smoking starts
c) maximum height of flame (in mm) without causing smoking, when burnt in a standard lamp
d) temperature at which smoking starts on burning
e) none of these

2- Pick out the wrong statement?

a) Lower boiling paraffins have higher octane number than higher paraffins
b) Conversion of naphthenes to aromatics is a desirable reaction in reforming process
c) Pyrolysis is a mild thermal cracking process.
d) Catalyst used in catalytic reforming is platinum on silica/alumina base
e) Characterization factor of paraffinic crude oil is more than 12.

3- Using a zinc-chromium oxide catalyst at a high-pressure range of 270–420 atmospheres for the production of

a) butanol
b) acetaldehyde
c) methanol
d) acetic acid
e) methylamines

4- The Puck process used for the production of NH_2NH_2 by oxidation reaction of ammonia in the presence of

a) NaOCl catalyst
b) H_2O_2 catalyst
c) $KMnO_4$ catalyst
d) $Ca(OH)_2$ catalyst
e) O_2 catalyst

5- Mercaptans are added to liquefied petroleum gas (LPG) to

a) reduce its cost
b) narrow down its explosion limit
c) increase its calorific value
d) increase octane number
e) assist in checking its leakage from cylinder

6- The compound eluted last and retained more in Normal and Reversed phase respectively are

a) Polar and Non-polar
b) Non- polar and Polar
c) Both are in Polar
d) Both are in Non- polar
e) None of the above

7- What useful information can be found from a Van Deemter plot?

a) The selectivity factor
b) Optimum mobile phase flow rate
c) Optimum column temperature
d) The capacity factor
e) None

8- Which type of liquid chromatography separation depends on interactions between solute, mobile phase, and immobilized liquid stationary phase?

a) Adsorption
b) Partition
c) Ion-exchange
d) Size exclusion
e) none of these

8- Choose the correct reaction sequence accessing methacrylic acid from isobutylene?

a) (i)-dehydration, (ii)-$O_2/H_2O/TlCl_3/CuCl_2$, (iii)-oxidation with O_2
b) (i)-oxidation with O_2, (ii)-dehydration (iii)-$O_2/H_2O/TlCl_3/CuCl_2$
c) (i)-$O_2/H_2O/TlCl_3/CuCl_2$, (ii)-dehydration (iii)-oxidation with O_2
d) (i)- dehydration, (ii)-oxidation with O_2, (iii)-$O_2/H_2O/TlCl_3/CuCl_2$
e) (i)-$O_2/H_2O/TlCl_3/CuCl_2$, (ii)-oxidation with O_2, (iii)-dehydration

1	2	3	4	5	6	7	8

Good Luck

MEDICAL BIOCHEMISTRY EXAMINATION

CLINICAL CHEMISTRY FACULTY OF SCIENCE

Time: 2hr	Total marks:50	Date:31-12-2019

➢ **Answer all the questions: Chose the correct answer (4 marks each)**

1. The best liver function test is:

a. AST/ALT

b. Alkaline phosphatase

c. Bilirubin

d. myoglobin

2. The main patterns of liver injury that increase liver enzymes is:

a. Hepatocellular carcinoma

b. cardiac diseases

c. kidney failure

3. Bilirubin can be elevated in both cholestatic and hepatocellular processes:

a. True

b. False

4. Enzymes for (coronary) heart disease is

(a) ALT; (b) Troponin ; (c) urine analysis ; (d) lipograme

➢ **Answer all the questions** **(4 marks each)**

a) Some example of liver dysfunction
b) Classification of LFTs
c) Cardiac function tests
d) ALLENs test for ABG
e) PH and Crystals found in alkaline urine
f) PH and Crystals found in acidic urine
g) Enzymes as Cardiac Markers

➢ **Answer the following case:** **(6 marks)**

John is a 55-year-old male admitted with a recurring bowel obstruction. He has been experiencing intractable vomiting for the last several hours, Here is his arterial blood gas result: Clinical Laboratory:

pH 7.5 PaCO2 42 HCO3 33

I. Describe this case?
II. Normal level for each biomarkers

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Laboratory examination

Total marks:20 marks

1. **Explain two methods for testing sugar in urine (8 marks)**
2. **Explain two methods for albumin analysis (8 marks)**
3. **Blood collection tubes: mention the colure and uses for each tube (4 marks)**

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BEST WISHES

Assistant Professor

Dr. Naglaa Kamal Idriss

Faculty of Medicine