

4- Choose the correct answer for ALL of the following? (27 Marks)

(Final answers must be depicted in tables at the answer notebook)

(ترصد الأجوبة المختارة والنهائية في جداول بكراسة الأجوبة)

Section (A): Petroleum Chemistry

1-The crude oil feedstock in desalting process is heated in the range of ----- to reduce viscosity for easier ----- and ----- of the water.

- a) 200-250°C & separation & mixing
- b) 65-180°C & mixing & separation
- c) 190-250°C & separation & mixing
- d) 200-350°C & reduce & mixing

3-Which of the following compounds have the highest octane number?

- a) p-Xylene
- b) Cyclopentane
- c) Octane
- d) n-Butane

5- Which solvent of the following is not used in extraction process?

- a) Phenol
- b) Furfural
- c) Nitrobenzene
- d) CH₂Cl₂

7-In the hydrodesulfurization unit, the feedstock is deaerated and mixed with preheated-H₂ in heater at ----- under pressure ----- using ----- as catalyst.

- a) 415°-525°C & 80 bar & bauxite
- b) 215°-315°C & 90 bar & sodium plumbite
- c) 315°-425°C & 70 bar & cobalt-molybdenum /alumina
- d) 455°-550°C & 100 bar & platinum

9-Pick out the wrong statement concerning Flash point?

- a) It gives an indication about the flammability of the fuel.
- b) Its significance is in the safety aspects and storing.
- c) It is measured for oils that contain paraffins
- d) It is an important parameter for transportation of volatile petroleum products

2-The naphthenic hydrocarbons have Kw values ----- paraffinic and aromatics. The latter have ----- Kw values while paraffins have ----- values.

- a) high & Between & low
- b) low & high & Between
- c) Between & high & low
- d) Between & low & high

4-For diesel fuels, cetane number can be enhanced by ----- additives.

- a) 2-ethyl-hexyl nitrate
- b) 2,2,4-trimethylhexane
- c) 3-ethyl-hexyl acetate
- d) 2-methyl-hexyl nitrite

6-Crude oil can be categorized as either sweet crude where the sulphur content less than ----- or sour crude where the sulphur content is at least -----.

- a) 0.5% & 2.5%
- b) 2.5% & 0.5%
- c) 3.5% & 1%
- d) 1.5% & 0.5%

8-What is the column internal have perforations in its design covered by caps with a flow area directs the vapors horizontally into the liquid?

- a) Bubble cap trays
- b) Sieve trays
- c) Valve trays
- d) Downcomers

10-With the increasing in the specific gravity of petroleum products indicates -----.

- a) improves the octane number
- b) increase in aromatic content
- c) higher H/C ratio
- d) decrease in paraffin content



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

Answer all of the following questions? (50 Marks)
(ALL answers must be depicted in the answer notebook)

1- Answer three only of the following questions? (3×3 = 9 Marks)

- Describe in detail, the API-gravity and Watson factor (UOP)?
- Discuss the Doctor's and hydrofining sweetening processes of sour feed stocks?
- Outline all of the hydrazine production methods?
- Show by equations the synthesis of glycerol from allyl chloride?
- Describe the purpose and types of electrophoresis?
- State in details the theory and main aspects of size exclusion chromatography (SEC)?

2- Explain briefly three only of the following? (3×2 = 6 Marks)

- Classifications of O&S-compounds present in the crude oils.
- Delayed coking and Hydrodealkylation processes.
- Synthesis of maleic anhydride and 1,4-butanediol.
- The Wacker process for acetaldehyde synthesis.
- Derivatizations and properties of silica and alumina.
- Theory and characteristics of refractive index detector (RI).

3- Answer ALL of the following with either (T) or (F)? (8 Marks)

(Final answers must be depicted in table at the answer notebook)

(ترصد الأجوبة النهائية في جدول بكتابة الأجوبة)

- In both chemical and electrical desalting methods, ammonia is often used to reduce corrosion.
- Lubricating oil has a number of carbon atoms in the range of 11 to 18 carbons.
- Fluorescence detector can measure the overall ability of the mobile phase and its solutes to bend the light array.
- Sodium alkanesulfonates can be produced from the free-radical addition reaction of light naphtha with sodium bisulfite.
- Chloroform is mainly used to produce Freon-12 by the reaction with HF.
- Isocratic elution involves changes of the mobile phase composition during chromatographic experiment.
- The lower cetane number fuel is the higher the lag time between fuel injection and ignition.
- Acrylic esters are produced via the acid-catalyzed ring opening of β -propiolactone in the presence of an alcohol.

D- Short-Answer Questions

write about the emission in cement production, and how can control the Co2 emissions?

Good luck
to you

22

7 - POZZOLANIC REACTIONS :

()

- A- $C_2S + CaO_{free} \leftrightarrow C_3S$
- B- Calcium Hydroxide+ Silica+ Water
- C- $C_3A + H_2O + CaSO_4$
- D- All the previous

8- Added value of GBFS using in concrete applications

()

- A- Improved resistance to sulfate attack
- B- Reduced heat of hydration in mass concrete
- C- Reduced chloride permeability
- D- All the previous.

9- The Iron raw material considered as:

()

- A- Corrective raw materials.
- B- Primary raw materials.
- C- Alternate raw materials.
- D- All the previous.

10- Sulfate resisting cements (SR-Cements)

()

- A- Low Tricalcium silicate.
- B- Low Tricalcium Aluminate
- C- Tetracalcium ferro aluminate
- D- All the previous.

11- Clay is a primary raw material,source of

()

- A- Hematite (Fe_2O_3) and Limonite ($FeO(OH)$)
- B- CaO
- C- The silica-aluminous component
- D- All the previous.

12 - Clinker must contain substantial portions of

()

- A- The elements of calcium, silicon, aluminum and iron.
- B- Calcium silicate hydrates (C-S-H)
- C- $CaSO_4$
- D- All the previous

C- Choose the correct answer from the given options:-

- 1- Pozzolanic cement is best suited for: ()
A- Pavement construction
B- Marine structures
C- Dam construction
D- All of the above
- 2- Cement standard strength achieved at: ()
A- 28 days
B- 2 days
C- 7 days
D- All the previous.
- 3- CO2 Emissions in Cement Manufacture has direct emissions of 50% of CO2 emissions. ()
A- Burning fuels to heat the kiln.
B- The transportation of cement represent another emissions.
C- Occur through a chemical process during clinkerization.
D- All the previous.
- 4- The CEM III products in a mix of Clinker, Gypsum and: ()
A- limestone
B- Silica fume
C- Blast furnace slag.
D- All the previous.
- 5- Sulphur dioxide emission in cement production due to ()
A- using high Gypsum %in cement
B- High temperatures are involved in the burning of the clinker formation step
C- Sulfite impurities in the raw materials and Sulphur contained in fuel.
D- Oxidation of nitrogen compounds present in the fuel.
- 6- For cement durability and low hydration heat: ()
A- Increase C3A content
B- Decrease C3A content
C- Increase C3S content
D- All the previous.

B- Short-Answer Questions

What are the key advantages of using pozzolanic cement in construction ?

2.

- 7- Granulated blast furnace slag is a waste product: ()
- A- Cement industry
 - B- The steel industry
 - C- Electrostatic or mechanical precipitation of dust
 - D- All the previous.
- 8- Pozzolanas consist essentially of reactive silicon dioxide (SiO_2) and aluminum oxide (Al_2O_3) and loss on ignition must be ()
- A- < 70%
 - B- < 10%
 - C- < 7%
 - D- < 25%
- 9- How can we control Gypsum hydration during cement production? ()
- A- Gypsum type.
 - B- C3S value in cement.
 - C- Control Cement mill temperature.
 - D- All the previous.
- 10- C3S in clinker phases is important for: ()
- A- Early strength
 - B- Durability
 - C- Heat of hydration
 - D- All the previous.
- 11- Factors affecting cementitious properties of GGBFS: ()
- A- Chemical composition of GGBFS
 - B- Glass content of the GGBFS.
 - C- The fineness of the final product.
 - D- All the previous.
- 12- One of the clinker phases is the "C2S" : ()
- A- It affects the durability
 - B- It affects the early strength
 - C- It effect setting time, early strength
 - D- It has slow strength development
- c9



First term exam 405-Cement raw materials (2 h)

الكيمياء الصناعية التطبيقية - الترم الاول 2024\2025



A- Choose the correct answer from the given options:-

- 1- The main compound responsible for the strength and hardening of concrete.: ()
A- The silica or alumina
B- Calcium hydroxide (Ca(OH)_2)
C- Calcium Silicate Hydrate (C-S-H).
D- All the previous.
- 2- For the pozzolanic raw material the reactive silicon dioxide content shall be: ()
A- Exceed 70% by mass
B- React at with C3A
C- Exceed 25% by mass.
D- All the previous.
- 3- Clay is source alumina (Al_2O_3), which is necessary for the formation of : ()
A- CaO
B- C2S
C- C_3A
D- All the previous.
- 4- Silica fume is: ()
A- A fine powder, having hydraulic and/or pozzolanic properties
B- From the reduction of high purity quartz with coal in electric arc furnace
C- Content of (SiO_2), (Al_2O_3), (Fe_2O_3) and other oxides.
D- All the previous.
- 5- Control the cement setting time by using: ()
A- Lime stone
B- Gypsum
C- Sand
D- All the previous.
- 6- Factors that affect the activity of Pozzolana: ()
A- $\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$ content.
B- The degree of Amorphousness of its structure
C- Fineness of its particle.
D- All the previous.

5-Oxidation or reduction can cause direct attack to the material by....., leading to degradation or structural weakening.

- a) Abrasion b) Deposition c) Absorption or Chemical reaction d) None

C- True or False equation:

(10 marks)

- 1- The main source of carbon monoxide is complete combustion engines. ()
- 2- The large particles greater than 10 μm are likely to be caught in the nose. ()
- 3- The TLV-STEL is the maximum concentration to which workers can be exposed for a period up to 15 minutes continuously without suffering. ()
- 4- The TLV-C is the concentration that should not be exceeded for a moment. ()
- 5- In the subisokentic sample, the stream velocity exceeds the velocity in the probe. ()

D- Essay equation:

(20 marks)

- 1- A cubic meter sample of air was found to contain 40 μg of SO_2 . The maximum temperature and pressure were 25° C and 103.193 kPa when the air sample was taken. What was the SO_2 concentration in ppm?

- 2- Calculate the minimum size of the particle that will be removed with 100 % efficiency from a settling chamber under the following conditions: Horizontal velocity = 0.3 m/s, Air temperature = 77°C, particle specific gravity = 2, Length = 7.5 m, Height = 1.5 m

3- Determining particle removal efficiency in cyclones An air stream with a flow rate of $7 \text{ m}^3/\text{s}$ is passed through a cyclone of standard proportions. The diameter of the cyclone is 2.0 m , and the air temperature 77°C .

(a) Determine the removal efficiency for a particle with a density of 1.5 g/cm^3 and a diameter of $10 \mu\text{m}$.

(b) Determine the collection based on the above if a bank of 64 cyclones with diameters of 24 cm are used instead the single large unit.

4- A power plant burns 5.45 ton of coal per hour and discharges the combustion products through a stack of an effective height of 75 m . The coal has $4.2\% \text{ S}$ and the wind speed at the top of the stack is 6 m/sec . $\sigma_y = 88 \text{ m}$ $\sigma_z = 53 \text{ m}$. Determine the maximum concentration of SO_2 .

- rock by sulphuric acid, in the rock to form the phosphatic fertilizers is

ng (3Marks)

- C₃A

wrong one with (F)

- performed to reduce the determined maximum.

Chemistry Department

Jan 2025

Faculty of Science

Time: 3h

Assiut University

Final exam of course 453C (industrial chemistry)

for 4th level students

Part I

(33 marks)

Answer the following questions

1. Give reasons for **FOUR** of the following (8 Marks)
 - A) Firing of ceramics is an important process in the manufacture of ceramic products.
 - B) Applying neutralising mixtures in the third stage (ageing) of superphosphate manufacture.
 - C) Importance of C-S-H (calcium silicate hydrate)-hydrogel which results upon cement hydration due to reaction of C_2S and C_3S with H_2O .
 - D) Chalk is qualified to be a good raw material for the wet process in cement industry.
 - E) Firing too hot and too long of glass melt causes devit in glass.
2. Answer the following (6 Marks)
 - A) Give the role that mullite and the vitreous phase play in affecting the properties of ceramic products.
 - B) "Borosilicate glass is characterized by a number of excellent properties". Discuss this statement.
 - C) During the manufacture of glass CO_2 and SO_2 that are of environmental impact are evolved. Give the possible sources of such gases.
- D) Write on the following (4 Marks)
 - The manufacture of tempered glass and its properties.
 - Three of the phosphate rock utilization factors in phosphatic fertilizers industry.

انظر خلفه وقصم

- D) Dry process in cement kilns requires less fuel compared to the wet process.
- E) C_4AF makes cement more resistant to seawater.
- F) When the content of PbO in lead glass is more than 18% then it is named crystal glass.
- G) Oxides, nitrides and borides are not considered ceramics.
- H) C-glass is an alumina-silicate glass with high MgO content.
-

Section II:
(17 points)

Answer Four Only from the following questions:

- 1) Explain the classification, properties, and applications of the Pigments
- 2) Write on the composition, applications and advantages of water-based printing inks.
- 3) Discuss the types of pulping, and the stages of manufacture of paper?
- 4) Compare between the properties in Dyes and Pigments ?
- 5) Write short notes about the following two Theories:
i) Witt's Theory ii) Armstrong Theory?

Examinars

Prof. Dr. Aref Aly

Prof. Dr. Kamal Ibrahim

Assiut University

Faculty of Science
Chemistry Department



Final Examination for 4th (Industrial Program) Textile Chemistry
(404 Chem.)

Date: Sunday, 12/01/2025

Time: 2 hours

Answer **Seven Only** from the following Questions:

(50 points)

- 1) " Carbon Fibers..... the wonder polymer..... stronger than the steel". Show by equations the steps of production of this polymer.
- 2) Mention the: Advantages, Disadvantages, Uses and Care for:
i) Cotton ii) Wool iii) Silk
- 3) What is the significance of fiber evidence? How can using the fibers to reconstruct crime scenes?
- 4) Explain what are the main tests for the identification of Fibers? and discuss the properties of Metallic Fibers?
- 5) What is the main difference between Wool and Cotton fibers? Draw its repeating unit?
- 6) Explain what you mean by (MAN MADE SYNTHETIC FIBRE), Giving two examples with its properties?
- 7) How are fabrics made? What are the different characteristics of a fiber, a filament & a fabric?
- 8) Mention the : Advantages, Disadvantages, Uses and Care for:
i) Polyesters ii) Acetate iii) Acrylic

Good Luck

Examiner:

Prof. Dr. Kamal Ibrahim Aly

CV



Department of Chemistry, Industrial
Chemistry Program
Faculty of Science
Assiut University
Mid-term Exam
January 20, 2025

Industrial Pollution, Its Control and
Industrial Safety
Code: **Chem 400**
4th year
Time: **2 Hours**
Lecturer: **Dr Mosaad Ali**



Important remarks:

- The exam measures ILOs No.: a22, b20, c21, c23, d2 & d9
- No. of Pages: 3 – No. of questions: 4 – Total marks: 50
- Provide all necessary steps of your answers and assume any missing data

A- Mention the answer to these points:

(10 marks)

I) What factors affect the degree of health risk?

1.
2.
3.
4.

II) Air Quality Modeling, the factors that affect the transport, dilution, and dispersion of air pollutants can be grouped into:

1.
2.
3.
4.

III) What are the common types of gravity dust collectors?

1.
2.

IV) What is the greenhouse effect?

.....

B- Chose the correct answer:

(10 marks)

1- Emitted during combustion processes, industrial operations, and transportation activities.

- a) Chemicals b) Particulate matter c) Hazardous waste d) All of them

2. The is the lowest layer of the atmosphere where most weather phenomena occur.

- a) Troposphere b) Tropopause c) Stratosphere d) None

3- Mechanisms or forms of deterioration due to air pollution are:

- a) Abrasion b) Deposition c) Chemical attack d) All of them

4- Solid particles of large size and high speed can cause damage by

- a) Abrasion b) Deposition c) Chemical attack d) All of them

Mosaad Ali

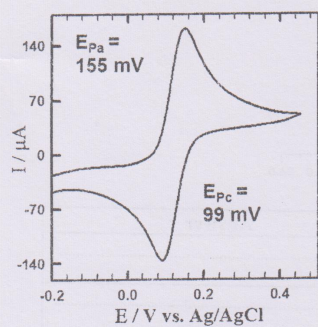
9. The following data were obtained by liquid-chromatography on a 30 cm packed column and 0.293 mL/min flow rate. (5 points)

	t_R , min	W, min
Nonretained	2.9	—
A	6.4	0.46
B	14.3	1.17

Calculate and comment on the results when necessary.

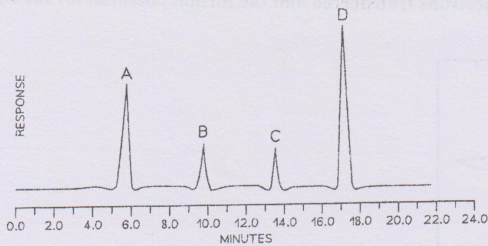
- The average number of plates from the data.
- The plate height for the column.
- The capacity factor for A and B.
- The resolution, R_s .
- The selectivity factor, α .

7. The following cyclic voltammogram was recorded for a reversible couple:
Calculate the number of electrons transferred and the formal potential for the couple? (2 points)



8. The concentration of copper in a sample of sea water is determined by anodic stripping voltammetry using the method of standard additions. The analysis of a 50.0-mL sample gives a peak current of 0.886 μA . After adding a 5-mL spike of 10.0 ppm Cu^{2+} , the peak current increases to 2.215 μA . Calculate the ppm copper in the sample of sea water. (2 points)

4. Analysis of a compound by liquid chromatography shows below the presence of four components, A, B, C and D. (2 points)



Question	Answer
a) Which compound is present in the greatest quantity?	
b) Which compounds were present in equal amounts?	
c) Which compound had the strongest interaction with the stationary phase?	
d) Which compound had the weakest interaction with the stationary phase?	

5. Explain why it is necessary for all polarographic measurements to be conducted in oxygen-free solutions. (1½ points)

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6. Draw the schematic cross-section of a hollow cathode lamp, the most common source for atomic absorption measurements, and label each component. (2 points)

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.....

.....

C.

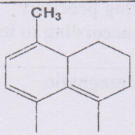
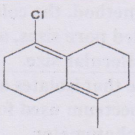
[1]	
[2]	
[3]	
[4]	
[5]	
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[7]	
[8]	

[9]	
[10]	
[11]	
[12]	
[13]	
[14]	
[15]	

Part III: Problems and Questions

(20 points)

1. Using Woodward-Fieser rule, calculate the wavelength of absorption maximum (λ_{max}) of the following compounds: **(2 points)**

Compound (I)	Compound (II)
 $\lambda_{\text{max}} =$	 $\lambda_{\text{max}} =$

2. Describe the disadvantages of the Graphite Furnace Technique. **(1½ points)**

-
-
-
-
-

3. What is the role and significance of using a supporting electrolyte in voltammetry? **(2 points)**

-
-
-
-
-

Part II: Enter in the appropriate box the expressions you would select to define each of the phenomena Labeled 1-15 inclusive. (15 points)

Expression	Phenomena
Partition chromatography	[1] This method is based on the interaction between the solute (Analyte) molecules and active sites on the stationary phase. This attachment or interaction depends on the polarity of solutes.
Size-exclusion chromatography	[2] It is the time takes after sample injection for the analyte to reach the detector.
Residual current	[3] It is the time for an unretained species to reach the detector.
Ion-Exchange chromatography	[4] In that the absorbance (A) is directly proportional to the concentration of the absorbing species (c) and the path length (b) of the absorbing medium.
Retention time (t_R)	[5] In this method the separation is based mainly on differences between the solubility of the sample components in the stationary phase or on differences between the solubility of the components in the mobile and stationary phases.
Zeeman effect	[6] In this method, the stationary phase has an ionically charged surface of opposite charge to the sample ions. This technique is used almost exclusively with ionic or ionizable samples.
Adsorption chromatography	[7] In this method, the column is filled with material having precisely controlled pore sizes, and the particles are separated according to its their molecular size.
Auxiliary (counter) electrode	[8] A device that isolates a restricted region of the electromagnetic (EM) spectrum used for measurement in the UV-Vis spectrophotometer.
Voltammetry	[9] A method is used for the determination of analytes in a complex matrix where interferences for the analyte will occur i.e. blood, sediment, human serum, etc.
Migration	[10] It is used for background correction in AAS by place flame polarized light through sample in magnetic field get absorbance (atom+molecule) or absorbance (molecule) depending on how light is polarized.
Standard addition method	[11] An electrochemical method in which information about an analyte is obtained by measuring current (I) as a function of applied potential (V).
Dead time (t_M)	[12] The number of waves per cm in units of cm^{-1} and equal to $1/\lambda$.
Wavelength selector	[13] Pt wire that completes circuit in voltammetry, conducts e^- from signal source through solution to the working electrode.
Wavenumber ($\bar{\nu}$)	[14] The current resulting from the reduction of trace impurities present in the blank solution or from the charging current
Beer's law	[15] A transport mechanism occurs in voltammetry which involves the movement of oppositely charged ions towards electrode due to electrostatic attractions.

8. In some quantitative chromatographic methods, the concentration of the analyte is found from the ratio of its peak area to the total area of all eluted peaks. What the name of this method?
- The internal standard method.
 - The calibration method.
 - The area-normalization method.
 - None of these.
9. Supporting electrolyte is used in voltammetry to suppress _____.
- Diffusion current
 - Migration current
 - Convection current
 - All of these.
10. A reversed-phase HPLC separation is carried out using a mobile phase of 40% v/v water and 60% v/v methanol. What is the mobile phase's polarity index? (Where $P'_{H_2O} = 10.2$ and $P'_{CH_3OH} = 5.1$).
- 4.08
 - 3.06
 - 7.14
 - 8.2
11. What is the advantage of electroanalytical methods over other analytical techniques?
- They are expensive than most techniques.
 - They provide information about oxidation state of an analyte.
 - Measuring temperature changes in reactions.
 - Determining the pH of solutions.
12. A device for converting solution into fine spray or droplets in AAS is _____.
- Atomizer
 - Nebulizer
 - Computerize
 - None of these
13. Cold vapor technique is an atomization method used only to the determination of _____.
- Cadmium
 - Lead
 - Aluminum
 - Mercury
14. Which of the following is a likely method for determining the half-wave potential ($E_{1/2}$) of Cu^{2+} ions in a sample solution?
- Spectrophotometry
 - Chromatography
 - voltammetry
 - Potentiometric titration
15. In voltammetry, which transport mechanism involves the movement of ions due to concentration gradients?
- Migration
 - Diffusion
 - Convection
 - Electrodeposition

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Instrumental Analysis (C-445)
(Final Exam., First Semester 2024-2025)

Answer the following questions: : (50 points)
Part I: Choose the correct answer: (15 points)

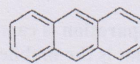
1. Rank each of the following molecules from highest to lowest $\lambda_{\max}$ for the $\pi \rightarrow \pi^*$ transition.



Benzene



Naphthalene



Anthracene

- a) Naphthalene > Benzene > Anthracene
b) Benzene > Anthracene > Naphthalene
c) Anthracene > Naphthalene > Benzene
d) Naphthalene > Anthracene > Benzene
2. The efficiency of chromatographic column increases _____.
a) as the number of plates becomes greater.
b) as the plate height becomes smaller.
c) by decreasing the particle size of column packing.
d) All of these.
3. Which is the correct order of AAS instrumentation?
a) Atomization – Lines source – Monochromator – Detector – Read-out
b) Lines source – Monochromator – Atomization – Detector – Read-out
c) Lines source – Atomization – Monochromator – Detector – Read-out
d) Lines source – Atomization – Read-out – Monochromator – Detector
4. In liquid chromatography, the use of a single mobile phase during the entire elution process is called _____.
a) normal elution.
b) reverse elution.
c) isocratic elution.
d) frontal elution.
5. Which of the following is the atomization method used for highly toxic elements such as arsenic (As), antimony (Sb) and lead (Pb)?
a) Flame method.
b) Hydride generation method.
c) Electrothermal method.
d) Cold-Vapor method.
6. The retention factor (k') is an important parameter that is widely used to describe the migration rates of solutes on columns. For a solute A, when $k'_A < 1.0$.
a) The separation is poor.
b) The separation is slow.
c) The separation is optimum.
d) None of these.
7. In voltammetry, which of the following describes a Faradaic process?
a) A process that involves only the charging of the electrode.
b) A process that involves electron transfer and obeys Faraday's Law.
c) A process with no electron transfer across the electrode interface.
d) A process that occurs without any change in current.

d) Neither A nor B

m) In sweetening process, solutizing agent used with caustic alkali is

- a) Potassium Chloride
- b) Sodium plumbite
- c) Methanol
- d) Phenol

n) Sulphuric acid treatment of petroleum products removes the----- materials.

- a) Gum forming
- b) Color forming
- c) Emulsions forming
- d) All of the above

o) Fuel oil is subjected to visbreaking to reduce its

- a) Pour point
- b) Viscosity
- c) increase the yield of gasoline and naphtha
- d) All of the above

3- I- Discuss three only of the following points: (12.5 Marks)

- a) Nitrogen compounds as chemical composition of petroleum Crude.
- b) Effect of hydrotreating on kerosene and lub oil.
- c) Cetane number and its additives and uses.
- d) Freezing point for aviation fuels and its significant.

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

4- I- Explain three only of the following: (12.5 Marks)

- a) write by equations, hydrotreatment for Indole and quinolone
- b) Effect of sulfur on gasoline...
- c) Hybrid-Base crude oils
- d) Smoke and pour points and their significant.

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

مع تحياتي بالنجاح والتوفيق
أ.د. عبدالعال جابر

- e) Catalytic cracking compared to thermal cracking of residue of vacuum distillation of crude oil
- gives higher yield of petrol.
 - lower octane number of petrol.
 - higher sulphur content in the product.
 - higher gum forming material in petrol
- f) Cetane number of diesel used in trucks may be about.....
- 85
 - 35
 - 14
 - 25-45
- g) Solution used in Doctor's treatment for the removal of mercaptans is.....
- Sodium plumbite
 - Sodium hydroxide
 - Cupric chloride
 - Potassium isobutyrate
- h) Which of the following has the lowest viscosity (at a given temperature) of all?
- Naphtha
 - Kerosene
 - Diesel
 - Lube oil
- i) Diesel index is defined as
- $(^{\circ}\text{API}) \times (\text{Aniline Point, } ^{\circ}\text{F})/100$
 - $(^{\circ}\text{API}) \times (\text{Aniline Point, } ^{\circ}\text{C})/100$
 - $(^{\circ}\text{API}) \times (100)/\text{Aniline Point, } ^{\circ}\text{F}$
 - $(^{\circ}\text{API}) \times (100)/\text{Aniline Point, } ^{\circ}\text{C}$
- j) Sweetening of petroleum product means the removal of
- Sulphur & its compounds
 - Water
 - Organic impurities
 - Wax
- k) The main reaction in reforming is the
- Dehydrogenation of naphthenes
 - Hydrogenation of naphthenes
 - Hydrocracking of paraffins
 - Saturation of olefins
- l) Petroleum is believed to have originated from _____ Sources.
- Vegetable
 - Animal
 - Both A & B



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

Answer the following questions: (50 Marks)

1. Sign () and/ or (X) for the following statements and write the correct ones: (10 Marks)

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

2. Choose the correct answer from the following false or true sentences (15 Marks)

a) Aniline point is related to

- Octane number
- Diesel number
- Smoke point
- Pour point

b) Which of the following highest-octane number?

- n-butane
- i-pentane
- Octane
- Toluene

c) In Alkylation process, which of the following is not used as catalyst?

- HF
- H₂SO₄
- Solid acid catalyst
- Mixed acid (H₂SO₄ and HNO₃)

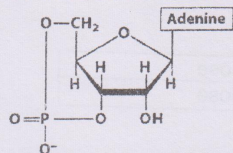
d) Gum formation in stored gasoline is mainly due to the

- Oxidation & polymerization of unsaturates
- presence of sulphur
- alkylation of unsaturated.
- higher aromatic content

11- Glyceraldehyde and dihydroxyacetone are two

- | | |
|---------------------|---------------------------|
| a) diastereoisomers | b) stereo isomers |
| c) enantiomers | d) constitutional isomers |

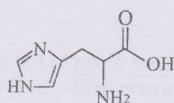
12- Choose the correct name of the following compound:



- | | |
|--|--|
| a) adenosine-3',5'- cyclic monophosphate | b) adenine-3',5'- cyclic monophosphate |
| c) adenosine-3',5'- cyclic diphosphate | d) adenine-3',5'- cyclic diphosphate |

13- Separation of amino acid mixture by Electrophoresis depends on the:

- | | |
|----------------------|------------------|
| a) boiling point | b) melting point |
| c) isoelectric point | d) end point |



14- Histidine classified as

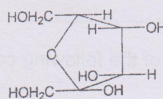
- | | |
|----------------------------------|-----------------------------------|
| a) monoamino monocarboxylic acid | b) diamino monocarboxylic acid |
| c) triamino monocarboxylic acid | d) tetraamino monocarboxylic acid |

1	2	3	4	5	6	7	8	9	10	11	12	13	14

III- Choose the correct answer:

(1.5 X 14 = 20 Marks)

I- Choose the correct answer:



1- The name of this structure is

a) α - D- Fructofurranose	b) α - D- Glucopyranose
c) β - D- Fructofurranose	d) β - D- Glucopyranose

2- Arabinose through Kiliani synthesis convert to

a) Glucose	b) Fructose	c) Mannose	d) Sorbitol
------------	-------------	------------	-------------

3- Which of the following fatty acids has the highest melting point?

a) $\text{CH}_3(\text{CH}_2)_7\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$
b) $\text{CH}_3(\text{CH}_2)_4\text{CH}=\text{CHCH}_2\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$
c) $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_2\text{CH}=\text{CHCH}_2\text{CH}=\text{CH}(\text{CH}_2)_7\text{COOH}$
d) $\text{CH}_3(\text{CH}_2)_{14}\text{COOH}$

4- Peptide linkage is the special name given to the amide bond between the

a) α -carboxyl group of one amino acid and the α -amino group of another.	b) β -carboxyl group of one amino acid and the α -amino group of another.
c) α -carboxyl group of one amino acid and the β -amino group of another.	d) β -carboxyl group of one amino acid and the β -amino group of another.

5- Mannose and Glucose are

a) C5 epimers	b) C4 epimers	c) C3 epimers	d) C2 epimers
---------------	---------------	---------------	---------------

6- The action of conc. HCl on glucose convert it to

a) Lactone	b) trihydroxi-butyric acid
c) glycolic acid	d) 5- hydroxymethyl furfuraldehyde

7- The number of milligrams of KOH required for the saponification of one gram of oil or fat is called

a) Acid number	b) Iodine number
c) Richert-Meissl number	d) Saponification number

8- Esters of fatty acids with higher molecular weight monohydric alcohols.

a) Neutral fats	b) Waxes	c) Derived lipids	d) β - Sitosterol
-----------------	----------	-------------------	-------------------------

9- Fats and oils are hydrolyzed into their constituents (fatty acids and glycerol) by the action of

a) super heated steam	b) acid or alkali	c) enzyme	d) All the above
-----------------------	-------------------	-----------	------------------

10- The melting point of the aliphatic fatty acids by increasing the length of the chain.

a) increase	b) decrease	c) doesn't change	d) can't be determined
-------------	-------------	-------------------	------------------------

Q6- Explain this statement:

Oxidation of fructose and glucose in presence of HNO_3 give different products.

(Show by equation)

Q7- Show by equation the preparation of glutamic acid from malonic ester.

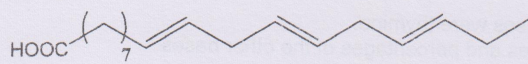
Q4- Compare between the preparation of both glycyl alanine and alanyl glycine.

Q5- Show by equations how can you prove the structure of Sucrose.

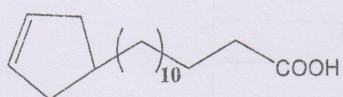
Q2- Explain this statement:

Oxidative Rancidity causes oxygen damage to a food substance. It occurs with unsaturated fats.

Q3- Write the abbreviated chemical formula for the following acids:



α -Linolenic acid



Chaulmoogric acid

Faculty of Science
Chemistry Department

Final Exam of Chemistry of Biomolecules (413 C) for double major Students
(Chemistry of carbohydrates, Amino acids & Proteins, Lipids and nucleic acids)

Date: January 2025

Time: 2 Hours

Note: Support your answer with Chemical equations whenever possible.

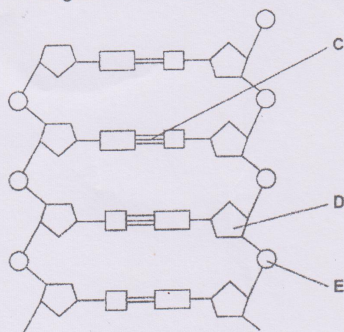
Answer on the Following Questions:

(50 Marks)

I]- Answer on Only Six of the following :

(6 X 5 = 30 Marks)

Q1- According to this figure answer the following question:
The diagram shows part of a DNA molecule.



(i) DNA is a polymer. What is the evidence from the diagram that DNA is a polymer?

.....
.....
.....

(ii) Name the parts of the diagram labelled C, D and E.

Part C _____
Part D _____
Part E _____

(iii) In a piece of DNA, 34% of the bases were thymine.
Complete the table to show the names and percentages of the other bases.

Name of base	Percentage
Thymine	34
	34

ملحوظة هامة : الأسئلة 6 صفحات



Chemistry Department



C- 441 Analytical Chemistry II Final Exam

January 2025
Time allowed: 2hrs

Answer Five Only the following questions (50 Marks)

1. Define: (10 marks)
 - i) Method validation and its parameters related to quantitative methods.
 - ii) Biosensors and its three generations.
 - iii) Internal Quality Control.
 - iv) Precision and accuracy as defined by the International Union of Pure and Applied Chemistry (IUPAC).
2. A) When analyzing water, what is the aim of water sampling? (5 marks)
B) State the requirements for an HPLC column packing materials. (5 marks)
3. What are the most common detectors for GC analysis? Explain-in brief – the basics for each detector and its applications. (10 marks)
4. A) Most commercially available biosensors are enzyme sensors based on electrochemical Transducers- Discuss this statement and mention the different techniques used for enzyme immobilization. (5marks)
B) If you are provided with an air sample, write how you can determine the following: (5marks)
 - i) Oxides of nitrogen by chemiluminescence.
 - ii) Fine particles (PM10).
5. Discuss in detail how you can separate proteins using polyacrylamide gel electrophoresis. (10 marks)
6. A) Discuss in brief- how you can purify mixture of a proteins using isoelectric precipitation. (5marks)
B) What are the most important parameters for characterizing or validating a chemical sensor or a biosensor? (5 marks)

Good Luck

Prof. Nagwa Abo El-Maati

Q7) Men on 3 Advantages of Catalytic Cracking. 3 Marks

Q8) Give brief account on the Desalting Process on the light of: a) Feedstock ; b) From; c) Process; and d) typical products - to – unit. 4 Marks

The end

Good luck

Prof. Talaat ElEmary

11

a) Sulfur compounds b) Nitrogen compounds c) Oxygen compounds

Q2) Carbazole is

a) Sulfur compounds b) Nitrogen compounds c) Oxygen compounds

Q3) The time for fixed volume of liquid to flow by gravity through capillary is:

a) Kinematic viscosity b) Dynamic viscosity c) Absolute viscosity

Q4) The number of side chain attached with nucleus is ----- viscosity than others

a) higher viscosity b) lower c) the same

Q5) An olefinic linkage in the side chain ----- the viscosity.

a) decrease b) increase c) don't change

Q6) The temperature at which oil ceases to flow is known as-----

a) freezing point b) pour Point c) meting point

Q7) In lighter products Fire point

a) = Flash point +1 5°C b) = Flash point +2 5°C c)) = Flash point + 5°C

Q8) the maximum flame height in milimeters at which a kerosene will burn without smoking is known as ----- point.

a) flash b) fire c) smoke

Q9) In Catalytic cracking, the purposes is to -----

a) upgrade gasoline b) produce hydrogen c) remove ammonia

Q10) In Catalytic reforming, the purposes is to -----

a) upgrade low-octane naphtha b) produce ammonia c) remove salts

=====

Third question **25 Marks**

Q1) Men on 3 forms of sulfur compounds might present in crude petroleum. **3 Marks**

Q2) Men on 3 forms of oxygen compounds might present in crude petroleum. **3 Marks**

Q3) Men on 3 forms of nitrogen compounds might present in crude petroleum. **3 Marks**

Q4) Write in 3 notes on the types of Crude Oils. **3 Marks**

Q5) Write in 3 points on the Viscosity of petroleum. **3 Marks**

Q6) write 3 objections against Carbide theory on the formation of petroleum. **3 Marks**

	Industrial program Final exam. (2024- 2025) In petroleum Chemistry	
Faculty of science	Chem. 408	Assiut university
Time allowed: 2 hr.	Degree: 50	

Answer the following questions:

First question : Answer with √ or ×. Put your answer in a table 15 Marks

- Q1) Densities of petroleum fractions decreases with increasing number of C atoms.
- Q2) Boiling point of straight chains is lower than that of iso-alkanes with the same number of C atoms.
- Q3)) Crude oil is in the form of emulsion of oil and brine.
- Q4) The boiling range of un-condensed gas is 800°C
- Q5) A dispersion system consisting of two immiscible liquids is called Lubricants.
- Q6) Some petroleums may contains no gasoline.
- Q7)) Geologically older crudes are paraffinic .
- Q8) The presence of some optically active compounds confirm the carbide theory Origins of Oil and Gas.
- Q9) Some petroleums may contains no paraffin wax.
- Q10) Unsaturated aliphatic hydrocarbon are rarely formed in crude oil.
- Q11) Unsaturated aliphatic hydrocarbon are produced during cracking and conversion processes .
- Q12) Sulfur compounds might be present in inorganic and organic forms.
- Q13) Many of the oxygen compounds found in crude oils are weakly acidic.
- Q14) Nitrogen compounds appear to be present in largest amounts in some of the geologically younger oils.
- Q15) Inorganic Salts act as emulsifiers.

=====

Second question choose the correct answer. Put your answer in a table 10 Marks

- Q1) Naphthenic acids are

- 6) Which of the following is true?
- A. Buyers determines supply and sellers determine demand.
 - B. Buyers determine demand and sellers determine supply.
 - C. Buyers and sellers as one group determine supply.
 - D. Buyers and sellers as one group determine demand.
- 7) Such as producing luxury goods and popular goods.
- A. Time gap
 - B. Quality gap.
 - C. Quantity gap.
 - D. Others.
- 8) Demand gap =
- A. Demand – Supply
 - B. (Domestic demand + exports) – (Domestic Supply + imports)
 - C. (Domestic Supply + imports) - (Domestic demand + exports)
 - D. A & B
 - E. A& C
- 9) TFC =
- A. TC + TVC
 - B. TVC – TC
 - C. TC + TVC
 - D. Others.
- 10) TFC is constantly with increasing production.
- A. decreases.
 - B. increases.
 - C. fixed.
 - D. All previous answers are correct.

(انتهيت الأسئلة مع اطيب التمنيات بالتوفيق)

د. محمد البريري

Part Two- Questions on topics in English:

First question: true or false:

(15 degrees)

- 1) The relationship between quantity demand and prices is negative. ()
- 2) The relationship between quantity supply and prices is positive. ()
- 3) If the Prices of Factors of Production decrease, supply will decrease. ()
- 4) If the Income increase, supply of normal goods will decrease. ()
- 5) If two goods are substitutes, then the price of one and the demand for the other are negatively related. ()
- 6) The new methods used in the factories that produce computer chips have decreased the supply of chips. ()
- 7) In the long run, the firm can change all factors of production (inputs). ()
- 8) When the volume of production is zero, the total variable cost is zero. ()
- 9) In the short run there are no fixed costs. ()
- 10) Operating costs are the costs that the project needs before starting operation. ()
- 11) When the taste of a consumer changes in favor of a good, her/his demand will increase. ()
- 12) If the government imposes a tax on a good while its price remains constant, this will lead to the supply of this good increases. ()
- 13) If the expected future price of a good rises, the supply decreases today. ()
- 14) lowest income expectations will increase demand. ()
- 15) An increase in the number of buyers will increase demand. ()

Second question choose the correct answer:

(10 degrees)

- 1) According to the law of demand when a price increase will cause:
 - A. an increase in the quantity demand.
 - B. a decrease in the quantity demand.
 - C. an increase in the quantity demand when all other factors are constant.
 - D. a decrease in the quantity demand when all other factors are constant.
 - 2) Which of the following factors affects supply:
 - A. Income.
 - B. Prices of related goods (substitute & compliments).
 - C. Factors of production prices.
 - D. All previous answers are correct.
 - 3) The demand increases when:
 - A. Income decreases.
 - B. Increase price (substitute good).
 - C. Increase price (complement good).
 - D. preferences decrease.
 - 4) Inputs in the Long Run:
 - A. are variable.
 - B. are fixed.
 - C. Some inputs are variable, and others are fixed.
 - D. All previous answers are not correct.
 - 5) Examples of operating costs:
 - A. The cost of machinery.
 - B. The cost of Cost of buildings.
 - C. The workers' wages.
 - D. All previous answers are correct.
-

لجنة الممتحنين: د. محمد أحمد البريري د. وليد عيد مصطفى الدرجة الكلية: ٥٠ درجة	كلية العلوم كلية التجارة برنامج الكيمياء الصناعية العام الجامعي ٢٠٢٤ / ٢٠٢٥	امتحان: نهاية الفصل الدراسي الأول مقرر: اقتصاديات المشروعات "Project Economics 401 Comm" التاريخ: ١٥ / ١ / ٢٠٢٥ م الزمن: ساعتان عدد الصفحات: ثلاث صفحات
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هـ/ام:

- ١- عند الإجابة على عبارات الصح والخطأ أو اختر من متعدد لا تقم بكتابة العبارات مرة أخرى يكفي بكتابة رقم العبارة واجابتك مباشرة.
- ٢- يرجى مراعاة التنظيم وحسن العرض، ويمكنك استخدام بعض الأوراق الفارغة كمسودة.
- ٢- يرجى كتابة بياناتك على الغلاف بشكل صحيح.

الجزء الأول- الأسئلة على الموضوعات المقررة باللغة العربية:

السؤال الأول- ضع علامة صح امام العبارة الصحيحة وعلامة خطأ أماما العبارة خاطئة: (١٠ درجات)

- ١- تعد السياسات السعرية أحد أدوات المنافسة الهامة بين المنشآت العاملة في سوق المنافسة الكاملة. ()
- ٢- قدرة المحتكر على تحديد أسعار منتجاته مطلقة. ()
- ٣- يفضل إقامة المشروع داخل المدينة إذا كانت إمكانية كبيرة في توفير المشروع لما يحتاجه من خدمات. ()
- ٤- في ضوء دراستك لأنواع الطاقة الإنتاجية فإن الطاقة الإنتاجية القصوى تساوي الطاقة الإنتاجية المتاحة مطروحاً منها الطاقة الإنتاجية غير المستغلة. ()
- ٥- تحتاج المنشأة العاملة في سوق المنافسة الاحتكارية الى الدعاية والاعلان لتعريف العملاء بمنتجاتها. ()
- ٦- عندما يكون للمقترح الاستثماري جدوى مالية فحين إذن يكون له جدوى اقتصادية. ()
- ٧- في ضوء دراستك لدراسة الجدوى الفنية فإن حجم الإنتاج المتوقع يساوي حجم الطلب مطروح منه الإنتاج المتاح حالياً. ()
- ٨- يمكن أن تتساوى التكاليف الاقتصادية مع التكاليف المحاسبية. ()
- ٩- شركات التضامن أفضل من المشروعات الفردية. ()
- ١٠- يجب ألا تسبق دراسة الجدوى التسويقية للمشروع دراسة جدواه الفنية. ()

السؤال الثاني: أجب عما يأتي: (١٥ درجة)

١- في ضوء دراستك لمقرر اقتصاديات المشروعات أجب عما يأتي (الإجابة على الثلاث نقاط في حدود صفحة ونصف):

أ- قدم ثلاث نصائح لصاحب مشروع يريد تحديد الطاقة الإنتاجية لمشروعه.

ب- اذكر في شكل عناوين فقط العوامل الاقتصادية التي تحكم اختيار موقع المشروع.

ج- اذكر في شكل عناوين فقط خطوات اعداد دراسة جدوى المشروعات.

٢- في ضوء دراستك لأنواع الأسواق (المنافسة الكاملة - الاحتكار - المنافسة الاحتكارية - احتكار القلة) حدد امام كل

خاصية من الخصائص التالية السوق الذي تنتمي اليه في ورقة اجابتك:

- أ- تمايز المنتجات التي المقدمة. ب- عدد كبير من البائعين. ج- عدم وجود نفقات نقل.
- د- التحكم في السعر لأقصى درجة. هـ- وجود نفقات دعاية وعلان. و- تماثل المنتجات المقدمة.
- ز- المنافسة بين البائعين في الخدمات المقدمة.



Chemistry Department
Faculty of Science
Assiut University



January 23, 2025
Time: 2 hours
Total Degree: 50

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

Answer Four only from the Following Questions: (50 Marks)

Q1) Answer the following: (12.5 Marks)

- a) Write on the following:
 - i. Polarographic cell. ii. Mohr method iii. Half wave potential and factors affected on it.
- b) Give the reason for the following:
 - i) The equivalent weight for $KMnO_4$ in acidic medium is $1/5$ of its molecular weight while the equivalent weight for $K_2Cr_2O_7$ in acidic medium is $1/6$ of its molecular weight.
 - ii) Mohr method is not applicable in basic solution.

Q2) Answer the following: (12.5 Marks)

- a) If you are provided with $0.1M CH_3COOH$ (10 ml) and titrated with $0.1M NaOH$. Calculate the pH value: ($k_a = 5 \times 10^{-5}$)
 - i) At the beginning of the titration.
 - ii) After the addition of 5 ml of $NaOH$.
 - iii) At the end point.
- b) Define the Ilkovic equation. Calculate the diffusion current (i_d) for the reduction of $2 \times 10^{-5}M Pb^{2+}$, which has diffusion coefficient (D) = $0.25 \times 10^{-5} cm^2 sec$, $m = 15 mg/sec$, and $t = 4 sec/drop$.

Q3) Answer the following: (12.5 Marks)

- a) Write on the following:
 - i) Potassium permanganate is self-internal indicator.
 - ii) Methyl orange is suitable for titration of NH_4OH solution with HCl solution.
- b) Write a brief account on adsorption indicators.

Q4) Answer the following: (12.5 Marks)

- a) During the titration of 25 ml of $NaCl$ (0.1N) using $AgNO_3$ (0.1N), calculate the pCl :
 - i) After the addition of 10 ml of $AgNO_3$
 - ii) At the end point
 - iii) After the addition of 30 ml of $AgNO_3$ ($K_{sp}(AgCl) = 10^{-10}$)
- b) Give the reason for the following:
 - i) Supporting electrolyte is used in voltammetric analysis.
 - ii) Oxygen must be removed from Polarographic cell before recording the polarogram.

Q5) Answer the following: (12.5 Marks)

- a) Define the following:
 - i) Oxidizing and reducing agents
 - ii) Glass electrode
- b) Explain the Volhard method for the determination of chloride ions in acidic medium.

Good Luck

EXAMINER: DR. GAMAL ABDEL WAHAB AHMED

2nd section: Answer four of the following including question number 6

Question 2 (10 Marks).

- a) "The sources of fibers used for the manufacture of pulp, paper, paperboards are varied", Explain the types of fibrous raw materials with examples and uses? (5 Marks).
- b) Draw a diagram explaining the Kraft papermaking processes from Bagasse? (5 Marks).

Question 3 (10 Marks).

- a) Define debarking process and show its importance? (5 Marks).
- b) Compare between chemical and mechanical pulping? (5 Marks).

Question 4 (10 Marks).

- a) "Wood is the Main source of fibrous raw materials"
Compare between Softwoods and Hardwoods. (5 Marks).
- b) Explain the cell wall structure with short brief about each layer? (5 Marks).

Question 5 (10 Marks).

- c) Define cellulose and its properties; draw cellulosic chain structure referring to monomer and dimer units. (5 Marks).
- d) Compare between lignin and hemicellulose? (5 Marks).

Question 6 (10 Marks).

A paper machine produced a paper roll with GSM 70 g/m².
Calculate breaking length, stretch, tear factor and burst factor, according to the following data:

Tensile strength MD	N	65	66	64	65
Elongation MD	mm	3.2	3.0	2.8	3.0
Tear strength MD	mN	340	340	350	330
Burst strength	kpa	140	135	145	140

End of the exam
With My Best Regards
Dr. Hazem Sadek Ahmed



1st section: Answer the Following Question

Question 1 (10 Marks).

a) Chose the correct answer:

(5 Marks).

1) is the outermost layer of the tree that is still actively involved in physiological processes. (1 Mark).

- i. Live Bark. ii. Dead Bark. iii. Cambium.

2) is a thin layer of generative tissue in plants, primarily found between the bark and the wood. (1 Mark).

- i. Live Bark. ii. Pith. iii. Cambium.

3) Younger, lighter-colored outer layer of wood in a tree? (1 Mark).

- i. Heartwood. ii. Pith. iii. Sapwood.

4) Storage area for nutrients and may assist in the transport of water and nutrients in younger trees? (1 Mark).

- i. Pith. ii. Bark. iii. Sapwood.

5) Estimate the age of the tree? (1 Mark).

- i. Medullary rays. ii. Cambium. iii. Growth rings.

b) Put (✓) or (×):

(5 Marks).

1) To improve the paper formation and increase ash and opacity we add filler, such as CaCO_3 . (1 Mark).

2) Ozone considered a Total chlorine free bleaching agent. (1 Mark).

3) Aim of pulping process is to remove cellulose. (1 Mark).

4) Breaking strength in kraft pulping process is lower than soda pulping process. (1 Mark).

5) To increase the brightness of produced paper we add AKD. (1 Mark).



- (iii) Discuss how is iron molybdate catalyst apply industrially for production of formaldehyde from partial oxidation of methanol.
- (iv) Why alumina is the most widely used as a carrier in industry and explain it's common manufacturing process.
- (v) The catalytic reaction over a catalyst proceeds in the steps", explain and how activation energy can be calculated.

3- Answer the following questions (16 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.
- (iv) Discuss how is ethylene oxide produced industrially.

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

Prof. Dr. Abdel-Aziz A. Said

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

Applied Industrial Chemistry

Time :2 h

Date: 28 / 12/ 2024



Assiut University

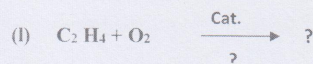
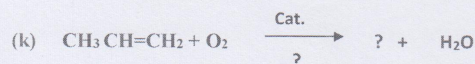
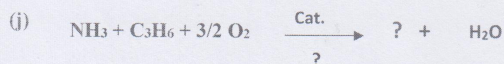


Faculty of Science
Chemistry Department

Answer the Following Questions:

1-) Complete the following sentences (10 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



2- Answer four only from the following (24 marks)

- (i) How is Cu/ ZnO/ Al₂ O₃ catalyst 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.

Section (C): Chromatography

21-In the RPLC-technique, the weak mobile phase is ----- while the strong mobile phase is -----.

- a) non-polar & polar
- b) polar & non-polar
- c) both non-polar
- d) both polar

23-Bare silica is named as the normal stationary phase (NP) due to the -----.

- a) lost of silanol polarity
- b) neutral silanol groups
- c) polarity of silanol groups
- d) Derivatization reactions of bare silica

25- Choose the name of the LC-mechanism shown in the following diagram?

- a) Affinity chromatography
- b) Partition chromatography
- c) Size-exclusion chromatography
- d) Ion-exchange chromatography



27-TLC is generally used as a qualitative analytical technique for -----.

- a) checking the purity of a compound
- b) following the course of a reaction
- c) determining the number of components in a mixture
- d) all of the above

22-The analyte solution in the frontal mechanism is continuously pass through an adsorbent and the solvent comes out first followed by -----.

- a) least strongly adsorbed components
- b) undesirable components
- c) more strongly adsorbed components
- d) more of pure solvent

24-Which of the following compounds could be detected by oxidation reactions in electrochemical detectors?

- a) Esters
- b) Aldehydes
- c) Mercaptans
- d) Ketones

26-State the factor(s) that affect mobile phase strength in ion-exchange chromatography (IEC)?

- a) Mobile phase pH
- b) Mobile phase concentration
- c) Type of competing ion
- d) All of the above

Good Luck

Prof. Dr. Hassan Abdou Koth

Section (B): Petrochemicals

- 11-Ethylene glycol is produced by the hydration of ethylene oxide in presence of ----- at a temperature range of ----- in 30 minutes.
- H_2SO_4 & 50–100°C
 - HCl & 100–110°C
 - HNO_3 & 100–120°C
 - HClO_4 & 80–90°C
- 12-The production steps of acetic anhydride is started by the formation of ----- followed by reaction with one mole of AcOH .
- mesityl oxide
 - ketene
 - 2-butanone
 - acrylic acid
- 13-The ----- used for acrolein synthesis in the presence of CuO -catalyst at 300–360°C and 1–2 atms.
- Shell process
 - DuPont process
 - Rashig process
 - Sohio process
- 14-The reaction of allyl alcohol with H_2O_2 produces an intermediate which is further hydrolyzed to give -----.
- glycerol
 - glycidol
 - isopropanol
 - isopropyl acetate
- 15-Select the proper process used for hydrazine production by the oxidation of ammonia using NaOCl ?
- Puck process
 - Rashig process
 - Liquid-phase process
 - Celanese process
- 16-The low-pressure process for methanol synthesis operating at about at 240°C/50 atm, using ----- catalyst by a successive ----- of chemisorbed -----.
- copper oxide & dehydrogenation & CO_2
 - copper-based & hydrogenation & CO
 - copper nitrate & CO & hydrogenation
 - platinum & dehydrogenation & CO_2
- 17-Methylamines can be synthesized by alkylation of ammonia with methyl alcohol at 500°C/20 atms in the presence of ----- catalyst.
- Zeolite
 - Thallium (III) chloride
 - Copper (II) chloride
 - Aluminum silicate
- 18-What is the catalyst used in the production of 2-butanone (MEK)?
- Aluminum-ruthenium alloy
 - Thallium(III) chloride catalyst
 - TeO_2 -catalyst
 - $\text{PdCl}_2/\text{CuCl}_2$
- 19-The reaction of n-butenes with O_2 at 400–440°C/2–4 atms catalyzed by Mo/V/P -oxides will produces -----.
- maleic anhydride
 - butylene oxide
 - methyl methacrylate
 - propylene chlorohydrin
- 20-What is the product from the reaction of HCl with acetylene in the presence of HgCl_2 catalyst?
- Perchloroethylene
 - Trichloroethylene
 - Vinyl chloride
 - Ethylene dichloride