

Assiut university	Final exam	Industrial chemistry
Faculty of science	Time: 2 hours	Fourth level
Chemistry department	Unit process in fertilizer industry	(400 Eng)

First question

(20 degrees)

A burning furnace in fertilizer factory consumes 25 ton per day sulfur. Temperature of exhausted gases is 1000°C.

- Calculate the air consumption per day.
- Calculate the excess air ratio.
- Calculate the final composition of exhausted gases.

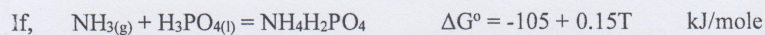


Second question

(15 degrees)

For producing MAP fertilizer needs to react ammonia with phosphoric acid (85 %) at 100°C.

- The amount of water content in the final product.



Third question

(15 degrees)

A heat exchanger used for cooling sulfur dioxide with rate 100 m³/hour from 600 to 450°C. The water charges at room temperature and outlet at 99°C.

- Calculate the flow rate of water per second.

Note, $C_{pN_2} = 7$ Cal/mole. K, $C_{pO_2} = 7.12$ Cal/mole. K

$C_{pH_2O_l} = 45$ Cal/mole. K, $C_{pSO_2g} = 6.5$ Cal/mole. K,

$C_{pH_2O_l} = 45$ Cal/mole. K, $C_{pH_2Og} = 6.8$ Cal/mole. K,

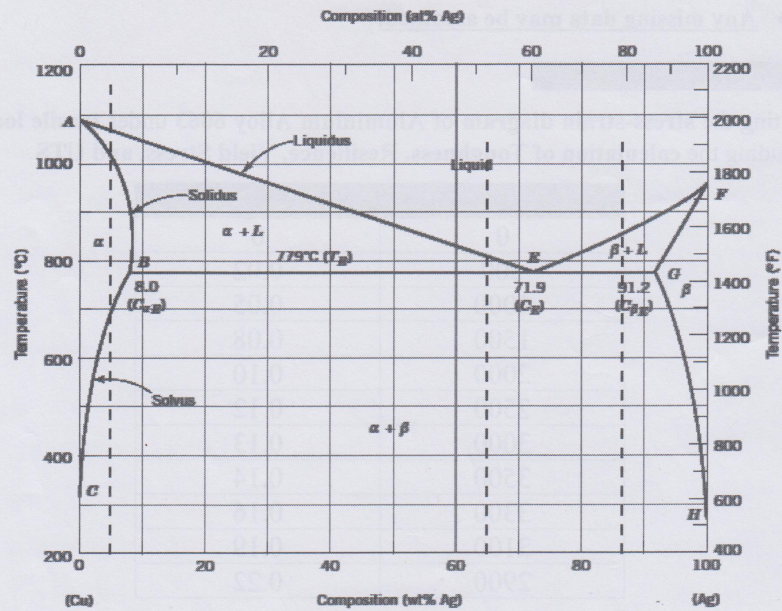
$\Delta H_{H_2O_{eva}} = 125$ J/mole

$m_s = 32$ g, $m_o = 16$ g, $m_N = 14$ g, $m_H = 1$ g,

Good Luck

Question No. 2 (50 marks):

A) Explain the equilibrium compositions of the following Alloys compositions, for the three dashed lines



With best wishes,

Examiners,
Assoc Prof. Ahmed M. Atia Abdelkader



- No. of pages: 1.
- No. of questions: 2.
- Any missing data may be assumed.

Exam is out of 50 Marks.

Question No. 1 (20 points):

Plotting the stress-strain diagram of Aluminium Alloy 6063 under tensile loading, including the calculation of Toughness, Resilience, Yield Stress, and UTS

Load (N)	Extension (mm)
0	0
500	0.02
1000	0.05
1500	0.08
2000	0.10
2500	0.12
3000	0.13
3500	0.14
3300	0.16
3100	0.19
2900	0.22

Specimen dimensions:

- Gauge length = 50 mm
- Diameter = 10 mm

Question No. 1 (20 points):

A) Describe the elastic and Plastic Deformation mechanism, Show the atomic configurations.

B) Show Effect of solid solution strengthening on: Mechanical Properties: Cu-Ni System

الزمن: ساعتان ٢٨ مايو ٢٠٢٥ الاجابة في ورقة البابل	كلية العلوم جامعة السليمانية	امتحان نهاية الفصل الدراسي المقرر: أخلاقيات المهنة والسلامة المهنية رقم المقرر ورمزه: F300
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(٢٠ درجة)

السؤال الاول: في ورقة البابل ظلل (T) للعبارة الصحيحة أو ظلل (F) للعبارة الخاطئة لما يأتي:

١- من اخلاقيات مهنة التعليم المفضلة أن يكون المعلم قدوة حسنة ومصدر ثقة .	١١- تطبيق عمل ميثاق اخلاقي من المهارات المهنية المكتسبة للمقرر
٢- تدوير المخلفات ثروة ضخمة ولحماية البيئة وجودة الحياة	١٢- يؤدي تطبيق قوانين الملكية الفكرية الى دفع عجلة الابداع والابتكار
٣- التدريب هو نشاط منظم لتحسين الأداء الوظيفي	١٣- تعتبر الاخلاقيات متطلب اساسي لتنظيم المجتمع واستقراره.
٤- التخلص من مخلفات المعامل يكون بالحرق الآمن ودفن الرماد في مدفن آمن	١٤- يجب وضع إناء مملوء بالرمال تحت أوعية حفظ المواد الكيميائية لامتصاص المياه
٥- التقرير هو عرض كتابي أو شفوي مركز لموضوع معين يقدمه فرد أو مجموعه	١٥- إدارة المخاطر تقوم بقياس المخاطر وتقييمها والعمل على تطويرها.
٦- السلامة والأمانة والصدق من اخلاقيات البحث العلمي وغيره.	١٦- في اختيارات الزواج فإن الإفشاء عن الأمراض التي قد تتوفر في أحد الطرفين يعتبر مبرر
٧- اتباع تعليمات السلامة في مكان العمل والشارع والبيت	١٧- الملون الأصفر في مدلول العلامات الإرشادية يعني ممنوع
٨- يعد سرقة علمية استخدام أفكار من موقع على الانترنت والاشارة اليه	١٨- تعرف الكوارث بأنها حوادث غير مفاجئة تقوى الطبيعة أو الانسان
٩- الشائعات جريمة قد تدمر الاوطان	١٩- الهروب من موقع العمل وقاية عند حدوث زلزال
١٠- رقم ٦ المكتوبة أسفل الزجاجات البلاستيكية يعني أمانة الاستخدام المتكرر	٢٠- المفاجأة والاضطراب والارتباك ليست من سمات الطوارئ والازمات

								
٢٩- مخاطر بيئية	٢٨- ممنوع الغطس	٢٧- مخاطر إشعاعية	٢٦- مخاطر بيولوجية	٢٥- اتجاه يمين	٢٤- شباك	٢٣- ممنوع التدخين	٢٢- مخاطر آلة حادة	٢١- حريق

(٢٠ درجات)

السؤال الثاني: في ورقة البابل ظلل حرف A أو B أو C أو D للإجابة الصحيحة:

- ٣١- مقرر اخلاقيات المهنة Scientific Ethics يتناول اخلاقيات مهنة (A-العلميين -B-الاطباء -C-المهندسين -D-كل ما سبق)
- ٣٢- من اساسيات تجهيز مختبرات الكيمياء (A- وجود شفاطات هواء -B- وجود كراسي -C- وجود سلام -D- كل ما سبق)
- ٣٣- هو تركيز المادة التي تؤدي لوفاة نصف مستخدميها اذا تم تناولها دفعة واحدة (A- LD50 -B- LEL -C- LEL -D- LD50)
- ٣٤- من الآداب العامة لمزاولة مهنة المختبرات الطبية (A- الخبرة -B- الزهو -C- الدعاية الشخصية -D- كل ما سبق)
- ٣٥- يلبس رجال الاطفاء خوذة لونها (A- احمر -B- اخضر -C- اصفر -D- ابيض)
- ٣٦- من الأساليب التي يمكن اللجوء اليها في إدارة الأزمة (A- المناورة والالتفاف -B- الضغوط الاقتصادية -C- الدبلوماسية -D- كل ما سبق)
- ٣٧- من طرق علاج الشائعات (A- المنطقية في التعامل -B- نشر الحقائق -C- التوعية -D- كل ما سبق)
- ٣٨- من الأهداف العامة التي تسعى السلامة والصحة المهنية لتحقيقها (A- حماية الممتلكات -B- حماية الافراد -C- العمل بأمان -D- كل ما سبق)
- ٣٩- MSDS لأي مادة أو جهاز هامة لسلامة (A- الجهاز -B- المستخدم -C- المادة -D- كل ما سبق)
- ٤٠- مجموعه من الوظائف المتشابهة التي يمكن أن يقوم بها فرد واحد عند اللزوم. (المهنة - العمل - السرقة العلمية - الوظيفة)
- ٤١- من اخلاقيات مهنة التحاليل الطبية التبليغ فورا في حالة نتائج إيجابية لمرض (A- الجرب -B- شلل الأطفال -C- الكوليرا -D- كل ما سبق)
- ٤٢- المسافة النموذجية لمستخدمي العمل (A- ٢متر مربع لكل -B- ٤متر مربع لكل -C- ١٦متر مربع لكل -D- ٢٠متر مربع)
- ٤٣- يجب ان تحتوي شئلة الاسعافات الأولية على (A- ملينات -B- مقاصات -C- قطن طبي وشاش -D- كل ما سبق)
- ٤٤- الرعاف هو (A- صدمة عصبية -B- رعشة الجسم -C- نزيف دموي من الانف -D- كل ما سبق)
- ٤٥- من الخطوات الرئيسية عند تنفيذ عملية مواجهة الكوارث (A- الانذار والتجدير -B- الاخلاء -C- الايواء -D- كل ما سبق)
- ٤٦- ترويض التلوث الصناعي يتم ب (A- الصناعة الخضراء -B- التدوير -C- التوازن البيئي -D- كل ما سبق)
- ٤٧- من مجالات الاخلاقيات البيولوجية (A- تأجير الارحام -B- القرصنة البيولوجية -C- سرقة الجينات -D- كل ما سبق)
- ٤٨- الجبس الموجود بالاسواق مادة كيميائية تسمى (A- كبريتات الكالسيوم -B- كبريتات الصوديوم -C- كلوريد الصوديوم -D- كل ما سبق)
- ٤٩- Plagiarism يعني (A- الانتحال -B- الاقتباس -C- البحث -D- كل ما سبق)
- ٥٠- من فن إدارة الوقت (A- كتابة قائمة بالمهام -B- البدء بأصعب مهمة -C- استخدام الأدوات المتاحة -D- كل ما سبق)

أ. د. فاضل الشبيبي

مع تمنياتي بالتفوق

انتهت الأسئلة

Q3) Put the sign (✓) in the front of correct statement and (X) in the front of wrong statement . (10 Marks)
(Correct the wrong statement)

- a) α -Hydroxy acids reacts with LTA to give alkenes.
 - b) DIBAL is used to Amides to Aldehydes at high temperature.
 - c) Diels-Alder reaction is a type of regioselectivity.
 - d) Zaitsev enamine requires a bulky sec. amines.
 - e) Benzyl alcohol could be oxidized to benzaldehyde using MnO_2 and methanol as solvent.
 - f) The Thioketals could be reduced to alkanes, using $\text{H}_2/\text{Raney Ni}$
 - g) Baeyer-villiger is a reaction to convert ketones to amides.
 - h) The reaction of chiral aldehyde with achiral enolate gives mainly anti -aldol product.
 - i) In Swern oxidation , DMSO is activated by DCC.
 - j) Oxidative cleavage of Acetone by Ozone gives Acetaldehyde and Formic acid.
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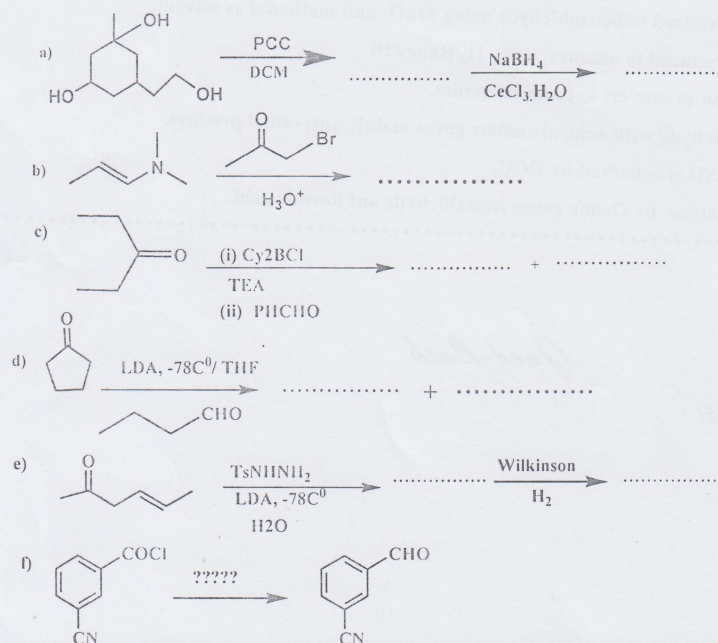
Good Luck

Prof. Dr. Shawkat

Final Exam of advanced synthetic Organic Chemistry for 3rd chemistry students (314 C)

Answer the following questions:

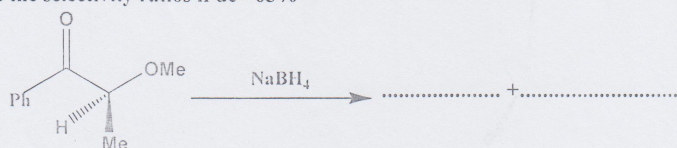
Q1) Complete the following equations (draw the major products if found) (20 Marks)



Q2) Write by equations on (Five-Only) the following:

(20 Marks)

- Wittig-Koshner reaction and mechanism of propanaldehyde
- DMP oxidation and mechanism of isopropanol
- Birch reduction and mechanism of Anisole
- Homogenous catalytic hydrogenation and gave an example
- (i) Using Felkin-anh model to explore the major product of the following reaction
(ii) Calculate the selectivity ratios if de= 65%



f- Using of LTA to prepare tetrahydrofuran.

Signature



Chemistry Department
C-342 Analytical Chemistry (I) Final Exam



June 2025
Time Allowed: 2 hrs

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Answer The Following Questions: (50 marks)

1. Define the following: (10 marks)
Conductometry- FTIR- interfering material- Chromatography.
2. Complete the following sentences: (10 marks)
 - a- Spectroscopy is the study of the interaction between ----- and -----.
 - b- In UV/VIS spectroscopy, two sources are required to scan the entire UV/VIS bands: ----- lamp that covers the UV from ----- nm and the ----- lamp that covers the VIS region from ----- nm.
 - c- In UV/VIS spectrometer, the function of the monochromator is to ----- which in turn sends a separate band to a cell containing -----.
 - d- The Beer-Lambert Law equation is: -----
Where: -----, -----, -----.
3. a- Draw a graphical representation for the different electronic transitions that may be occurred in UV spectroscopy. (5 marks)
b- State the different parameters that affect the electrical conductivity of an electrolyte. (5 marks)
4. a- State the principles for conductometric titration. (5 marks)
b- State the applications of ion-exchange methods. (5 marks)
5. a- State the principles of amperometric titrations. (5 marks)
b- Discuss how you can precipitate proteins from a solution. (5 marks)

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Good Luck

Prof. Nagwa Abo El-Maali



Answer Five Only from the following questions :

(50 Mark)

- 1) Discuss with examples the types of Initiators, and what you mean by HIPS ?
- 2) Is it possible to make polyethylene from cyclohexane? If not, say why? then show examples of ring opening polymerization?
- 3) Compare between the step- and chain- growth polymerization, and also compare, giving reason, between the time needed in polymerization of these monomers: (Vinyl Chloride, Styrene, MMA)
- 4) In the living polymerization, show by equations how can we put an ending for the living chain (Carbanion).
- 5) " Carbon Fibers..... the wonder polymer..... stronger than the steel". Show by equations the steps of production of this polymer.
- 6) Explain by (equations or structures): Types of copolymers- Backbiting- Dianion, Self initiator.

Good Luck

Examiner: Prof. Dr. Kamal Ibrahim Aly

Assiut University

Faculty of Science
Chemistry Department



Final Examination for 3rd (General Division)
Photochemistry and Active Intermediates (313 C)

Date: Wednesday, 04/06/2025

Time: 3 hours

Answer Nine Only from the following:

(50 points)

- 1) Discuss the storage of Solar Energy in Inorganic Compounds
- 2) Compare between Phosphorescence and Slow Fluorescence.
- 3) Compare between the properties of Excited state and Ground state.
- 4) What differences are between Luminescence and Slow Fluorescence.
- 5) Describe briefly the physical fate of Photoexcited molecules.
- 6) Explain briefly the photosensitization process on the light of the photodimerization of 1,3-butadiene.
- 7) Compare between the electronic configuration of singlet and triplet carbenes.
- 8) Methyl carbocation is less stable than tert-butyl carbocation. Explain this statement.
- 9) A carbon radical has seven electrons in its valence shell, while carbocation has only six. (Explain this statement).
- 10) The trifluoromethyl and cyclopropyl radicals are σ radicals, while the ethyl and cyclohexyl radicals are π radicals. (Explain this statement).

Oral -----(10 Mark)

- 1) Explain the difference between Photo- reactions and Thermal reactions.

Good Luck

Examiner:

Prof. Dr. Kamal Ibrahim Aly

III- Put (T) for the true statements and (F) for the false ones.

(10 Mark)

No.	Statement	T /F
1	Smaller quantum dots emit light of lower energy compared to larger ones.	
2	A red shift in LSPR peak typically indicates an increase in particle size.	
3	At the nanoscale, gravitational forces become negligible, and electromagnetic forces dominate.	
4	Miniaturization in chips improve performance and reduce power consumption.	
6	Nanoparticles have a significantly lower melting point compared to bulk materials	
7	Gold nanoparticles, which are chemically inert in bulk form, become highly reactive catalysts at the nanoscale	
8	Graphene is a Two-dimensional material	
9	Higher S/V ratio for nanomaterials means faster diffusion of atoms	
10	Localized surface plasmon resonance (LSPR) is a result of the collective oscillation of free electrons in nonmetal nanoparticles	

Good Luck

Dr. Mahmoud Kamel

4. Which of the following correctly ranks the energy gap from largest to smallest?
- Individual Atom > Quantum Dots > Bulk Semiconductor
 - Quantum Dots > Bulk Semiconductor > Individual Atom
 - Bulk Semiconductor > Individual Atom > Quantum Dots
 - Individual Atom > Bulk Semiconductor > Quantum Dots
5. What happens to the emission wavelength of QDs as their size increases?
- Blue shift
 - Red shift
 - It does not change
 - It turns ultraviolet
6. In the transition from quantum dots to bulk materials, what happens to the energy gap and emission properties?
- Band gap increases; emission shifts to blue.
 - Band gap decreases; emission becomes less size-dependent.
 - Band gap remains constant; emission becomes sharper.
 - Discrete energy levels emerge.
7. Smaller semiconductor particles exhibit
- A blue shift in optical absorption and a decreased band gap.
 - A red shift in optical absorption and an increased band gap.
 - A red shift in optical absorption and a decreased band gap.
 - A blue shift in optical absorption and an increased band gap.
8. Which statement best describes the role of AuNPs in pregnancy tests?
- Act as fluorescent probes
 - Generate electric signals
 - Bind target molecules and generate visible color changes
 - Catalyze hormone breakdown
9. What is the reason silver exhibits stronger plasmonic behavior than copper in the visible range?
- Higher density
 - Stronger interband transitions
 - Fewer interband transitions in the visible spectrum
 - Larger atomic radius
10. How does the melting point of metals change when their size is reduced to the nanoscale compared to their bulk form?
- The melting point decreases due to increased surface-to-volume ratio.
 - The melting point decreases due to large cohesive energy.
 - The melting point increases due to large cohesive energy.
 - The melting point decreases due to decreased surface-to-volume ratio.

* Please fill in your selected answers in the table below:

1	2	3	4	5	6	7	8	9	10



Assiut University
Faculty of Science
Chemistry Department
Final Exam in Basics of Nanotechnology (Chem 304)
May 2025, Time: 2 hours



Answer the following questions:

(50 Marks)

I- Complete the Following Statement:

(20 Marks)

1. Materials whose thickness is at nanoscale and length and breadth at macro scale are known as _____
2. Unlike bulk semiconductors with a fixed band gap, quantum dots exhibit _____ band gap.
3. Like atoms, quantum dots have _____ energy levels, this is why they are called _____
4. The light emitted when an excited electron drops back into the valance band is called _____
5. There are many potential applications for photoluminescent quantum dots such as _____, _____ and _____
6. In quantum dots, excitons are confined in _____ dimensions of space.
7. Optical properties describe how a material interacts with electromagnetic radiation, including processes such as _____, _____, _____, and _____.
8. Quantum dots (QDs) are semiconductor particles typically ranging in size from _____ to _____ nm.
9. At the nanoscale, optical properties are mainly influenced by the following four factors _____, _____, _____, and _____
10. The scientist who is credited with coining the term "nanotechnology" in 1974 is _____

II- Choose the correct answer

(20 Marks)

1. Which of the following statements about quantum dots is TRUE?
A) They have a continuous energy band like metals B) They exhibit a size-independent band gap
C) Their band gap increases with decreasing size D) They are macroscale materials
2. Which of the following best describes the energy levels in quantum dots?
A) Continuous and overlapping B) Similar to bulk semiconductors
C) Discrete, like atoms D) Constant, irrespective of size
3. Which quantum dot would emit light with the highest photon energy?
A) A 10 nm CdSe QD B) A 2 nm CdSe QD
C) A 5 nm CdSe QD D) They all emit the same energy

Continued on next page

Assiut university

Academic year : 2024/2025

Faculty of science

time allowed : 2 hours

Chemistry Department

Final exam for course No : C-302 for Nano Technology group

Question No. 1

Identify the crystal system , crystal class and Laue class for the following space groups

$P2_1/c$, $P622$, $P422$, $pnma$, $F432$

Discuss in details all the symmetry elements present in space group $pnma$

Question No : 2

AgCl is known to have NaCl type structure. Which of the following indices are allowed in the x-ray diffraction pattern? 100 , 010 , 110 , 111.200, 020, 012, 210, 220, 211, 122 and 222. Write the fraction coordinates of both cations and anions in the lattice

Question No .3

When measuring the x-ray diffraction pattern of KCl (NaCl - type structure) sample by $\text{CuK}\alpha$ radiation ($\lambda = 1.54 \text{ \AA}$) the following diffraction lines were obtained with the scattering angles (2θ).

2θ (degree): 24.48 , 28.35 , 40.50 , 47.92 , 50.18, 58.66, 66.39, 73.54 , 87.68 , 94.58 , 101.51 , and 108.65

Index the pattern and compute the lattice parameters.

Question No.4

With respect to X-ray diffraction from a crystal. Explain the relationship between the incident beam , the scattered beam and the direction of a crystal for detecting the scattering intensity using Ewald sphere

Prove that the reciprocal lattice for BCC cubic lattice is FCC direct lattice

Good Luck

Prof. R.M.mahfouz

5. Complete the following (10 Marks)

- a. Because of its high density lead oxide glass (crystal glass) possesses a high.....giving the glassware a brilliant appearance.
- b. Coatings in glass containers industry involve application of a thin layer of.....at the hot end while at the cold end a layer of.....is applied.
- c. Fibrization of glass fibers involves a combination of two processes.....and.....
- d. The crucibles of pot furnace are made ofor.....
- e. Toughened or tempered glass is a glass processed by controlled.....and.....treatments.
- f. Danner process is used for the shaping of.....

Good Luck

Examiner: Prof. Dr. Aref A. M. Aly

e. Which of the following raw materials is the major component in glass industry?

- i) soda ash ii) alumina iii) borax iv) feldspar.

3. Answer the following (12 Marks)

- a. Draw the basic components of the **float process** and then comment.
- b. Give the importance of the following sizing (coating) components in fiberglass industry:
 - i) Lubricants
 - ii) binders
 - iii) coupling agents
- c. Write on the following
 - i) Radial and concentric cracks of glass fracture
 - ii) Environmental impact of glass industry regarding CO_2 and SO_2

4. Mark right answer with (✓) and the wrong one with (X)

(13 Marks)

- a. Beck line appears inside the glass fragment when the refractive index of liquid (in which the fragment is immersed) is higher than that of the glass.
- b. 96% silica glass is translucent and has very high thermal expansion coefficient.
- c. Glass has the crystal structure and hence it breaks.
- d. Gelcoat used in fiberglass molds gives the mold a shiny appearance.
- e. The pot furnace in glass manufacture possesses higher capacity than tank furnaces.
- f. Number of glass fibers as well as their direction affect the durability of glass fiber cloth.
- g. Every 10% of cullet (recycled glass) used as a raw material in glass manufacture results in 7% reduction in carbon emission.
- h. Wired glass resists fire.
- i. Glass fibers are not moisture resistant.
- j. Every 10% of cullet (recycled glass) used as a raw material in glass manufacture results in 7% reduction in carbon emission.
- k. Borosilicate glass is called also pyrex or Jena glass.
- l. When 99.5% silica glass is heated above its melting point, it becomes transparent (clear silica glass).
- m. Alkali-silicate glass is manufactured from only two components, i.e sand and soda ash.

Chemistry Department

May 2025

Faculty of Science

Time 2h

Assiut University

Final exam of course 310 C (glass industry) for the third level students of the industrial program.

1. Give reasons for FIVE of the following (10 Marks)

- a. Too hot and too long firing of glass cause devitrification.
- b. Use of sodium sulphate (salt cake) in glass industry.
- c. Use of waste glass (cullet) as a raw material in glass industry.
- d. Addition of arsenic oxide to the glass melt in tank furnace.
- e. Polyester resin is preferred for wetting the chopped strand mat (CSM).
- f. Bushings in glass fiber furnace is heated and heat should precisely controlled.

2. Choose the correct answer (5 Marks)

- a. E-glass is a type of glass that can be regarded as
 - i) alkali-lime glass with high boron oxide content
 - ii) alumino-silicate glass with high MgO content
 - iii) alumino-borosilicate glass with less than 1% alkali oxide
 - iv) alumino-borosilicate glass with more than 2% calcium oxide.
- b. C-glass is a type of glass that is
 - i) electrical resistant
 - ii) with high tensile strength
 - iii) resistant to chemical attack
 - iv) non of them
- c. From the health point of view, are glass fibers safe?
 - i) not safe
 - ii) safe
 - iii) it is not known till now
 - iv) research work on this subject is ongoing.
- d. Devitrification of glass occurs
 - i) above 700°C
 - ii) below 700°C
 - iii) at 580°C
 - iv) below 580°C

انظر

iii- Mn^{2+} and Zn^{2+} follow the expected lattice energy line.

iv- d^3 and d^8 complexes have higher octahedral site preference energies.

2-Complete the following:

i-CFT cannot explain partly nature of metal ligand bond.

ii-VBT does not distinguish between and ligands.

iii-Non-linear systems will undergo a that makes the complex less

iv-A small neutral ligand with a highly localized lone pair results in significantly larger values than might be expected.

3-i $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{2+}$ has 3 unpaired electrons, show whether the given complex ion is inner or outer orbital octahedral complex ion.

ii-Determine the CFSE for d^7 configuration in octahedral and tetrahedral fields.

4-i The maximum absorption spectrum of $[\text{PtCl}_6]^{4-}$ is at $27,600 \text{ cm}^{-1}$, calculate its crystal field splitting energy and CFSE of the complex ion.

ii-The complex ion $[\text{VL}_6]^{3-}$ has three energy transitions, give their assignment.

5-i Find the ground terms for d^4 and d^2 configuration and show their splitting in weak octahedral field.

ii-State the main assumptions of crystal field theory.

Atomic numbers: V=23, Mn=25, Fe=26, Zn=30, Rh=45 and Pt=78.

Examiners

Prof. Dr. Aref Ahmed

Prof. Dr. Mohamed Abdelhakeem

Prof. Dr. Asma Ibrahim

D. Choose the correct answer A, B, C or D (3 Marks)

1. Oxidation state +7 is shown by :

- A) Pa and U B) Np and Pu C) Am and Cm D) all of these pairs

2. Among the quadrivalent lanthanides, it was found that one of the following quadrivalent lanthanide ions is sufficiently stable in solution as well as in solid state:

- A. Ce(IV) B. Pr (IV) C. Tb(IV) D. Dy (IV)

3. Solution chemistry of uranium are complex due to:

- A) presence of four oxidation states
B) complex reactions with anions in solution
C) formation of polymeric species only D) all the three reasons.

Part II

(17 Marks)

A) Answer four only of the following:

(12 Marks)

i- A solution of $[\text{Ni}(\text{H}_2\text{O})_6]^{2+}$ is green but a solution of $[\text{Ni}(\text{CN})_4]^{2-}$ is colorless. Explain.

ii- Discuss the factors affecting on the magnitude Δ

iii- Write the electronic configuration of d^4 in terms of t_{2g} and e_g in an octahedral field when $\Delta_0 > P$

iv- Discuss effect high spin on d^4 and d^8 in Π_T and LFSE (where : $\Delta_0 = 9350\text{cm}^{-1}$; $\Pi_e = 19600\text{cm}^{-1}$; $\Pi_o = 2000\text{cm}^{-1}$)

v- Account number of uses crystal field stabilization energy

B) Explain why Co (III) forms a paramagnetic octahedral complex with weak field ligands whereas it forms a diamagnetic octahedral complex with strong field ligands.

(3 Marks)

C) What is the difference in the energy of the electrons in $[\text{Fe}(\text{H}_2\text{O})_6]^{+3}$ and $[\text{Fe}(\text{CN})_6]^{-3}$

(2 marks)

Part III

(16 Marks)

Answer Only Four of the following questions

1-Give reason(s) of the following:

i- $\text{Co}(\text{CO})_4$ compound has paramagnetic property.

ii- $[\text{FeF}_6]^{4-}$ complex ion is in HS state while $[\text{Rh}(\text{NH}_3)_6]^{3+}$ is in LS state.

Assiut university

May, 2025

Faculty of Science

Time 3h

Chemistry Department

Final exam of "Inorganic chemistry III" course code 324C for the third level students

Part I

(17 Marks)

Answer the following

A. Complete THREE of the following (4 Marks)

- i. is the most stable divalent ion among the divalent lanthanides .
- ii. Breaking of bonds by emitted particles in a sample of a radioactive actinide element is equivalent to a process of.....
- iii. +5 oxidation state in actinide elements is very important for the element.....
- iv. Very pure thorium can be obtained by thermal decomposition of.....

B. Give reason for the following (4 Marks)

- i. Cerium and terbium form stable +4 oxidation states.
- ii. Zirconium and hafnium have almost the same atomic size and almost the same chemistry.
- iii. Actinides show higher oxidation states ranging from +4 to +7 while lanthanides exhibit a maximum oxidation state of +4.
- iv. Sm^{2+} and Yb^{2+} liberate hydrogen from water.

C. Mark the correct sentence with $\checkmark$ and the false one with x (6 Marks)

1. Owing to the lanthanide contraction the basic character of the hydroxides increases with increasing atomic number due to the decreased covalent character between the lanthanide ion and the hydroxide.
2. Sulphates of lanthanides are more soluble in cold water than in hot water.
3. Lanthanide contraction causes a slight decrease in the electronegativity of the trivalent lanthanides.
4. Actinide compounds are more basic than lanthanide ones.
5. The chemistry of lanthanides is predominantly covalent.
6. Electronegativity values of lanthanides are comparable to aluminium.

انظر الخانة



Final Examination for 3rd Level of Nanotechnology students
(Scientific Reports- 312 Chem.)

Answer the following questions: (50 Marks)

First question:

(a) Give the meaning of the following terms in the light of the scientific research: Only Five
(5 X 3 = 15 Marks)

- | | | |
|------------------|----------------|------------------------|
| 1. IMRAD | 2. Objectivity | 3. Deductive research |
| 4. Replicability | 5. Plagiarism | 6. Research literature |

(b) Discuss the criteria that must be fulfilled in preparing the abstract of the research paper and refer to the most important one. How can you prepare the graphical abstract.

10 marks

Second question:

(a) Put (T) for the true statement and (F) for the false one of the following:

(Answer in a table) (10 X 1 = 10 Marks)

1. Good scientific reporting provides only replicable new findings of the research.
2. The methodological skills of the researcher depend only on his/her scientific knowledge.
3. Descriptive research provides secondary data.
4. Applied research is deductive research rather than inductive one.
5. The most important feature of scientific research is to be rigor.
6. Publishing all the data obtained obeys the ethics of scientific research.
7. Scientific research is bad when it is a cyclic process.
8. Precision in scientific research refers to the closeness of the findings to reality.
9. Citation must be provided in all parts of the scientific paper.
10. Literature knowledge is the sole source of suggesting the hypothesis.

(b) Discuss the objectives of ethics in scientific research.

5 marks

Third question: Discuss briefly Only One the following:

10 marks

- (a) Different methods of in-text citation and preparation of the references list.
- (b) Steps of performing scientific research and refer to the most important one.



GOOD LUCK

Examiner: Asst. Prof. Awad Said

3. Nickel dissolves readily in dilute acids to produce:
 - a) Ni^{2+} and O_2
 - b) Ni^{2+} and H_2
 - c) Ni^{3+} and H_2
4. Cuprous oxide (Cu_2O) reacts with hydroiodic acid producing
 - a) CuI
 - b) CuI_2
 - c) Cu_2I
5. The product of reacting Cu^{+2} ions with excess CN^- is
 - a) $\text{Cu}(\text{CN})_2$
 - b) $[\text{Cu}(\text{CN})_4]^{3-}$
 - c) $[\text{Cu}(\text{CN})_6]^{4-}$
6. Ammonium metavanadate (NH_4VO_3) decomposes on heating to form:
 - a) $\text{VO}_2 + \text{NH}_3 + \text{H}_2\text{O}$
 - b) $\text{V}_2\text{O}_5 + \text{NH}_3 + \text{H}_2\text{O}$
 - c) $\text{V}_2\text{O}_3 + \text{N}_2 + \text{H}_2\text{O}$
7. What happens when $\text{Cr}(\text{OH})_3$ is dissolved in excess NaOH ?
 - a) It forms CrO_4^{2-}
 - b) It forms Cr^{2+}
 - c) No reaction

(C) The sums of the first and second ionization energies and those of the third and fourth ionization energies of nickel and platinum are given below: (2 Marks)

Metal	$\text{IE}_1 + \text{IE}_2$	$\text{IE}_3 + \text{IE}_4$
Ni	2.49	8.80
Pt	2.66	6.70

Based on these values, answer the following:

1. What is the most common oxidation state of Ni and Pt?
 2. Which metal, Ni or Pt, is more likely to form compounds in the +4-oxidation state? Explain your reasoning.
- (D) Explain why for only two of the following (2 Marks)
1. $[\text{Ni}(\text{CN})_4]^{2-}$ is diamagnetic
 2. The complex formed between nickel and dimethylglyoxime is stable.
 3. Mn^{+2} is more stable than Fe^{+2}

Question Number Three: (16 Marks)

- (A) Complete the following: (10 Marks)
1. The tendency of transition metals to form complexes is mainly due to the following two reasons:
 - i)
 - ii)
 2. Colour in transition-series metal compounds is generally due to electronic transitions of the following two principal types:
 - i)
 - ii)
 3. TiO_2 occurs in the following three different crystalline forms:
 - i)
 - ii)
 - iii)
 4. Zn, Cd and Hg have lower melting point compared to other transition elements because.....
 5. $\text{TiCl}_4 + 2 \text{H}_2\text{O} \rightarrow \dots + \dots$
- (B) Define each of the following: (6 Marks)
1. Charge transfer transitions.
 2. Transition elements.
 3. Ionization energy.
 4. Paramagnetic substances.
 5. Magnetic susceptibility and its relation with magnetic moment (Using equations).
 6. Lanthanide contraction

Good Luck

Prof. Dr. Said Ahmed Ibrahim, Dr. Mahmoud Kamal

Final Exam in Inorganic Chemistry (2) (Chem 321) for Third Level Students

Question Number One:

(17 marks)

- a) Write the statement of the effective atomic number rule.
b) Calculate the effective atomic number for the following complexes and clarify it is obeying the rule or not.
(i) $[\text{Ni}(\text{CO})_4]$, (ii) $\text{K}_3[\text{Fe}(\text{CN})_6]$
c) Write the formula of the following complexes:
(i) Tetramminedicyanoplatinum(IV)tetrachloroplatinate(II).
(ii) Octaammine- μ -hydroxo- μ -amidodicobalt(II) chloride.
d) Write the IUPAC name of the following complexes.
(i) $[\text{PdI}_2(\text{ONO})_2]$
(ii) $[\text{Co}(\text{en})_2\text{NH}_3\text{Br}]\text{Cl}$
(iii) $\text{K}[\text{Pt}(\text{NH}_3)\text{Cl}_5]$
e) What kinds of isomerism that compound (i) above can possess?
f) Put (✓) or (x) in front of the following:
(i) The compound $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ contains 4 charges and 3 ionizable Cl.
(ii) The oxidation number of nickel in the complex $\text{K}_4[\text{Ni}(\text{CN})_4]$ is zero.
(iii) The number of charges in a solution of the complex $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ is zero.
(iv) A solution of the complex $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ contains 6 charges and 4 particles.
(v) Chiral complexes possess superimposable mirror image isomers.
g) In the light of HSAB concept, predict which direction the following reaction will go?
 $\text{HgO} + \text{H}_2\text{S} \rightleftharpoons \text{HgS} + \text{H}_2\text{O}$

Question Number Two:

(17 marks)

(A) Put (✓) for the true statements and (x) for the false ones. Then, **correct the false statements.**

(6 Marks)

- The brown ring test involves the formation of $\text{K}_3[\text{Fe}(\text{CN})_6]$ complex.
- $[\text{Ni}(\text{NH}_3)_6]^{2+}$, $[\text{Ni}(\text{H}_2\text{O})_4(\text{NH}_3)_2]^{2+}$, and $[\text{Ni}(\text{ethylenediamine})_3]^{2+}$ are all octahedral, and are paramagnetic.
- The color of V_2O_5 (red-orange) is due to defects in the structure and charge transfer transitions.
- The (+II) state is the most stable and common for group 7 elements (Mn, Tc, Re).
- Both Cu^+ and Au^+ undergo disproportionation in water.
- Zn dissolves in acidic solution to form zincate ions.

(B) Choose the correct answer

(7 Marks)

- Prussian blue is formed when:
a) Fe^{2+} reacts with $\text{K}_3[\text{Fe}(\text{CN})_6]$ b) Fe^{3+} reacts with $\text{K}_3[\text{Fe}(\text{CN})_6]$ c) Fe^{2+} reacts with NH_3
- Which compound is known as ferrocene?
a) $(\text{C}_6\text{H}_5)_2\text{Fe}$ b) $\text{Fe}(\text{CO})_5$ c) $\text{K}_3[\text{Fe}(\text{CN})_6]$

Section III- Kinetic Theory of Gases Section:

(16 Marks)

Answer the following questions:

- 1 - For molecular carbon dioxide (CO_2), at 25°C , calculate the collision frequency z_{11} and the collision density Z_{11} at a pressure of $1\ \mu\text{bar}$. The collision diameter of carbon dioxide is $0.464\ \text{nm}$.
- 2 - Drive the probability density equation $F(\epsilon)d\epsilon$ and plot $F(\epsilon)$ for the molecular translational energy of an ideal gas molecular at $300\ \text{K}$ versus the energy (ϵ) .
- 3- What is the mean free path for oxygen at 25°C and $0.1\ \text{Pa}$ pressure? where the collision diameter of oxygen is $0.361\ \text{nm}$.
- 4 - The vapor pressure of solid beryllium was measured by using a Knudsen cell. The effusion hole was $0.318\ \text{cm}$ in diameter, and they found a mass loss of $9.54\ \text{mg}$ in $60.1\ \text{min}$ at a temperature of $1457\ \text{K}$. What is the vapor pressure?
- 5- Calculate the viscosity of molecular methane at $273.2\ \text{K}$ and $1\ \text{bar}$. The molecular diameter is $0.414\ \text{nm}$.
- 6- State which of the following statements are true and which are false:
 - a- The collision frequency of a gas is inversely proportional with the mean speed. (T) (F)
 - b- The mean relative speed of two different molecules increases with increasing the square root of temperature. (T) (F)
 - c- In general, the speed distribution curve is wider (broader) at higher temperature than that at lower temperature. (T) (F)
 - d- Polyatomic molecules besides having transitional motion, they also have rotational and vibrational motions. (T) (F)

($R = 0.082\ \text{L atm K}^{-1}\ \text{mol}^{-1}$, $8.314\ \text{J K}^{-1}\ \text{mol}^{-1}$, $1.987\ \text{cal K}^{-1}\ \text{mol}^{-1}$, Avogadro's number $= 6.022 \times 10^{23}$, $h = 6.626 \times 10^{-34}\ \text{J s}$, $k = 1.381 \times 10^{-23}\ \text{J K}^{-1}$, speed of light $= 3.0 \times 10^{10}\ \text{cm s}^{-1}$, the atomic mass of $\text{C} = 12$, $\text{N} = 14$, $\text{Be} = 9.012$ and $\text{H} = 1$).

With Our Best Wishes

Examiners:-

1- Prof. Dr. AbdelRahman A. Dahy

2- Prof. Dr. Mostafa Farrag Mostafa

Final Examination of Physical Chemistry III (C-332) for Third Level Students

Section I- Quantum Chemistry Section:

(17 Marks)

A) If $\Psi = Ce^{im\phi} + D e^{-im\phi}$ is a solution for Schrödinger equation for a microscopic particle moving in a circle

with radius r . Confirm that the rotational energy for that particle is quantized and equal to $m^2 \frac{\hbar^2}{2I}$.

(note: $e^{ix} = \cos x + i \sin x$)

(8 Marks)

B) Answer Only Two from the following:

(9 Marks)

i) Confirm that the allowed wavelengths for a particle moving in one dimensional box is given by the relation

$$\lambda = \frac{2a}{n} \text{ where } a \text{ is the length of the box.}$$

ii) Calculate the wavelength for each of the following;

1- Tennis ball has weight 65.0 g moving with velocity 45.0 ms^{-1} .

2- Electron with kinetic energy 205 eV.

What do you deduce from solution of this problem?

iii) The infrared spectroscopy of carbon monoxide is formed from one intense line at 2143 cm^{-1} .

Calculate its force constant.

Constants: ($h = 6.626 \times 10^{-34} \text{ Js}$, $m_e = 9.11 \times 10^{-31} \text{ kg}$, $e = 1.602 \times 10^{-19} \text{ C}$, $c = 3 \times 10^8 \text{ ms}^{-1}$,
Avogadro's number = 6.022×10^{23} , the atomic mass of C = 12, O = 16)

Section II- Molecular Spectroscopy Section:

(17 Marks)

Answer the following questions:

1- The ESR frequency for a free electron is 9000 MHz. Calculate the magnetic field at which the ESR spectrometer is working, (Bohr magneton $\beta = 9.273 \times 10^{-24} \text{ JT}^{-1}$, g value = 2).

2- Write the rule of mutual exclusion, and show when NO_2^- ion will be infrared active and when Raman active.

3- Explain, how the electron charge cloud around an atom or molecule is distorted, when UV-Vis light is absorbed or emitted by the atom or molecule.

4 - A NMR spectrometer operating at a 60 MHz frequency gives proton spectra at a field of 1.4092T. At what field would the ^{11}B spectrum be observed at 60 MHz. (For ^{11}B , $I=3/2$, $g = 1.792$, $\mu_N = 5.0504 \times 10^{-27} \text{ JT}^{-1}$).

5- Calculate the degrees of freedom for acetate ion and draw its vibrational modes.

6- State which of the following statements are true and which are false:

a - The relative energy levels of the three transition processes are in the order electronic > rotational > vibrational. (T) (F)

b- In asymmetric top molecule, two moments of inertia are equal and the third is not equal to both or zero. (T) (F)

c - Shifting the absorption maximum to longer wavelength means hypsochromic shift. (T) (F)

d - Symmetric stretching in CO_2 is Raman active. (T) (F)

Examination of Nano Catalysis for 3th Level Students (Chem.305)

Material Science and Nanotechnology

Time :2 h

Date: 14 / 5 / 2025



Assiut University



Faculty of Science
Chemistry Department

Answer the Following Questions:

I- Put true (✓) or false (x) for the following sentences:

(10 marks)

- 1- Nano catalysts are typically larger than 100 nano meters in size ()
- 2- Nanoparticles used in catalysis often have a lower surface area to volume ratio compared to bulk materials ()
- 3- Nano catalysts can be easily separated from reaction mixture using filtration methods ()
- 4- Nano catalysts are only used in heterogeneous catalysis ()
- 5- The catalytic activity of nanoparticles is independent of their shape ()
- 6- The small size of nanoparticles makes them more susceptible to poisoning by impurities ()
- 7- Nano catalysts are only used in chemical synthesis reactions ()
- 8- Nano catalysts are not effective at high temperatures ()
- 9- Nano catalysts are more expensive than traditional catalysts ()
- 10- Nano catalysts can simultaneously reduce CO, HC and NO_x emissions ()

II- Write short notes on three only from the following:

(20 marks)

1. What are the key factors influencing the catalytic performance of nanoparticles
2. The factors are responsible for deactivation of a catalyst.
3. The characteristic properties of a catalyst support.
4. Advantages and disadvantages of heterogeneous and homogeneous catalysis.

III- Answer four only from the following:

(20 marks)

- 1- Write on basic oxidation – reduction reactions used in the catalytic converter.
- 2- What are the specific properties afforded by nano catalysts.
- 3- Mention the factors affecting synthesis of nanoparticles.
- 4- The role of the shape of nanoparticles in catalytic reaction.
- 5- The role of texture and structure promoters on the catalyst properties.

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

Prof. Dr. Abd El-Aziz A. Said

5. What are the types of classification of amino acids according to their metabolic fate in the body?

II. Choose the correct answer:(10 Marks)

1. Glucose and allose epimers at: a. C2 b. C4 c. C3
2. In reduction of mannose with sodium borohydride to give mannitol, which has: a. plan of symmetry, b. point of symmetry c. has no element of symmetry
3. Amino acid containing two amino groups: a. Leucine b. L-lysine c. Threonine
4. From neutral AAs (5-Hetrocyclic): a. histidine b. tyrosine c. valine
5. From glucogenic amino acid: a. Leucine: b. Aspartic acid c. Cysteine
6. From ketogenic amino acid: a. Glutamic acid b. Glutamine c. leucine
7. Amino acids that are both glycogenic and ketogenic: a. phenylalanine b. Proline c. Serine
8. From polar amino acids which can forming hydrogen bonds : a. Threonine b. Methionine c. cysteine
9. From acidic amino acids: a. Ornithine b. glutamic acids c. Arginine
10. From basic amino acids: a. Lysine b. aspartic acid c. glutamic acid
11. The isoelectric point is: a. the pH at which an amino acid is electrically neutral b. the pH at which the amino acid cannot form Zwitterion c. the pH at which the amino acid is acidic
12. From achiral amino acids: a. alanine b. tryptophan c. Glycine
13. When alanine treated with nitrosyl chloride gave: a. acetic acid b. propanoic acid c. chloroacetic acid.
14. Hippuric acid was prepared from reaction of glycine with: a. acetyl chloride b. formaldehyde c. benzoyl chloride.
15. When amino acid treated with chloroform and KOH gave: a. hydroxyl acid b. chloroacid c. carbylamines (isocyanoacid).
16. Hydroiodic acid reacted with amino acid to give: a. Iodo acid b. hydroxyl acid c. aliphatic fatty acid.
17. Amino acids when heated with barium hydroxide gave: a. barium salt of amino acid b. aliphatic fatty acid c. primary amine
18. Which disaccharide when hydrolyzed produce two Glucose bonded by (1-1) linkage: a. trehalose b. cellobiose c. Lactose
19. Lactulose is a disaccharide sugar found in: a. Mammalian milk b. is formed from glucose & galactose c. semisynthetic sugar formed produced by isomerization of lactose.
20. Hyaluronic acid is composed of: a: glucuronic acid and N-acetyl-d-glucosamine b. N-acetyl-d-glucosamine and gluconic acid c. N-acetyl-d-glucosamine and glucaric acid

Best Wishes

Prof. Adel Kamal El-Dean

Prof. Abdel-Aal Gaber



**Final Examination of Natural Products and Biochemistry for
312 C Students**

Answer the following questions:

Section A: Natural Products Chemistry

(25 Marks)

1. Write on the following:

(8 Marks)

- Prove that piperic acid has two double bonds in its side chain.
- conversion of quinolone into 1- allylbenzene.
- Conversion of oestriol into oestrone and via verse through Leed et.al.
- conversion of β -farnesene into phytol

2. Discuss the following:

(8 Marks)

- Conversion propionitrile into ephedrine.
- Prove by equation that geraniol has two double bonds at positions 2 and 6.
- conversion of β -ionone into Vit A2 into via Reformatsky reaction.
- Conversion of p-hydroxybenzaldehyde into adrenaline

3. Explain the following points:

(9 Marks)

- Conversion of α -pinene into terpenylic acid
- Conversion of ergosterol into ergocalciferol.
- IUPAC name of the following compounds:
Hygrine, Nerolidol, α -ionone, Adrenaline
- Prove by equation that papaverin contains achiral centre.
- Ozonolysis of squalene gave the followings compounds::
 - 4 Mole of laevulic acid and succinaldehyde
 - 2 Mole of laevulaldehyde and acetone
 - 4 Mole of laevulic acid and succinic acid.
 - None of the above

Section B: Biochemistry

(25 Marks)

Answer the following questions:

I. Show by equation the following:....

(15 Marks):

- Using Kiliani – Fisher synthesis, conversion arabinose to mannose
- Write the names and draw the structure of essential and non-essential amino acids.
- Define Polar Acidic α Amino Acids exploring your answer with examples.
- Mention the name of two heterocyclic amino acids and developing your answer with structures.

بقية الأسئلة خلف الصفحة

39	Metachromasia is the phenomenon where certain dyes or stains exhibit a color change or shift when they bind to specific tissue components.	
40	Peptide bonds are the type of bond that links monosaccharide subunits in a disaccharide.	

Q3: Write short notes on five only of the following eight topics: (10 marks, 2 marks for each)

- 1- Oligosaccharides, with one example.
- 2- Periodic Acid-Schiff (PAS) stain, indicating its principle.
- 3- Oil-soluble dyes, indicating their basic concept, with one example.
- 4- Feulgen method, indicating its principle.
- 5- Metachromasia.
- 6- Indirect fluorescent antibody method.
- 7- Lyophilization.
- 8- Simultaneous coupling method.

Write the numbers of the five selected topics in the box below

<u>Selected topics</u>					
------------------------	--	--	--	--	--

End of Questions, With My Best Wishes
Dr. Ahmad U. M. Al-Mutairi

Q2: Write the letter (T) if the statement is true, and write the letter (F) if the statement is false, then put your answer inside the empty box, under the black arrow:

(15 marks, one mark for each)

26	Verbasose is an example of an oligosaccharide that contains 3 monosaccharide units.	
27	The staining reactions for proteins or protein-containing substances depend on their amino acid composition.	
28	Formaldehyde is the best routine fixative for lipid histochemical methods.	
29	The Sagaguchi method is a histochemical technique used for the detection of tyrosine in proteins.	
30	Glycogen is a homopolysaccharide composed of only one type of monosaccharide subunit.	
31	In Immunohistochemical methods, most of disadvantages of fluorochrome have been overcome by using of enzyme-labeling of the antibodies especially with the horseradish peroxidase.	
32	Histochemical demonstration of proteins is possible only in fresh tissue due to their high sensitivity.	
33	Cerebrosides are a type of glycolipids that consist of a fatty acid linked to sphingosine and a single carbohydrate residue.	
34	Proteins are involved in the synthesis of hormones, such as testosterone and estrogen.	
35	Alcian Blue stain is a histochemical method used to detect acidic polysaccharides in tissue samples.	
36	Sudan Black B is an appropriate histochemical method for the demonstration of phospholipids.	
37	In the Malachite green and Acridine red histochemical method, DNA is stained red, and RNA is stained green.	
38	A nucleotide is an organic molecule formed of a nitrogenous base, a six carbon-sugar, and a phosphate group.	

17	What cellular structures can be visualized using dehydrogenase and ATPase enzymes? A) Nuclei B) Golgi apparatus C) Mitochondria D) Lysosomes
18	Which staining method is specific for glycogen? A) Alcian Blue stain B) PAS stain C) DPAS stain D) None of the above
19	Which method involves the precipitation of colored PRP at the site of enzyme activity? A) Self-colored substrate B) Post-incubation coupling C) Metal precipitation technique D) Simultaneous coupling
20	Which of the following is a pyrimidine base? A) Adenine B) Cytosine C) Guanine D) Inosine
21	Which method is used to demonstrate triglycerides in histochemical methods for lipids? A) Copper rubeanic acid method B) Acid hematin method C) Schultz method D) Calcium lipase method
22	What color does the PAS stain produce in areas where carbohydrates are present? A) Blue B) Magenta C) Yellow D) Green
23	Which of the following is NOT an example of a simple protein? A) Albumin B) Fibrin C) Glycoproteins D) Reticulin
24	When osmium tetroxide is reduced by unsaturated fatty acids and their esters, it turns into a: A) White oxide B) Yellow oxide C) Black oxide D) Red oxide
25	Which histochemical method is specifically used to demonstrate DNA? A) Feulgen method B) Basophilia C) Acridine red method D) Methyl Green Pyronin method

8	Which method involves the simultaneous production and capture of primary reaction product (PRP) and final reaction product (FRP) in one incubating medium?	A) Self-colored substrate C) Metal precipitation technique	B) Post-incubation coupling D) Simultaneous coupling
9	Which type of enzymes catalyze the rearrangement of chemical bonds within a molecule?	A) Ligases B) Transferases C) Isomerases D) Hydrolases	
10	What enzyme is commonly used to illustrate lysosomes?	A) Alkaline phosphatase C) Dehydrogenase	B) Acid phosphatase D) Esterase
11	Which of the following staining reactions for proteins depends on their physical configuration rather than their chemical composition?	A) Sagaguchi method C) Mercury orange method	B) Ninhydrin-Schiff method D) Masson's Trichrome stains
12	What are the monosaccharide units that compose sucrose?	A) Glucose and fructose C) Glucose and mannose	B) Glucose and galactose D) Glucose and ribose
13	Which histochemical method is used to demonstrate free fatty acids?	A) Copper rubeanic acid method C) Schultz method	B) Acid hematin method D) Calcium lipase method
14	Which microscopy technique is used to identify crystalline cholesterol and cholesterol esters?	A) Polarizing microscopy C) Transmission electron microscopy	B) Fluorescent microscopy D) Scanning electron microscopy
15	What type of bond links monosaccharide subunits in a polysaccharide?	A) Peptide bond C) Ionic bond	B) Hydrogen bond D) Glycosidic bond
16	What is the substrate used to visualize peroxidase activity in immunoenzyme staining?	A) Hematoxylin B) Alcian Blue C) Eosin D) Diaminobenzidine (DAB)	



Final-term exam, 2nd semester, 2024/2025

Histochemistry (Z 316)

Time limit: 2 hours, Date: May. 15th, 2025

Total score: 50 marks, the test consists of 7 pages



Q1: Choose the correct answer from "A, B, C, or D", then put your answer inside the empty box, under the black arrow: (25 marks, one mark for each)

1	Which histochemical technique is used for the detection of free amino groups in proteins? A) Ninhydrin-Schiff method B) Sagaguchi method C) Mercury orange method D) Millon's reaction	
2	The histochemical method used to detect cholesterol and its ester is: A) Copper rubeanic acid method B) Schultz method C) Calcium lipase method D) Acid hematin method	
3	Acid hematin is a histochemical method used for the demonstration of: A) Cholesterol esters B) Phospholipids C) Triglycerides D) Plasmalogens	
4	Which microscopy technique is used after staining with osmium tetroxide? A) Confocal microscopy B) Light microscopy C) Fluorescence microscopy D) Electron microscopy	
5	Which of the following methods is used to demonstrate antigens, antibodies, and antigen-antibody complexes in tissues and cells? A) Autoradiography B) Histological methods C) Immunohistochemical methods D) Enzyme labeling	
6	The structural unit of nucleic acids is: A) Monosaccharides B) Nucleotides C) Fatty acids D) Amino acids	
7	The general chemical formula for carbohydrates is: A) $C_n(H_2O)_n$ B) $C_n(H_2O)_{2n}$ C) $C_n(H_2O)_{n+1}$ D) $C_n(H_2O)_{2n+1}$	