(B) Complete the following equations with the major product, ***Five Only***: (7.5 Marks)

(1) *o*-Toluenesulfonic acid $\xrightarrow{PCl_5}$ ..... $\xrightarrow{NH_3}$ ..... $\xrightarrow[(ii)\Delta]{(i)KMnO_4}$ .....

(2) Benzene + 4-chlorobutanoyl chloride $\xrightarrow{ALCl_3}$ ..... $\xrightarrow{CH_3Cl/AlCl_3}$ ..... $\xrightarrow[\Delta]{NH_2NH_2/HO^-}$ .....

(3) Picryl chloride $\xrightarrow{NaCN}$ ..... $\xrightarrow{H_3O^+}$ ..... $\xrightarrow{Na_2CO_3}$ .....

(4) Phenol $\xrightarrow{CHCl_3/NaOH}$ ..... $\xrightarrow{CH_3CHO/NaOH}$ ..... $\xrightarrow{KMnO_4}$ .....

(5) Cumene $\xrightarrow{H_2O_2}$ ..... $\xrightarrow{H_3O^+}$ ..... $\xrightarrow[(ii)\ H_3O^+]{(i)\ CO_2}$ .....

(6) Toluene $\xrightarrow{3\ Cl_2/h\nu}$ ..... $\xrightarrow{HNO_3/H_2SO_4}$ ..... $\xrightarrow{NaOH}$ .....

Fourth question:

(A) Give the reason, using chemical structures and equations, for the following, ***Five Only***. (5 Marks)

(1) *m*-Nitrophenol is more acidic than *p*-nitrophenol.

(2) Cyclobutadiene is anti-aromatic.

(3) Fluorobenzene is more active than chlorobenzene in electrophilic substitution.

(4) Acylation of aniline before its nitration to obtain ortho and *para* nitroaniline.

(5) Storing *N*-phenylhydroxyl amine in acid-free medium.

(6) Nitration of naphthalene gives α-nitronaphthalene as major product.

(B) Using resonance contributors for the carbocation intermediate, explain why a phenyl group is an *ortho–para* director in chlorination of biphenyl. (3.5 Marks)

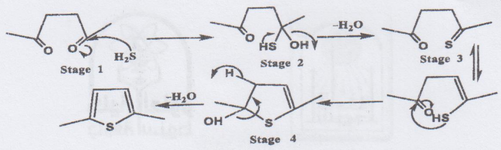
(C) A chemist isolated an aromatic compound with molecular formula C_6H_4ClBr. He treated this compound with fuming sulfuric acid and isolated three different isomers, in different amounts, with molecular formula $C_6H_4ClBrSO_3$. What are the structures of the original compound, the major product, and minor product? (1.5 Marks)

GOOD LUCK

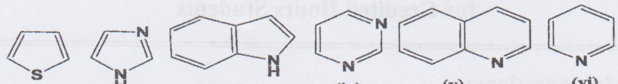
تنبيه هام: سوف يعقد امتحان الشفوي اليوم الموافق 15 مايو 2025 فى تمام الساعة 12:30 ظهراً بنفس مكان انعقاد الامتحان النهائي

Examiners: *Prof. Dr. Zeinb Hozein* *Dr. Awad I. Said*

الامتحان من ثلاث صفحات

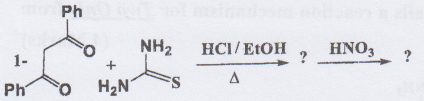


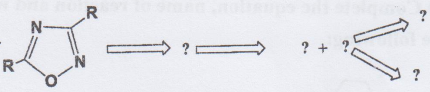
(B) **Define the position of the electrophilic substitution reaction occurs in the following:** **(3 Marks)**

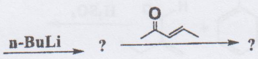


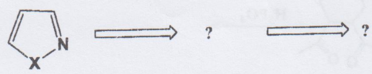
(i) (ii) (iii) (iv) (v) (vi)

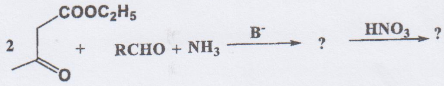
(C) **Complete the following equations (Five Only)** **(5 Marks)**

1- 

2- 

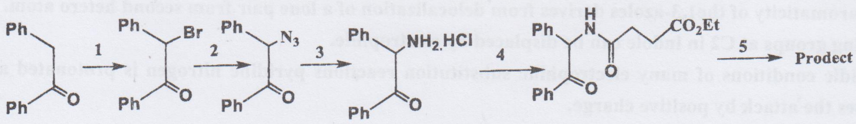
3- 2-Methylpyridinee 

4- 

5- 

6- 2-Methylimidazole $\xrightarrow{NO_2^+}$?

(D) **Give reagents and final product of the following equation:** **(3Marks)**



☺☺

Section II : Aromatic Compounds **(25 Marks)**

Third question: **(7.5 Marks)**

(A) How, by equations, achieve the following, Five *Only*?

(1) Synthesis of all isomers of cresols from benzene.

(2) Synthesis of *o*-nitroacetanilide from acetanilide as a major product.

(3) Increasing the tendency of aromatic compounds towards nucleophilic substitution reactions.

(4) Synthesis of picric acid from benzene.

(5) Differentiate between primary, secondary and tertiary amines.

(6) Synthesis of *m*-dibromobenzene from benzene.

الامتحان من ثلاث صفحات

Assiut University
Faculty of Science
Chemistry Department

Date: 15 May 2025
Duration: 3 hours

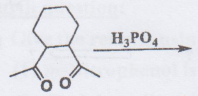
Final Examination of Organic Chemistry (Aromatic and Heterocyclic Compounds, 212C)
for Credited Hours Students

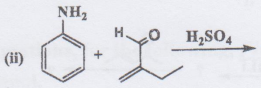
Answer the following questions: (50 Marks)

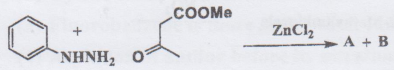
Section I : Heterocyclic Compounds (25 Marks)

First question:

A) Complete the equation, name of reaction and write in details a reaction mechanism for *Two Only* from the following: (4 Marks)

(i) 

(ii) 

(iii) 

B) Mark (√) for the right statement and the (X) for the wrong one (Five Only) (5 Marks)

1-The aromaticity of the1,3-azoles derives from delocalization of a lone pair from second hetero atom.

2-Leaving groups at C2 in indole can be displaced by electrophile.

3-In acidic conditions of many electrophilic substitution reactions pyridine nitrogen is protonated and decreases the attack by positive charge.

4-The nitrogen atom in quinoline, the lone pair of electrons doesn't be involved in aromatic system.

5-Cycloaddition of nitrile with Sod. azide followed by acidification affords triazole.

6-The ratio between the starting materials for the synthesis of pyridine by Hantzsch method a mixture of ester, aldehyde, and NH_3 is equal.

C) Illustrate by equations (Three Only) what happens when: (3 Marks)

1-Treatment of thiophene with benzoyl chloride in presence of $AlCl_3$.

2-Reaction of α-aminocarbonyl compound with acid chloride in the presence of base.

3-The combination of formyl pyrrolidine acetal and nitro toluene.

4-Major product obtained upon treatment of thiazole with n-BuLi then followed by CH_3CHO, HCl/H_2O.

Second question:

A) Which stage of the following mechanism is incorrect, show the flow of electrons (2Marks)

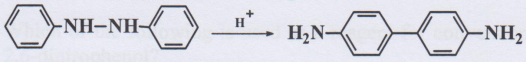
الامتحان من ثلاث صفحات

b) a-hydroxy ketone
c) Benzoic acid
d) Both a and b

17. What reagents will be used in the preparation of benzaldehyde via Gattermann Koch synthesis?
a) Carbon dioxide and HCl
b) Carbon monoxide and HCl
c) Oxygen and H_2SO_4
d) Carbon monoxide and H_2SO_4

18. n-Propyl phenyl ether can be prepared from which of the following reactants?
a) Phenol and n-propyl bromide
b) Sodium phenoxide and n-propenyl bromide
c) Sodium phenoxide and n-propyl bromide
d) n-propenyl bromide

19. What is the name of the following reaction?



a) Clasien rearrangement
b) Benzidine rearrangement
c) Reimer-Tiemann reaction
d) Mannish reaction

20. Write on the following: **(6 Marks)**
a) Starting with benzene, how can you prepare 2,4,6-trinitrotoluene (TNT)?
b) Synthesis of indoaniline as violet dye
c) Kolb-Schmidt reaction of phenol
d) Synthesis of Aspirin
e) Reaction of benzoic acid with PCl_5, $LiAlH_4$, $Cl_2/FeCl_3$ and Soda lime

Section B (Heterocyclic Chemistry) (25 Marks)

Answer the following questions:

1) Marks (only 8) of the following as (√) or (X): **(8 Marks)**
i) α - Pyrone react easily with hydroxylamine to give oxime
ii) Isoquinoline is less basic than quinoline.
iii) Pyrone ring is less stable than benzene.
iv) Coumarine is decomposes with acids.
v) Flavones are not similar to cromones in their chemical reactions.
vi) Xanthone and pyrons react easily with NH_2OH
vii) Pyrimidines are aromatic heterocycles.
viii) Pyrazolesare mor basic than imidazoles.
ix) Imidazolesare less basic than oxazoles

2) Show by equations one method for the synthesis of the following **(10 Marks)**
Pyrazole – thiazole – antipyrine - barbituric acid - phenoxazine.

3) Explain the following with equations:
a) The effect of alkali on flavone **(3 Marks)**
b) The Perkin method mechanism for coumarine synthesis. **(4 Marks)**

With our best wishes
Prof. Ali Abdel-Hafez
Prof. Abdel-Aal Gaber

8. In the series of reaction, what are X and Y are respectively?

$$C_6H_5NH_2 \xrightarrow[0-5^oC]{NaNO_2/HCl} X \xrightarrow[CH_2O]{HNO_2} Y + N_2 + HCl$$

a) C_6H_5–N=N–C_6H_5, $C_6H_5N^+{}_2Cl^-$
b) $C_6H_5N_2{}^+Cl^-$, C_6H_5–N=N–C_6H_5
c) $C_6H_5N_2{}^+Cl^-$, $C_6H_5NO_2$
d) $C_6H_5NO_2$, C_6H_6

9. Friedel-Crafts of phenol with acetyl chloride in absence of catalyze gave one of the following:
   a) o-Acetyl phenol
   b) o- and p-Acetyl phenol
   c) Methyl benzoate
   d) All the previous

10. Which of the following products is formed when Friedel –Crafts of phenol in the presence of tert-butyl alcohol and H_2SO4:
   a) p-Methyl phenol
   b) p-tert-Butyl phenol
   c) o-sec-Butyl phenol
   d) 2,4,6-Tritert-butyl phenol

11. When benzaldehyde is heated with concentrated NaOH, it gives:
   (a) Benzyl alcohol
   (b) Sodium benzoate
   (c) Benzoic acid
   (d) Benzyl alcohol + Sodium benzoate

12. Which of the following is formed when phenol is exposed to air?
   a) o-Benzoquinone
   b) p-Benzoquinone
   c) Phenoquinone
   d) o-and p-Benzoquinone

13. Among the following, which one is the strongest acidic?
   a) 2,4,6-Trinitrophenol
   b) m-Nitrophenol
   c) 2,4-Dinitrophenol
   d) p-Nitrophenol

14. What is the name of the reaction of condensing aromatic halides and heating with copper-bronze at an elevated temperature forming biaryl?
   a) Ullmann Reaction
   b) Sandmeyer's reaction
   c) Perkin reaction
   d) Schiemann reaction

15. The mechanism of heating chlorobenzene with NaOH above 300 °C and affords phenol pass through:
   a) Elimination–addition
   b) Formation of benzyne is a highly reactive, unstable intermediate
   c) Nucleophilic aromatic substitution
   d) All the previous.

16. When benzaldehyde is reacted with KCN and ethanol/water, it gives :
   a) Benzoin

Assiut university
Faculty of science
Chemistry department

Date: May 2025
Time allowed: 2 hours

Final exam in Organic Chemistry-2 (202 C) course for second level's industrial chemistry students

A. Aromatic compounds: (25 Marks)

Choose the correct answer a, b, c or d (one mark each) from the following questions: (19 Marks)

1. Which of the following is used as a reagent for the nitration of *o*-nitro aniline to form *o*-dinitrobenzene?
   a) Caro's acid
   b) H_2SO_5
   c) pertrifluoroacetic acid
   d) All the previous

2. Which of the following is used as a reagent for conversion of m-dinitrobenzene to 2,6-dinirophenol?
   a) $K_3Fe(CN)_6$/ NaOH
   b) Conc. HNO_3
   c) $Na_2Cr_2O_7/H_2SO_4$
   d) All the previous

3. What happens when benzene diazonium chloride is treated with potassium cyanide in presence of Cu powder?
   a) Benzophenone
   b) Methyl isocyanide
   c) Acetonitrile
   d) Benzonitrile

4. Which of the following reagent is converted aniline to azobenzene?
   a) PhI/Ac_2O
   b) Cf_3COOOH
   c) NaOCl
   d) All the previous

5. What of the following product is formed from oxidation of aniline with NaOCl?
   a) Indoaniline
   b) p-Aminophenol
   c) Azobenzene
   d) p-dinitrobenzene

6. Picric acid is formed when phenol react with which of the following reactant?
   a) Formaldehyde
   b) Hydrogen
   c) Nitric acid
   d) Hydrochloric acid

7. Which of the following reagent give monobromination with phenol?
   a) Water
   b) 1,2-Dichloroethane
   c) Cyclohexane
   d) NaOH

Assiut University
Faculty of Science
Chemistry Department

May 2025
Time: 3 Hours

Physical Chemistry II (C-232) Examination for Second Level Students

Section II, Phase Rule (1 hour)

Answer *All* the following questions: (17 marks)

A) Explain briefly *Only Two* from the following: (10 marks)

i- *Potassium iodide-Water* system and its uses as freezing mixture.

ii- The two-component system *magnesium* and *zinc* forming intermetallic compound with congruent melting point.

iii- The ternary system NH_4NO_3-$AgNO_3$-H_2O, where the binary compound NH_4NO_3-$AgNO_3$ is formed at 30 °C.

B) Compare between the phase diagram of water system with that of sulfur system. (4 Marks)

C) Complete each of the following: (3 Marks)

i- The peritectic reaction can be expressed as.....

ii- *NaCl-Water* phase diagram condensed system exhibits only..... univariant solubility curves and .....invariant triple points.

iii- The number of bivariant and univariant areas appearing in phase diagram of *n-Butyl alcohol- Ethyl acetate-Water* system at lower temperature are..... and..... respectively.

Good Luck

Prof. Maher M.A. Hamed

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

(ترصد الأجابة النهائية في الجدول المرفق بعد السؤال)

1. Contact fungicides are more effective against spores which have already entered the plant.
2. The second condition over the antarctic zone included the reaction of HCl and $ClONO_2$ to produce Cl_2 and HNO_3.
3. Ozone is responsible for filtering most of the UV light from sunlight between 120-220 nm.
4. Paraquat are rapidly losing their activity on contact with the soil.
5. Thiabendazole used against apple scab and as seed dressing against common bunt of wheat.
6. The major biological source of sulfur containing compounds is dimethyl sulfide.
7. Prochloraz is an example of the pyrimidines-type which is effective against a wide range of diseases.
8. Incineration method involves burning PCBs at a temperature of 1200°C for at least five seconds.

1	2	3	4	5	6	7	8

3- Describe in details *TWO* only of the following? **(2×3 = 6 Marks)**

a) **Synthesis of 2-methyl-4-chlorophenoxyacetic acid (MCPA).**
b) **Troposphere oxidation of methane.**
c) **Variation of concentration of gases during the day.**
d) **The asymmetric approach applied in the synthesis of *R*-Fusilade.**

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

a) **Chemical destruction methods of PCBs.**
b) **Geigy synthesis of atrazine and simazine from cyanuric chloride.**
c) **Reactions responsible for the ozone hole.**
d) **Long-term exposure to UV and protection inorganic/organic ingredients.**

9-Which of the following is widely used as total herbicides in land clear?

a) Rimsulfuron
b) Thiabendazole
c) Diquat
d) Ethirimol

10-Which one of the following is not amongst the components of photochemical smog?

a) O_3
b) SO_2
c) RCHO
d) NO_2

11-Select the best Dow process condition used in the 2,4-D synthesis?

a) alkaline solution & 50% excess of 2,4-dicholorophenol
b) alkaline solution & 50% excess of 2,3-dicholorophenol
c) alkaline solution & 50% excess of 2,5-dicholorophenol
d) alkaline solution & 60% excess of 2,4-dicholorophenol

12-Which of the following is not considered as chemical disposal methods of PCBs?

a) Substitution of a chloride ion with H by using of NaH
b) Substitution of chlorine by polyethylene glycols for $2h/N_2$
c) Hydrogen cleavage of C-Cl bond and biphenyl nucleus using copper catalyst
d) Using of $C_{10}H_8Na$ which results in the expulsion of a chloride ion

13-Which is the type of distribution modes in which particles serve as nuclei and undergo coagulation followed by deposition of gas molecules?

a) Nuclei mode
b) Particle mode
c) Coarse particles
d) Accumulation mode

14-What is the aerosol radiative forcing effect?

a) Dark particles tend to scatter light led to warming Earth s atmosphere.
b) Dark particles tend to absorb light led to warming Earth s atmosphere.
c) Dark particles tend to react with light led to warming Earth s atmosphere.
d) None of these

15-What is going on if there is no nitrogen oxides present over antarctic zone?

a) The Cl_2 molecule is broken down by solar radiation producing two chlorine $Cl^{\cdot}$
b) Nitric acid is incorporated into the polar stratospheric clouds (PSC)
c) HCl and $ClONO_2$ react with each other to produce Cl_2 and HNO_3.
d) Chlorine radicals start a catalytic reaction chains leading to ozone destruction.

16-Benomyl synthesis is usually started by the reaction of ----- with ----- followed by addition of ----- and finally, reaction of the later intermediate with -----.

a) cyanamide & methyl chloroformate & o-$C_6H_4(NH_2)_2$ & C_4H_9NCO
b) cyanamide & o-$C_6H_4(NH_2)_2$ & methyl chloroformate & CH_3NCO
c) methyl chloroformate & o-$C_6H_4(NH_2)_2$ & cyanamide & PhNCO
d) o-$C_6H_4(NH_2)_2$ & cyanamide & methyl chloroformate & $C_5H_{11}NCO$

17-The revolutions of inactive $HCl\&ClONO_2$ to active chlorine occur at the surface of particles composed of ------.

a) H_2O, SO_3 & NO_2
b) H_2O, CO_2 & NO
c) H_2O, H_2SO_4 & HNO_3
d) H_2O, HCl & HNO_3

18- What is the final product of mechanistic routes B&C sequence of the microbial DDT degradation?

a) 4-Chlorophenyl acetate
b) 4-Chloroacetophenone
c) 4-Chlorobenzoate
d) 4-Chlorobenzaldehyde

19-one step in troposphere oxidation process of methane includes the reaction of $CH_3O^{\cdot}$ with oxygen to give ------ and ------.

a) $HOO^{\cdot}$ & CH_2O
b) $CH_3OO^{\cdot}$ & $CH_3^{\cdot}$
c) $HOO^{\cdot}$ & CO
d) $HOO^{\cdot}$ & CO_2

20-Abstraction reaction of loosely oxygen atom from O_3 molecule is characteristic of all of the following species *EXCEPT*------.

a) $NO_2^{\cdot}$
b) $HO^{\cdot}$
c) Cl
d) $NO^{\cdot}$

9	10	11	12	13	14	15	16	17	18	19	20

ملحوظة: الأختبار مكون من ثلاث صفحات

Chemistry Department
Faculty of Science
Assiut University

May, 2025
Time: 3 hours
50 Marks

Final Exam of Green Chemistry (214C) for the 2nd Level Students

Answer all of the following questions? (50 Marks)

1- Choose the correct answer for *ALL* of the following? (30 Marks)

(ترصد الإجابة النهائية في الجداول المرفقة في نهاية السؤال)

1-The most effective triazine-herbicides are obtained if the 2-chlorine atom replaced by ------. However variations in ----- extends the range of biological activity.

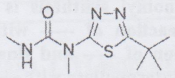
a) amino-or methyl-group & methyl-or amidic groups
b) methyl-group & alkyl side chains
c) methoxy-or thiomethyl groups & alkyl amino side chains
d) alkyl-amino side chains & methoxy-or thiomethyl groups

2-Which of the following is not significant problem in the environmental degradation of PCBs?

a) Microbes tend to be highly selective in their dechlorination with preference to in the para and meta positions
b) Microbial dechlorination tends to be rather slow acting on PCB as a soil contaminant
c) Transferring a successful laboratory strain to a natural system
d) Microbes tend to be highly selective in their dehydrochlorinations of DDT

3-What is the trademark name for the following herbicide structure?

a) Allethrins
b) Simazine
c) Tebuthiuron
d) Triemorph



4- If the pH below 5 in the SO_2-aqueous phase oxidation, the ------ dominates oxidation. While, above pH 5, ------ or other catalytic reactions dominate the oxidation.

a) O_3 & H_2O
b) O_3 & H_2O_2
c) H_2O_2 & O_3
d) $HO^{\bullet}$ & O_3

5-Which of the following is correctly describe the *albedo* effect?

a) The lower the albedo, the more light the surface reflects, and the less it absorbs
b) The higher the albedo, the more light the surface absorbs
c) The higher the albedo, the more light the surface reflects, and the less it absorbs
d) The higher the albedo, the more light the surface emits.

6- Furans can be formed at a temperature of ----- by strong heating of ----- having boiling point range ----- in the presence of oxygen.

a) 325-466 °C & polychlorinated biphenyls (PCBs) & 300-310 °C
b) 250-450°C & polychlorinated biphenyls (PCBs) & 325-366 °C
c) 310-360°C & 2,4-dichlorophenoxyacetic acid (2,4-D) & 290-320 °C
d) 300-390°C & chlorinated cyclohexane and cyclopentadiene & 200-300 °C

7-Choose the preferred IUPAC name for Carbofuran insecticide?

a) (N-(phosphonomethyl) glycine
b) 2-chloro-4-(ethylamine)-6-(iso-propylamine)-s-triazine
c) 2,2-Dimethyl-2,3-dihydro-1-benzofuran-7-yl methylcarbamate
d) 3,3-Dimethyl-2,3-dihydro-1-benzofuran-7-yl methylcarbamate

8-The shown mechanism refers to the catalytic processes contributing to ozone destruction by ------ catalyst.

a) hydroxyl radical
b) $ClONO_2$
c) HNO_3
d) nitric oxide

Mechanism I

$$X + O_3 \rightarrow XO + O_2$$
$$XO + O \rightarrow X + O_2$$
$$O_3 + O \rightarrow 2\,O_2$$

1	2	3	4	5	6	7	8

ملحوظة: الأختبار مكون من ثلاث صفحات

8. When considering electrophilic aromatic substitution reactions electron donating substituents (e.g. methoxy) are described as:

a) *Ortho/para* directing and activating
b) *Ortho/para* directing and deactivating
c) *Meta* directing and activating
d) *Meta* directing and deactivating

9. Find the reactants other than $AlCl_3$ in Friedel-Craft's alkylation

a) $C_6H_6 + CH_4$ b) $C_6H_6 + NH_3$ c) $C_6H_6 + CH_3Cl$ d)$C_6H_6 + CH_3COCl$

10. What is the electrophile in the electrophilic substitution reaction of benzene using oleum and conc. H_2SO_4?

a) SO_3H b) NO_3 c) NO_2^+ d) NO^+

11. Which of the following is the most activating in electrophilic aromatic substitution?

a) $-NO_2$ b) $-NHCOCH_3$ c) $-CN$ d) $-NH_2$

12. Which of the following statements regarding electrophilic aromatic substitution is wrong?

a) Acetyl and cyano substituents are both deactivating and *m*-directing
b) Alkyl groups are activating and *o,p*-directing
c) Nitro group are *m*-directing but amino groups are and *o,p*-directing
d) Chloro and methoxy substituents are both deactivating and o,p-directing

13. Which combination of reagents used in the indicated order with benzene will give *m*-nitropropylbenzene?

a) 1) HNO_3/H_2SO_4, 2) $CH_3CH_2CH_2Cl/AlCl_3$
b) 1) $CH_3CH_2CH_2Cl/AlCl_3$, 2) HNO_3/H_2SO_4
c) 1) $CH_3CH_2COCl/AlCl_3$, 2) HNO_3/H_2SO_4, 3) $H_2NNH_2/NaOH$
d) 1) HNO_3/H_2SO_4, 2) $CH_3CH_2COCl/AlCl_3$, 3) $H_2NNH_2/NaOH$

14. Which of the following statements regarding electrophilic aromatic substitution is wrong?

a) Sulfonation of toluene is reversible
b) Friedel-Crafts alkylation of benzene can be reversible
c) Friedel-Crafts alkylation with primary alkyl chloride may involve rearrangement.
d) Friedel-Crafts acylation of ethylbenzene readily gives a *meta* substitution product.

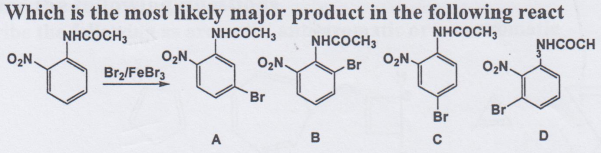
15. Aromatic systems contain 4n+2 π-electrons where n is

a) The number of carbon atoms in the ring,
b) The number of lone pairs of electrons in the molecule
c) An integer excluding zero
d) An integer.

16. Which of the following is not associated with electrophilic aromatic substitution?

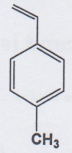
a) The formation of nitrobenzene
b) The formation of benzyne
c) The formation of bromobenzene
d) The formation of benzene sulfonic acid

17. Which is the most likely major product in the following react

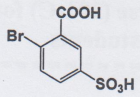


With our best wishes
Prof. Adel Kamal El-Dean
Prof. Abdel-Aal Gaber

2. **What is the correct name for the following compounds?** **(4 Marks)**



(a)



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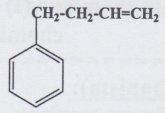
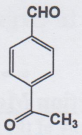
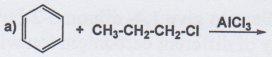


(c)

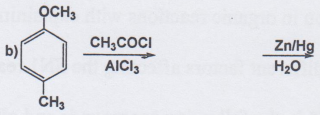


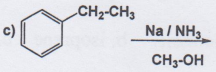
(d)

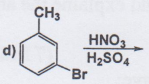
3. **Complete the following equations:** **(4.5 Marks)**

a) 

4.

b) 

c) 

d) 

Choice the correct answer from the following questions (14 Marks)

4. **Which of (a)-(d) does not give isopropyl benzene as a product upon reaction with benzene?**
   a) $(CH_3)_2CHCl/AlCl_3$
   b) $CH_3CH_2CH_2Cl/AlCl_3$
   c) $CH_3CH{=}CH_2/H_3PO_4$
   d) $(CH_3)_2C{=}CH_2/H_3PO_4$

5. **The Huckel's 4n+2 rule on aromaticity is applicable to**
   a) All hydrocarbons
   b) All aromatic hydrocarbons
   c) All aromatic compounds
   d) Only naturally occurring aromatic compounds

6. **The reaction of benzene with MeCl under Friedel-Crafts conditions leads to which of the following**
   a) A mixture of methylbenzene, 1,2-dimethylbenzene and 1,4-dimethylbenzene.
   b) 1,2-Dimethylbenzene and 1,4-dimethylbenzene as the only products.
   c) Methylbenzene (toluene) as the only product.
   d) Methylbenzene and 1,2-dimethylbenzene as the only products.

7. **When benzene undergoes its typical reactions it behaves as**
   a) An electron donor
   b) An electron acceptor
   c) An electrophile
   d) None of the above is correct

Assiut University
Faculty of Science
Chemistry Department

Date: May 2025
Time allowed: 2 hours

Final exam in Organic chemistry(I) course (201-C) for second level's industrial chemistry students

==========

Part 1 (Reaction Mechanism):

1. Answer six only of the following questions: ..... (18 Marks)

a) Define the inductive effect and show what its effect in the acidity of carboxylic acid with giving examples.
b) show the mechanism of addition of bromine to 1,3-butadiene to give 1,4- dibromo-2-butene.
c) Define the hyperconjugation and its effect on the stability of different carbonium ion with clarifieng your answer with example.
d) Mention the different intermediates shapes of carbon in organic reactions with explaining the properties of each intermediate
e) give an example of SN1 reaction and showing the different factors affecting the SN1 reaction mechanism.
f) Show the type of isomerism (*cis, trans*, *E, Z, R*,or *S*) in the following compounds and give the names of these compounds.
g) Show by equations one method for preparation of : a. Allyl Alcohol; b. isoprene c. hexa-1,5-diene
h) what is the name of the reaction of acraldehyde with 1, 3-butadiene and explaine the answer by equation

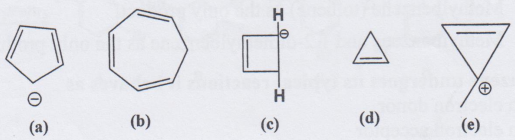
2. Choose the correct answer for the following questions: ..... (7 Marks)

a) Vinyl Chloride when hydrolyzed with aqueous sodium hydroxide gave:
a. Vinyl alcohol b. acetaldehyde c. formaldehyde
b) Which is the most acidic on the following carboxylic acids.
a. $HCCl_2COOH$ b. $CHCl_2CH_2COOH$ c. CCl_3COOH d. CF_3COO
c) Arrange the following compounds according to the descending order of their acidity (the highest acidity first)
(I) CH_3CO_2H (II) $O_2NCH_2CO_2H$ (III)$HOCH_2CO_2H$ (IV) FCH_2CO_2
d) Tertiary butyl carbocation was stabilized through: a. hyperconjugation b. inductive effect c. resonance effect
e) Which of the following compound is classified as allylic halide:
a. $PhCH{=}CBrCH_3$, b. $PhCH{=}CH\text{-}CH_2Br$, c. $PhCBr{=}CHCH_3$
f) Which of the following compounds reacted according SN1 and which reacted according SN2 mechanism in the nucleophelic substitution reactions.
a. $(CH_3)_3CHI$ b. CH_3I c. CH_3CH_2Br d. $CH_3CH(I)CH_3$
g) The order of stability of carboanion: $1^o{>}2^o{>}3^o$ b) $2^o{>}3^o{>}1^o$ c) $3^o{>}2^o{>}1^o$

Part II. Aromatic Section: (25 Marks)

Answer the following questions

1. Describe the following as aromatic, anti-aromatic or non-aromatic (2.5 Marks)



(a) (b) (c) (d) (e)

Assiut university
Faculty of science
Chemistry department

Date: 2/6/ 2025
Time allowed: two hours

Final exam in Biochemistry 1 (210 C) course for second level's industrial chemistry students

==========

I. Answer the following questions:.....(24 marks)

1. Using Kiliani– Fisher synthesis show by equation converting arabinose to mannose
2. Write the names and draw the structure of essential and non essential amino acids.
3. Define basic α Amino Acids exploring your answer with example and structures
4. Mention the name and draw two heterocyclic amino acids.
5. What are the types of classification of amino acids according to their metabolic fate in the body?
6. Show step by step and by equation how you can confirm the structure of lactose.
7. Show by equations how each of glucose, mannose and fructose gave the same ozazone.
8. Explained the mutarotation in glucose and how glucose converted from fom to other form.

II. Choose the correct answer: .....(26 marks)

1. Glucose and allose epimers at: a. C2 b. C4 c. C3
2. In reduction of mannose with sodium borohydride to give manetol, which has: a. plan of symmetery, b. point of symmetery c. has no element of symmetery
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 glucogenic and ketogenic: a. phenylalanine b. Proline c. Serine
8. From polar aminoacids which can forming hydrogen bonds : a. Threonine b. Methionin c. cysteine
9. From acidic amino acids: a. Ornithine b. glutamic acids c. Arginine
10. From basic amino acids: a. Lycine 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 aminoacids: a. alanine b. tryptophane c. Glycine
13. When alanine treated with nitrosyl chloride gave: a. acetic acid b. 2-chloro propanoic acid c. chloro acetic 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. hydrocy acid c. aliphatic fatty acid.
17. Amino acids when they are heated with barium hydroxide gave: barium salt of anino 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 disacharide sugar found in:
    a. Mammalian milk b. is formed from glucose & galactose
    c. semisenthetic 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
21. Isomaltose: a. has two glucose molecules linked through an α(1→6) bond b. has two glucose molecules linked through an α(1→4) bond c. isomaltose has one molecule of glucose and one molecule of galactose linked through an α(1→6) bond. d. isomaltose has one molecule of glucose and one molecule of galactose linked through an α(1→4) bond.
22. Cellobiose: composed of two fructose molecules, b. cellobiose structur in the β configuration. c. cellobiose structur in the α configuration. D. cellobiose metabolized by yeast.
23. Which of the following is not reducing sugar? a. ribose b. mannose c. lactose d. Trehalose
24. L. carbohydrates meaning that: a. this sugar rotate plane of polarized light to right. B. this sugar rotate plane of polarized light to left. C. highest numbered chiral carbon pointing to the left.
25. The formula of Deoxyribose is a. $C_5H_{10}O_4$ b. $C_5H_{10}O_5$ c. $C_5H_{10}O_6$
26. Glucose and galactose was considered : Epimers b. enantiomers c. aneomers

Good luck

د. عادل محمد

5- The sign of the standard reduction potential changes when the half-reaction is reversed.
6- The sign of the standard reduction potential changes when the half-reaction is reversed.
7- $E°cell = E°anode - E°cathode$.
8- In an electrolytic cell, the anode is negative.
9- The silver-silver chloride electrode is a type of gas electrode.
10- Calomel electrode contains mercury and chloride ions.
11- Tap water has higher conductivity than pure water due to dissolved ions.
12- Conductivity (κ) and resistivity (ρ) are inversely related.
13- Increasing temperature decreases ionic conductivity.
14- Kohlrausch's Law is valid at all concentrations.
15- Oxidation is the gain of electrons.

Q3 Answer only two of the following: **(10 maks)**

1) Determine the activity coefficient of the Cu^{2+} ion in an aqueous solution that is 0.001 M $Cu(NO_3)_2$. Where, A=0.509.
2) Write with examples the types of electrolytes
3) Write on the factors affecting ionic conductivity.

Q4 Answer only two of the following: **(10 marks)**

1) Write on Kohlrausch's law of molar ionic conductivity and its limitations.
2) The resistance (R) of a 0.01 M KCl solution is measured using a conductivity cell with a cell constant (G^*) of 1.25 cm^{-1}. The resistance is 150 Ω. Calculate the specific conductivity (κ) and molar conductivity .
3) How much Ca will be produced in an electrolytic cell of molten $CaCl_2$ if a current of 0.452 A is passed through the cell for 1.5 hours? (mol. Mass Ca: 40.0, F=96500 C mol^{-1})

مع اطيب التمنيات بالتوفيق..

الاستاذ الدكتور/ أبوالحجاج عبدالعزيز هرماس

Chemistry Department
Faculty of Science
Assiut University

June 2025
Time two hours

Final Exam for Second Grad Students, Applied Industrial Chemistry
Electrochemistry (Chem 209), 2^{d} semester

Answer the following questions **(50 marks)**

Q1: Choose the correct answer **(15 marks)**

1- What is the oxidation number of sulfur in H_2SO_4?

A. +4 B. +6 C. –2 D. 0

2- The salt bridge in an electrochemical cell:

A. Acts as the anode B. Balances ion flow
C. Prevents electrons from flowing D. Adds voltage

3- Which of the following is a correct representation of a cell notation?

A. Zn || Cu B. Zn | Zn^{2+} || Cu^{2+} | Cu C. Cu | Cu^{2+} || Zn^{2+} | Zn D. Zn | Cu || Zn^{2+} | Cu^{2+}

4- Which type of electrode is used as a reference electrode?

A. Gas electrode B. Amalgam electrode C. Metal-metal ion electrode D. Calomel electrode

5- What is the Nernst equation used for?

A. Measuring current B. Determining resistance
C. Calculating electrode potentials D. Balancing redox equations

6- What is the correct half-reaction for the silver-silver chloride electrode?

A. $Ag \rightarrow Ag^{+} + e^{-}$ B. $AgCl + e^{-} \rightarrow Ag + Cl^{-}$
C. $Ag^{+} + Cl^{-} \rightarrow AgCl$ D. $Cl^{-} \rightarrow Cl_2 + e^{-}$

7- In a concentration cell, emf is generated due to:

A. Different metals B. Salt bridge C. Temperature difference D. Ion concentration difference

8- Which of the following is not a redox reaction?

A. $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$ B. $H_2 + Cl_2 \rightarrow 2HCl$
C. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ D. $2Fe^{2+} + Cl_2 \rightarrow 2Fe^{3+} + 2Cl^{-}$

9- The high conductivity of strong electrolytes is due to ….

A. Partial ionization B. Complete dissociation into ions
C. Non-polar solvent use D. High molecular weight

10- What is the product of the electrolysis of molten $CaCl_2$ at the cathode?

A. $CaCl_2$ B. Cl_2 gas C. Ca metal D. Ca^{2+} ions

11- Which of the following cells are recharged by reversing its chemical reactions?

A. Dry cell B. Mercury battery C. Lead storage battery D. Leclanché cell

12- Which ion exhibits the highest conductivity due to its small size?

A. K^{+} B. OH^{-} C. Ca^{2+} D. H^{+}

13- Which of the following correctly represents the unit of conductivity (κ)?

A. Ω·m B. S/m C. V/A D. mol/L

14- Which condition increases ionic conductivity in a solution?

A. Increased viscosity B. High ion pairing C. Low temperature D. High ion mobility

15- In a hydrogen-oxygen fuel cell, what is the main product formed?

A. Hydrogen peroxide B. Water C. Methane D. Oxygen gas

Q2: Give <u>True</u> or <u>False</u> for the following statements **(15 marks)**

1- The salt bridge allows for the flow of electrons between half-cells.

2- The anode is the site of reduction in a galvanic cell.

3- The standard hydrogen electrode has a potential of 0 V.

4- In acidic medium, H^{+} is used to balance hydrogen atoms in redox reactions.

c) Calculate the pH of water containing 0.15 M KCl at 25°C.
($\gamma_{H^+} = 0.83$, $\gamma_{OH^-} = 0.76$)

d) Calculate the pH of a 0.1 M solution of aniline, $C_6H_5NH_2$, a weak base ($K_b = 4.0 \times 10^{-10}$).

5. a) **Define:** The following:

i) Ionic strength.

ii) Student's "t–test".

b) Explain the principles of the theory of neutralization indicators.

c) An acetic acid–sodium acetate buffer of pH 5.0 is 0.1 M in NaAC. Calculate the pH after the addition of 10 ml of 0.1 M NaOH to 100 ml of the buffer (pKa = 4.76).

d) Find the pH of a solution prepared by dissolving 12.43 g of tris (M.wt = 121.135) plus 4.67 g of tris hydrochloride (M.wt = 157.596) in 1 L of solution ($pK_a = 8.075$).

(At.wt's: C = 12.0 , O = 15.999 , Cl = 35.453 ,
Na = 23.0 , Fe = 55.84 , Ag = 107.870).

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Good Luck

Examiners: **Prof. Dr. Hassan Sedaira**
Prof. Dr. Elham Y. Hashem

Assiut University
Faculty of Science
Chemistry Department

June, 2025
Time: 2 hours

Final Examination of Introductory Quantitative Analysis for 2nd Level Students (C–240)

Answer Four Questions Only: **(50 Mark)**

1. **a)** Describe the ways in which the end points of redox titrations may be detected visually.
   b) Calculate the ppm concentration of a 5.0×10^{-4} M Na_2CO_3 solution.
   c) A solution is 10^{-3} M in $Cr_2O_7^{2-}$ and 10^{-2} M in Cr^{3+}. If the pH is 2.0, what is the potential of the half reaction?

   $$Cr_2O_7^{2-} + 14\ H^+ + 6e^- = 2\ Cr^{3+} + 7\ H_2O \quad (E^\circ = 1.33\ v)$$

   d) Calculate the potential of a solution obtained by reacting 10.0 ml each of 0.2 M Fe^{2+} and 0.2 M Ce^{4+},

   $$(E^\circ_{Fe^{3+}, Fe^{2+}} = 0.77\ v\ \&\ E^\circ_{Ce^{4+}, Ce^{3+}} = 1.61\ v)$$

2. **a)** Mohr method must be performed in a neutral or a faintly alkaline solution. Explain why?
   b) Explain the principles of adsorption indicators.
   c) Calculate the molar solubility of AgCl $(K_{sp} = 1.2 \times 10^{-10})$
   d) Calculate the pAg and pCl in a solution obtained by reacting 20 ml each of 0.1 M $AgNO_3$ and 0.1 M NaCl. $(pK_{sp} = 9.92)$

3. **a)** **Define:** **i)** The titer, **ii)** The electrode potential.
   b) Express the titer of a 0.05 M $KMnO_4$ solution in mg Fe_2O_3/ml.

   $$MnO_4^- + 5\ Fe^{2+} + 8\ H^+ = Mn^{2+} + 5\ Fe^{3+} + 4\ H_2O$$

   c) Explain the difference between co–precipitation and post–precipitation, and how to overcome of their effect.
   d) A 0.7011 g of an impure chloride containing sample was treated with excess $AgNO_3$, where 0.9805 g of AgCl was obtained. What is the mass percentage of chloride in the sample?.

4. **a)** **Define:** The following:
   i) Chemical factor (CF).
   ii) Buffer solution.
   b) a solution containing calcium was analyzed with 6 results listed below. Use the Q–test to determine the result of trial 5 can be rejected? Ca^{2+} concentration (µg/ml): 2.83, 2.54, 2.91, 2.75, 3.05 and 2.72 $(Q_{trabulated} = 0.56)$.

انظر خلفه

Assiut University
Faculty of Science
Chemistry Department

May 2025
Time allowed: 2hrs

Physical and Inorganic Chemistry Examination(C-250) for Second Level Students

Section (I)

1- Answer the following **(25 Marks)**

a) Discuss the temperature dependence of entropy.

b) The density of ice at 0°C is 0.9g cm^{-3} and has an entropy of 38cal mol^{-1} deg^{-1}. The density of liquid water at this temperature is 1 g cm^{-3} and has an entropy of 60 cal mol^{-1} deg^{-1}. Given these date , calculate ΔS,ΔH and ΔE for the conversion of 36 gm of liquid water to ice at the normal melting point. (M.wt. of H_2O=18 g $mole^{-1}$).

c) Calculate the enthalpy change when 540 g of water freezes at constant pressure and a temperature of -30°C. At 0°C , ΔH is -1435 cal $mole^{-1}$, and C_p is 18 and 8.8 cal mol^{-1} deg^{-1} for water and ice , respectively.

d) At 760 mm/Hg , 100gm of benzene is vaporized at its boiling point of 80°C.
Calculate : a) W_{rev} , b) q , c) ΔH , d) ΔE
The heat of vaporization is 7.6 K cal/mol , M.wt of benzene =78gm/mol.

Section (II)

Answer the following:

1 - a- Choose the correct answer and comment **(Three only)** (6 Marks)

I)The compound which contains hydrogen bond [CH_4, H_2S, H_2O]

II) Which one of the following species contains an odd number of electrons
(CO, NH_4^+, NO)

III) The element which has the maximum number of oxidation state [C, N, Cl]

IV)Which solution of the following reagents gives a precipitate when CO_2 is bubbled into it [KOH , NaOH , $Ba(OH)_2$]

b- Give three examples of Freon's and how they damage the environment. (3.5 Marks)

c- In each pairs of acids, state which is stranger and why? HF and HI, H_2SO_4 and H_2SO_3, HClO and HIO. (3 Marks)

2- a- Explain the reason for **(Five only)** from the following: (5 Marks)

I) Concentrated solution of HF acid is not kept in glass bottle.

II) PF_5 is known but NF_5 is not. III) CO_2 is an acidic oxide.

IV) Cesium ions conduct electricity more than lithium ions.

V) KCl is soluble in water but $CaCO_3$ is not. VI) CO is a poisonous gas.

b- What products are formed when each of group (I) metals burnt in dioxygen? How do these products react with water? (3 Marks)

c- How you can prepare (Three only) from the following: H_2, NH_3, HI, $CaCO_3$ (4.5 Marks)

Good Luck;

ii) How oil in water emulsion can be converted to water in oil emulsion. (1 Mark)

iii) Define: Gold number (1 Marks)

iv) Illustrate what is meant by protective colloids. (Give an example): (2 Marks)

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

Prof. Dr. Maher M. Girgis

Assiut University
Faculty of Science
Chemistry Department

Date: 28/5/2025
Time: 3 hours

Physical Chemistry-2 Examination (C-232) for 2nd Level Students

Part 1: Colloids:

Q 1: State which of the following phrases is True (√) and which is False (X): (5 Marks)

No.	Phrase	
1	The lyophobic sols are reversible in nature.	
2	When macromolecules are dispersed in suitable dispersion medium, the resulting colloidal solutions are known as multimolecular colloids.	
3	Glue is peptized by water.	
4	The surface tension of lyophilic sols is higher for the sol than for the medium.	
5	In lyophilic colloids the Tyndall effect is relatively weak.	

Q 2: Mark (√) on the correct answer (7 Marks)

No.	Phrase
1	Which of the following ions is the most active in precipitation of crystals of SiO_2 sol in water? A) SO_4^{2-} B) Ca^{2+} C) PO_4^{3-} D) Al^{3+}
2	Some gels liquify readily when shaken to form a sol which on standing turns back into a gel. The sol-gel transformation is referred to as ..... . A) metathesis B) syneresis C) thixotropy D) swelling.
3	The dispersed phase in emulsions..... in an electric field. A) migrate to the cathode B) migrate to theanode C) do not migrate D) none of the above
4	Many elastic and non-elastic gels shrink in volume on standing, with an accompanying exudation of solvent. This process is called ..... . A) syneresis B) metathesis C) thixotropy D) swelling.
5	If the sol particles in a given colloid move towards the cathod, the dispersion medium carries.....charge. A) no B) negative C) positive D) sometimes negative and sometimes positive
6	Silica gel is ..... gel. A) flexible B) elastic C) non-elastic D) thixotropic
7	Proteins at their isoelectric point ..... in an electric field. A) migrate to the anode B) migrate to the cathode C) sometimes migrate to the anode and sometimes migrate to the cathode D) do not migrate

Q 3: Write on the followings

i) Describe a method for the preparation of Calcium acetate gel. (1 Mark)

xiii. The chemistry of ammonium salts resembles those of K and Rb in solubility and structure.

xiv. Xenon trioxide is formed upon hydrolysis of XeF_6.

xv. Dehydration of metal chlorides can be best done by using thionyl chloride.

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

i. One of the following ions is subjected to disproportionation

i) Ni(II) ii) Cu (I) iii) Zn(ii)

ii. Solutions of Be salts are

i) Basic ii) neutral iii) acidic.

iii. Industrial preparation of hydrogen is performed by catalytic steam reforming of:

i) Ethane ii) methane iii) propane

iv. Electrical conductance of I_2 is attributed to:

i) Its self-ionization to I_3^+ and I_3^-

ii) removal of an electron from I_2

iii) removal of two electrons from I_2

v. Impure nitric acid appears slightly yellow due to:

i) formation of NO_2 in a photochemical decomposition reaction

ii) presence of nitrous acid impurities that decomposes to NO_2

Iii) both

---

7. Choose (T) for true sentence or (F) for false sentence **(15 Marks)**

i. $TiCl_4$ and $SnCl_4$ are liquids that fume in moist air.

ii. In the absence of complexing agents Co^{3+} is reduced by water in aqueous solutions

iii. $K_2Cr_2O_7$ can not be used as a primary standard in volumetric analysis.

iv. ZnS can easily be precipitated when H_2S is passed in an acidic solution of Zn(II) while CdS does not.

v. Cr is not resistant to corrosion

vi. NH_4VO_3 produces V_2O_5 upon heating.

vii. Cu^{2+} gives a mixture of I_2 and a CuI precipitate upon reaction with KI.

viii. B_2H_6 can be quantitatively prepared by reaction of $NaBH_4$ and BF_3.

ix. NO is a diamagnetic compound.

x. Ammonium salts of strong acids are slightly basic.

xi. Chromium sulphide can be easily precipitated from H_2S solutions.

xii. The first ionization potential of copper is higher than that of the alkali metals.

Chemistry Department May 2025

Faculty of Science Time: 2 h

Assiut university

Final examination of the second level students in "Inorganic chemistry" 207c course, (Industrial program)

ملحوظة : الامتحان يقع في ثلاث صفحات

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

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

i. Lanthanide and actinide contractions.

ii. $La(OH)_3$ is more basic than $Lu(OH)_3$.

iii. SF_6 is very resistant to chemical attack.

iv. Iron does not show the maximum group valency in its compounds.

v. When $Mn(OH)_2$ is precipitated from alkaline solutions it rapidly darkens

vi. $BaCO_3$ is mixed with carbon to produce BaO by heating

2. Suggst a mechanism illustrating the reducing action of hydrogen in the following equation: (**2 Marks**)

$$CuO + H_2 = H_2O + Cu$$

3. Give one method for the preparation of the following (**6 Marks**)

- Industrial preparation of hydrogen.
- Mond process for the preparation of pure Ni.
- Metal carbonyls

4. Give the nomenclature of the following compounds: (**8 Mark**)

$[Co(NH_3)_4Cl_2]^+$, $[Ag(CN)_2]^-$, $[Cr(NH_3)_3Cl_3]$, $[Ni(CN)_4]^{2-}$

5. Draw the structure of the following (**4Marks**)

- B_2H_6 $-H_3PO_4$

6. Choose the correct answer (**5 Marks**)

III. Discuss in details the galvanic cell with the help of drawing and equations.

With my best wishes **Prof. Dr. Ahmed Fawzy**

Electrochemistry

Answer the following questions **(16 Marks)**

I- Put (√) in the front of the correct statement and (x) for the wrong one: (5 Marks)

1. Oxidizing power is increased with increasing the negative value of E°. ( )
2. The potential of oxygen electrode depends on the pressure of O_2 and $[OH^-]$. ( )
3. Lead storage battery is not rechargeable. ( )
4. The oxidation numbers of Ca and H in CaH_2 are +2 and 1, respectively. ( )
5. The potential of a half-cell consisting of zinc electrode in 0.01 M $ZnSO_4$ at 25°C, (E° = 0.763 V) is 0.8221 V. ( )

II. Select the correct answer: **(5 Marks)**

1. ..... is the process in which electrical energy is used to cause a non-spontaneous chemical reaction to occur.

   A. Hydrolysis B. Photolysis C. Osmosis D. Electrolysis

2. ..... cell is an electrochemical cell that requires a continuous supply of reactants to keep functioning.

   A. Reversible B. Fuel C. Daniell D. Alkaline

3. What is the potential of the cell: $2Na + Cl_2 = 2NaCl$, that has a ΔG° of -165 kJ/mol (F = 96500)?

   A. 2.73 B. 0.85 C. 1.37 D. −2.73

4. Which four quantities a, b, c and d are required to balance the following equation:

   $$aFe_2O_{3(s)} + bCO_{(g)} = cFe_{(l)} + dCO_{2(g)}$$

   A. 2,3,4,6 B. 2,6,4,3 C. 1,6,2,6 D. 1,3,2,3

5. The emf of the cell: $Zn \mid Zn^{2+}(0.001M) \parallel Ag^{+}(0.1M) \mid Ag$, ($E^{0}_{Ag/Ag+}$ is +0.80 V and $E^{0}_{Zn/Zn2+}$ is -0.76 V) equals to .....

   A. 0.159 V B. 0.0159 V C. 1.59 V D. 15.90 V

Assiut University
Faculty of Science
Chemistry Department

May 2025
Time Allowed: 2 hrs

Physical chemistry Examination (208) for the second level students

Answer the following questions:

1) Answer two only from the following:

a- Derive an expression for the efficiency of heat engine working between T_1 and T_2.

b- Explain with derivation, how the free energy change of a reaction provides a convenient criteria for both spontaneity and equilibrium.

c- Consider the reaction: $N_2 + 3H_2 = 2NH_3$, the standard enthalpy of formation for NH_3 = - 11.40 Kcal/mol and the absolute entropy of H_2, N_2 and NH_3 are 45.7, 31.21 and 46.0 cal mol^{-1} K^{-1} respectively. Calculate the standard free energy change and the equilibrium constant for the reaction.

2) Answer two only from the following:

a- Show how to calculate the entropy change for the following processes:

i) Reversible and irreversible isothermal processes.

ii) Processes accompanied by temperature change.

b- Compare graphically and mathematically between the work performed in reversible and irreversible isothermal expansion of a gas.

c- 5 liters of an ideal gas at 10°C and 5 atm. pressure were allowed to expand at 10°C and against constant pressure at 2.5 atm. . Find q, w, ΔE and ΔH in calories.

Assiut University
Faculty of Science
Chemistry Department

May 2025
Time Allowed: 3 hrs

Physical chemistry Examination (C-230) for the second level students

Section I (17 Marks)

Answer the following questions:

1) Answer the following statements with True (T) or False (F). Write the correct answer in case of the statement is false.

a- Plotting 1/(a-x) versus t gives a straight line whose slope equal to $2K_2$.

b- Plotting log k against 1/T gives a straight line of slope = ΔE.

c- The theory of absolute reaction rate postulates that molecules before undergoing a reaction must form an activated complex in equilibrium with the reactants.

d- The combination of hydrogen and brome to form hydrogen bromide is an example of consecutive reactions.

2) Answer only two from the following:

a- Derive the kinetic equation for the determination of the specific rate constant and half-life period for the following reaction: $2A \xrightarrow{K_2}$ Products.

b- Discuss the theory of absolute reaction rates.

c- The decomposition of a gas which is first order reaction the specific rate constants were found to be 2.2×10^{-5} min^{-1} at 457°C and 3.07×10^{-3} min^{-1} at 510°C from these data estimate the energy of activation and the specific rate constant at 480°C (R = 1.978 cal/degree/mol).

Section II (33 Marks)

1) Answer two only from the following:

a- Derive an expression for the efficiency of heat engine working between T_1 and T_2 temperatures.

b- Explain with derivation, how the free energy change of a reaction provides a convenient criterion for both spontaneity and equilibrium.

c- Consider the reaction: $N_2 + 3H_2 = 2NH_3$, the standard enthalpy of formation for NH_3 = - 11.40 Kcal/mol and the absolute entropy of H_2, N_2 and NH_3 are 45.7, 31.21 and 46.0 cal mol^{-1} K^{-1} respectively. Calculate the standard free energy change and the equilibrium constant for the reaction.

2) Answer two only from the following:

a- Show how to calculate the entropy change for the following processes:

i) Reversible and irreversible isothermal processes.

ii) Processes accompanied by temperature change.

b- Compare graphically and mathematically between the work performed in both reversible and irreversible isothermal expansion of a gas.

c- 5 liters of an ideal gas at 10°C and 5 atm. pressure were allowed to expand at 10°C and against constant pressure at 2.5 atm. . Find q, w, ΔE and ΔH in calories.

Best Wishes
Prof. Y.M.Temerk and Prof. R.M.Gabr

Question II: **(10 Marks)**

1. What is the pH of formic acid (0.1 M) solution? The K_a of formic acid is 1.77×10^{-4}.
2. Calculate the pH of 0.04 M NaOH.
3. Calculate the pH of a solution that is both 1M CH_3COOH and 1M CH_3COONa ?

   $K_a(CH_3COOH) = 1.8 \times 10^{-5}$.
4. Calculate the pH of 0.001M H_2SO_4 solution?

Question III: **(10 Marks)**

1. In the back titration of Cl^- ion using Volhard's method, how can you overcome the problems resulting from the presence of AgCl?
2. **Give reason for:**
   a. Mohr's method should be occurred in pH range (6 – 10)?
   b. Addition of nitric acid in Volhard's method?

Question IV: **(10 Marks)**

1. Find the pH of the solution obtained when 1.00 mol NH_3 and 0.40 mol NH_4Cl are mixed to give 1 L of solution. $K_b(NH_3) = 1.8 \times 10^{-5}$
2. Calculate the normality of $KMnO_4$ solution resulting from dissolving 0.2 g of $KMnO_4$ in 100 ml water. (At.Wt of O=16, C=12, K=39, Mn=55)

Good Luck

Dr. Doaa Abdel-rahman Mohamed

Assiut University Faculty of Science Chemistry Department	20/5/2025 Time allowed: 2 hours

Second Semester Final Examination

Subject: Analytical Chemistry (C-204)

Second Level "Industrial chemistry"

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

Question I: Complete the following sentences **(20 Marks)**

1. A strong acid is …… when dissolved in water, while a weak base is …….. when dissolved in water.
2. CH_3COONa derived from …… acid and …… base.
3. The resulting solution from hydrolysis of NH_4Cl is ……
4. …… is formed when a base gains a hydrogen ion, while …… is formed when an acid loses a hydrogen ion.
5. ……... resists changes in pH when acids or bases are added, and it consists of …… **and** ……..
6. …… depends on formation of a soluble, colored complex at the end point, while …… depends on adsorption of a colored indicator on the precipitate.
7. The concentrations of …… **and** …..... ions cannot be determined successfully using Mohr method.
8. An atom is oxidized if its oxidation number …….. and then becomes …….
9. An example of self-indicator is …… , while …….. can act as an external indicator.
10. Starch can be used as an indicator in …….. **and** …… titrations.

Turn Over the page

8. Conductance of a solution does not depend on .....
   (A) Number of free ions. (C) Charge of free ions.
   (B) Mobility of ions. (D) Pressure of the ions.
9. The energy of the emitted radiation in Stoke's fluorescence is .....
   (A) Greater than the excitation radiation. (C) Equal to the excited radiation.
   (B) Lower than the excitation radiation. (D) Sometimes greater and sometimes lower.
10. Fluorescence intensity depends on all of the following except .....
   (A) Concentration. (C) Path length.
   (B) Temperature. (D) Pressure.
11. Collision quenching leads to a loss in energy in .....
   (A) Internal conversion. (C) External conversion.
   (B) Intersystem crossing. (D) All mentioned above.
12. Static Quenching is due to.....
   (A) Neutralization reaction. (C) Complex formation reaction.
   (B) Hydrogenation reaction. (D) All of the above.
13. In concentrated solution which layer is absorbed more radiation?
   (A) Upper layer. (C) A and B.
   (B) Lower layer. (D) Middle layer.
14. Phosphorescence is a result of transition of electron from .....
   (A) Singlet ground state to singlet exited state.
   (B) Lower singlet exited state to singlet ground state.
   (C) Triplet exited state to singlet ground state.
   (D) Triplet ground state to singlet exited state.
15. In conductometry, if temperature of the solution is increase by 1°c this causes .....
   (A) 1% rise in mobility of ions
   (B) 2% rise in mobility of ions
   (C) 3% rise in mobility of ions
   (D) 4% rise in mobility of ions

II) Define each of the following (10 Marks)

1. External conversion. 2. Intersystem crossing. 3. Transmittance.
4. Equivalent conductance. 5. Photochemical decay.

III) Discuss each of the following: (10 Marks)

1. The conductometric titration of a strong acid with a strong base.
2. The effect of temperature on fluorescence measurements.

Good Luck

Dr. Doaa Abdel-rahman Mohamed

Assiut University Faculty of Science Chemistry Department	May 2025 Time allowed: 2 hours
Second Semester Final Examination Subject: Industrial Methods of Analysis (C-205)	

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

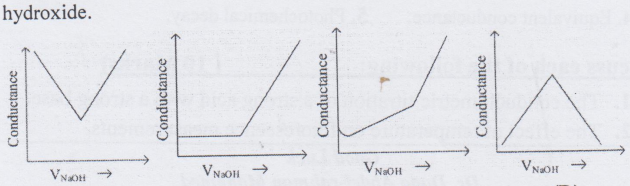
I) Choose the correct answer (30 Marks)

1. Using a standard curve, if you know the absorbance of an unknown sample, what else can be determined about the unknown?

   (A) The wavelength of maximum absorbance. (C) The concentration of the sample.

   (B) The molecular weight of the sample. (D) The identity of the sample.

2. Which of the following is a real limitation to Beer's law?
   (A) Fluorescence. (C) Polychromatic radiation is used as source.
   (B) Analyte dissociation. (D) Analyte at high concentration.
3. During relaxation, the electron spin is reversed in .....
   (A) Fluorescence. (C) IR.
   (B) Phosphorescence. (D) NMR.
4. Two compounds A and B have molar absorptivities as 1200 and 15,000 mol L^{-1} cm^{-1} respectively. Which of the following statements is correct regarding them?
   (A) Compound A can be detected at very low concentrations than compound B.
   (B) Compound B can be detected at very low concentrations than compound A.
   (C) Both compounds can be detected at very dilute concentrations.
   (D) Molar absorptivity have no influence on the detection of compounds.
5. Cell constant of an electrolytic cell is .....
   (A) Length * Area. (C) Length/Area.
   (B) Area/length. (D) None of the above.
6. On dilution, the molar conductance will .....
   (A) Increase. (C) Decrease.
   (B) Remain the same. (D) None of them.
7. Choose the correct representation of conductometric titration of acetic acid versus sodium hydroxide.



(A) (B) (C) (D)

Question 4---------- (10 Mark)

A) How do you convert : (Three only) :

i) Formaldehyde → Pry.(1°) alcohol by Gruinard reagent. ii) Toluene → Saccharin.

iii) Acetophenone → Iodoform. iv) Ethyl alcohol → Acetic anhydride.

B) Draw the structural formula of (5 only) from the following compounds:

a) Chloro-cyclohexadiene b) Benzanilide c) Ter. Butylchloride d) Sodium salcylate

e) p- cresole f) Succinimide

Question 5.---------- (10 Mark)

A) What is meant by (give example) (four only)

i) Hydrazone ii) Primary (1°) alcohol iii) Quinone iv) Amide / Imide v) DMSO

B) Complete the following equations (Four only) :

a) Fructose + 5. Acetic anhydride → a + b

b) 1-Pentene + O_3 → a + H_2O → b + c

c) Benzoic acid + PCl_5 → a + b + c

d) Toluene + Cl_2 / dark (Fe) → a + b

e) Aniline + HNO_2($NaNO_2$ / HCl) → a + β -naphthol → b + c

Oral. ---------- (10 Mark)

Write one method to prepare the following compounds :

a) o- xylene b) Benzoic anhydride c) p- bromoaniline d) Benzylchloride.

Good Luck

Examiner:

Prof. Dr. Kamal Ibrahim Aly

Assiut University

Faculty of Science

Chemistry Department

Final Exam. for (211C) (Students not Chemistry (second Term)

Date: Tuesday, 20/05/2025 **Time: 2 hours**

Answer the following questions:

Question 1. ---------- **(10 Mark)**

A) Give example for the following reactions (Three only):

i) Rearrangement reaction
ii) Cannizzaro's reaction
iii) Friedel-Crafts acylation
iv) Nucleophilic substitution reaction (S_n^2)

B) Write one method to prepare the following compounds (Three only):

1) Saccharin 2) Formic anhydride 3) Iodoform 4) Benzanilide

Question 2. ---------- **(10 Mark)**

A) Write on three only:

1.Tautomerism 2. Aldol condensation 3. Gabriel reaction 4. Resonance

B) Answer the following (Three Only):

a) Reaction of 3-phenylpropene with HCl and give a mechanism.
b) Prepare phenylethene from benzene.
c) Reaction of benzene with $ClCOCH_3/AlCl_3$ and propose a mechanism.
d) Complete the following sequences of reactions:

1.Bromobenzene + ethyl bromide/Na/ether $\rightarrow$? + $KMnO_4 \rightarrow$? + $HNO_3/H_2SO_4 \rightarrow$?

Question 3. ---------- **(10 Mark)**

Complete the following equations :

a) $CH_3\text{-}C{\equiv}CH + NaNH_2 \rightarrow a + CH_3CH_2I \rightarrow b + c$
b) 2-Methylpropene + $O_3 \rightarrow a + H_2O \rightarrow b + c$
c) Acetic acid + $PCl_5 \rightarrow a + b + c$
d) Benzene + $3Cl_2$ / light (hv, φ) $\rightarrow a$
e) Aniline + HNO_2 ($NaNO_2$/HCl) $\rightarrow a + H_2O$ (Δ) $\rightarrow b + c + d$

(انظر خلفه)

The best method was .....

Was B3LYP good? Why?

Was HF good? Why?

The previous calculations were obtained by the **6-31G(d)** basis set. Do you think **STO-3G** would give better results? Why?

Would **6-31G** give good results? Why?

Atomic numbers: H = 1, He = 2, N = 7

Good Luck **Dr. Ahmed A. K. Mohammed**

Which functionals of DFT fix this problem?

Question 3 (15 marks): The bond energy of the N_2 molecule is **226** kcal/mol. Calculate the bond energy of N_2 using B3LYP and HF in kcal/mol (**1 H = 627.5 kcal/mol**).

Molecule	Spin	B3LYP (H)	HF (H)
N	D	-54.4790	-54.2458
N	Q	-54.5845	-54.3854
N_2	S	-109.5241	-108.9439

13. CCSD(T) is ……..

a) fast b) highly accurate c) empirical d) and b

14. ……. is more accurate than HF.

a) CIS b) CCSD c) MP6 d) a and b

15. ….. is the fastest method in this group.

a) DFT b) CCSD c) MP2 d) PM6

16. ….. relies on experimental parameters.

a) HF b) molecular mechanics c) semi-empirical methods d) b and c

17. ….. functionals combine exchange from HF and DFT.

a) LDA b) Dispersion corrected c) GGA d) Hybrid

18. ….. is the least accurate method in this group.

a) DFT b) molecular mechanics c) semi-empirical d) HF

19. ….. studies the physical movements of atoms and molecules in time.

a) Molecular dynamics b) DFT c) CCSD(T) d) All of the preceding

20. ……. is based on classical physics.

a) Molecular mechanics b) DFT c) HF d) b and c

Please insert your answers in the following table:

1	2	3	4	5	6	7	8	9	10
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**

Question 2 (5 marks): DNA strands are held together into a double helical structure by non-covalent interactions. Is the B3LYP appropriate for calculating these interactions? Why?

Chemistry Department

Faculty of Science

Time: 3 hours

Chemistry Department

Final Exam for Computational Chemistry (C234)

Answer the following questions: (The exam is in **four** pages)

Question 1: Choose the correct answer(s) for each of the following: (30 Marks)

1. A stable conformer will have …… negative frequencies.
   a) **0** b) **1** c) **2** d) more than **1**
2. The most problematic term in the Hamiltonian operator is ……
   a) kinetic energy b) e-e interaction c) e-N interaction d) N-N interaction
3. The ……. approximation states that the kinetic energy of nuclei is zero.
   a) Born-Oppenheimer b) Slater c) Hartree d) Fock
4. The Schrödinger equation can be solved exactly for …….
   a) **H** b) **He** c) $\mathbf{H_2}$ d) a and c
5. ….. suggested that the electron–electron repulsion in the Hamiltonian is replaced with an effective field.
   a) Fock b) Hartree c) Slater d) a and b
6. ….. is the most flexible basis set in this group.
   a) STO-3G b) 6-31G(d,p) c) 6-31G(d) d) 6-31++G
7. …… functions improve the flexibility of the basis set.
   a) Polarized b) Diffused c) Minimal d) a and b
8. ….. basis sets are recommended for van der Waals interactions.
   a) Polarized b) Diffused c) Double zeta d) Minimal
9. ….. has electron correlation.
   a) HF b) CIS c) DFT d) b and c
10. ….. basis sets are the least accurate.
    a) Polarized b) Diffused c) Double zeta d) Minimal
11. ….. gives the most accurate bond strengths.
    a) DFT b) CCSD(T) c) HF d) CCSD
12. The energy of …….. will always be higher than the true energy.
    a) HF b) DFT c) CCSD(T) d) a and b

xiii. The chemistry of ammonium salts resembles those of K and Rb in solubility and structure.

xiv. Xenon trioxide is formed upon hydrolysis of XeF_6.

xv. Dehydration of metal chlorides can be best done by using thionyl chloride.

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

i. One of the following ions is subjected to disproportionation

i) Ni(II) ii) Cu (I) iii) Zn(ii)

ii. Solutions of Be salts are

i) Basic ii) neutral iii) acidic.

iii. Industrial preparation of hydrogen is performed by catalytic steam reforming of:

i) Ethane ii) methane iii) propane

iv. Electrical conductance of I_2 is attributed to:

i) Its self-ionization to I_3^+ and I_3^-

ii) removal of an electron from I_2

iii) removal of two electrons from I_2

v. Impure nitric acid appears slightly yellow due to:

i)formation of NO_2 in a photochemical decomposition reaction

ii) presence of nitrous acid impurities that decomposes to NO_2

iii) both

---

7. Choose (T) for true sentence or (F) for false sentence **(15 Marks)**

i. $TiCl_4$ and $SnCl_4$ are liquids that fume in moist air.

ii. In the absence of complexing agents Co^{3+} is reduced by water in aqueous solutions

iii. $K_2Cr_2O_7$ can not be used as a primary standard in volumetric analysis.

iv. ZnS can easily be precipitated when H_2S is passed in an acidic solution of Zn(II) while CdS does not.

v. Cr is not resistant to corrosion

vi. NH_4VO_3 produces V_2O_5 upon heating.

vii. Cu^{2+} gives a mixture of I_2 and a CuI precipitate upon reaction with KI.

viii. B_2H_6 can be quantitatively prepared by reaction of $NaBH_4$ and BF_3.

ix. NO is a diamagnetic compound.

x. Ammonium salts of strong acids are slightly basic.

xi. Chromium sulphide can be easily precipitated from H_2S solutions.

xii. The first ionization potential of copper is higher than that of the alkali metals.

Chemistry Department May 2025

Faculty of Science Time: 3 h

Assiut university

Final examination of the second level students in "Inorganic chemistry" course, Chem-203 (Material Science and Nanotechnology program)

ملحوظة : الامتحان يقع في ثلاث صفحات

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

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

i. Lanthanide and actinide contractions.

ii. $La(OH)_3$ is more basic than $Lu(OH)_3$.

iii. SF_6 is very resistant to chemical attack.

iv. Iron does not show the maximum group valency in its compounds.

v. When $Mn(OH)_2$ is precipitated from alkaline solutions it rapidly darkens

vi. $BaCO_3$ is mixed with carbon to produce BaO by heating

2. Suggst a mechanism illustrating the reducing action of hydrogen in the following equation: **(2 Marks)**

$$CuO + H_2 = H_2O + Cu$$

3. Give one method for the preparation of the following **(6 Marks)**

- Industrial preparation of hydrogen.
- Mond process for the preparation of pure Ni.
- Metal carbonyls

4. Give the nomenclature of the following compounds: **(8 Mark)**

$[Co(NH_3)_4Cl_2]^+$, $[Ag(CN)_2]^-$, $[Cr(NH_3)_3Cl_3]$, $[Ni(CN)_4]^{2-}$

5. Draw the structure of the following **(4Marks)**

- B_2H_6 $-H_3PO_4$

6. Choose the correct answer **(5 Marks)**

Part 2 Carbonyl compounds ----------25 marks

uestion three Answer five only of the following---------- 15 marks

a-Complete the following reaction

1,3-dithiane+n-Bu-Li ------- ? +$Me(CH_2)_2Cl$----- ? + $HgCl_2$/HCl------- ?

b-Reaction of PhCHO with excess EtOH/ HCl and give a mechanism

c-Prepare acetone from propyne

d-Reaction of cyclohexanone with $LiAlH_4$ether followed by HCl/H_2O work up

e-Choose I,ii ,iii or iv of the following sentences -----

1-Reaction of 1-butene with O_3 followed by Zn/H_2O work up gives

i-proanal ii-methanal iii-a mixture of I and ii, iv-none of these

2-Reaction of Ph-H With $MeCOCl/ALCl_3$ gives

i-PhCOMe,ii-PhCHO, iii-$PhCOCH_2CH_3$

f-Prepare propanoic acid through a Grignard synthesis

Question four Complete the following reactions(four only)---------- 10 marks

a-CH_3CH_2COCl+DiBal-H,toluene,-78C° followed by dilute acid work up-------?

b-CH_3COOEt+NH3---------- ?

c-2 CH_3CHO+ dilute NaOH/ 5 C---------- ? +heat---------- ?

d-CH_3CH_2COOEt +HCOOEt / EtONa/EtOH---------- ?

e-Sodiacetoacetic ester +2-bromopropane-------?+i-NaOH,ii-HCl,iii-heat--------?

GOOd Luck

Prof.Dr.Sh.M.Radwan Prof.Dr.Omima Said

اجمل الامنيات بالتوفيق

ادـ شعبان محمد رضوان ادـ اميمة سعد الطوخى

4. Which compound would *not* expected to react with sodium metal?

a. CH_3-O-CH_3 , b. $CH_3.CH_2OH$, c. $CH_3.CO.OH$, d. C_6H_5OH

5. Electron donating groups :

a. weakens the acidity of carboxylic acids. ,

b. strenthens the acidity of carboxylic acids. , c. no effect.

Questions Two:

Answer *Five Only* of the the following: ..... (10 Marks)

1. Predict the more stable alkene product of the E2 dehydrohalogenation of $CH_3CH_2CHClCH_3$. (Suggest a mechanism). (2 Marks)

2. Draw the reaction mechanism , showing the selectivity, the energy diagram and type of the reaction for:

HBr with 2-methylpropene in the presence of H_2O_2. (2 marks)

3. Suggest the reactants which will react to give t.butyl ethyl ether and then write the suitabule mechanism. (2 marks)

4. Draw the equation and reaction mechanism of the reaction : (2 Marks)

cis-1-bromo-2-methylcyclopentane + EtONa/EtOH →

5. Complet the following equation and then explain your answer by mechanism: (2 Marks)

$PhCHBrCH_2CH_3$ + CH_3S^- / DMF →

6. For the following reaction, suggest a reaction mechanism and show the type of the reaction:

CH_3–$CHBr$–CH_2–CO–CH_3 + $(CH_3)_3COK/(CH_3)_3COH$ → CH_3–CH=CH–CO–CH_3 (2 Marks)

انظر الصفحة التالية ←

اد/اميمة سعد الطوخي

Assiut university

Faculty of science

Chemistry department

Date: May / 2025

Time allowed: 3 hours

Final exam in 210 C course for second level's students

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

Part 1 (Reaction Mechanism)..... (25 Marks)

Questions One: ..... (15 Marks)

I-A- Mark (√) or (X) for *Ten Only* of the following sentences (write your answers in table): (10 Marks)

1. The E1cB mechanism is usually second order rate law.

2. Elementary reactions are the individual molecular events make up the mechanism.

3. Chemical trapping and isolation are methods used to determine the rate of reaction.

4. The reaction of t-butyl alcohol with HI, the approach of the nucleophile I^- towards center of the protonated alcohol is not sterically hindered by the methyl groups.

5. Carbanion stabilized by alkyl substituents by positive inductive effect and negative hyperconjugation.

6. Nucleophilicity of a nucleophil is the availability of its electron pair for coordination with a proton.

8. The benzyne bond is like the triple bond of acetylene.

9. Hydrolysis of vinyl bromide by NaOH form vinyl alcohol .

10. In triplet carbene, the unshared electrons are paired and occupied sp hybrid orbital for bonding.

11. S_N1 reactions go faster with DMF as solvents.

B- Choose the correct answer for the following questions: ..... (5 marks)

1. Which of the following reagent would you expect to react with 2-bromopropane to give a substitution product(S_N2) .

a. H_2O , b. C_2H_5OH , c. $CH_3.CO.OH$, d. NaCN

2. Based on Saytzeff's rule, select the most stable alkene :

a. 1-methylcyclohexene , b. 3-methylcyclohexene , c. 4-methylcyclohexene , d. They are all of equall stability

3. Which of the following compound is classified as allylic halide:

a. $PhCH{=}CBrCH_3$, b. $PhCH{=}CH\text{-}CH_2Br$, c. $PhCBr{=}CHCH_3$

انظر الصفحة التالية ←

44-The questionnaire must be worded objectively, clearly, and without bias.
True/ False.

45- High cost is one of the disadvantages of Person-Administered surveys.
True/ False.

46-Problems are situations calling for managers to make choices among decision alternatives.
True/ False.

47-Causality may be thought of as understanding a phenomenon in terms of conditional statements of the form "If x, then y".
True/ False.

48-Marketing research projects are continuous - they haven't a beginning and an end.
True/ False.

49-Marketing research is not needed when its cost outweighs the value.
True/ False.

50- Causal studies attempt to uncover what factor or factors cause some event.
True / False.

GOOD LUCK

29- **Is a business philosophy that holds that the key to achieving organizational goals consists of the company's being more effective than competitors in creating, delivering, and communicating customer value to its chosen target markets.**

A) Marketing strategy.
B) Marketing concept.
C) Market research.

30- **Research design that describe the phenomena of interest.**

A) Exploratory Research
B) Descriptive research
C) Causal studies

QUESTION TWO:
CHOOSE THE CORRECT ANSWER **(20 marks)**

31-**Primary data is relatively easy to access.**
True/ False.

32- **Marketing Research System gathers information for a specific situation.**
True/ False.

33- **Defining the problem is considered the first step in the marketing research process**
True/ False.

34- **Marketing research is always presented as an 11- step process.**
True/ False.

35- **Good research design is the "first rule of good research.**
True/ False.

36 - **Results are the most important portion of your report.**
True/ False.

37 - **Telephone Surveys are limited in the quantity and types of information obtainable.**
True/ False.

38- **The survey may be the only part of the project the client will see.**
True/ False.

39- **The need to make a decision requires decision alternatives.**
True/ False.

40- **Case Analysis is a small groups brought together and guided by a moderator through an unstructured, spontaneous discussion for the purpose of gaining information relevant to the research problem.**
True/ False.

41- **In-Office Surveys characterized by relatively low cost per interview.**
True/ False.

42- **The marketing research report consists of front matter, body, and end matter.**
True/ False.

43- **In marketing research report, research objectives should be listed within the introduction section.**
True/ False.

20- A/An..... involves interviews with a large number of respondents using a predesigned questionnaire.
A) Observation.
B) Survey.
C) Focus group

21- The .....describes how each sample element, or unit, is to be drawn from the total population sample plan.
A) Sample.
B) Sample plan.
C) Sample size

22-Analyzing data is the ..... step in the marketing research process.
A) 9th
B) 10th
C) 11th

23- In selecting a data collection mode, the researcher must consider:
A) Speed, cost, and feedback.
B) Speed, cost and.data quality.
C) Cost, rapport and data quality.

24- A survey, in which the survey representative approaches a prospective respondent, introduces the general purpose of the survey to the prospect, and leaves it with the respondent to fill out on his or her own.
A) Mail Survey.
B) Drop-off survey.
C) In-Home Survey

25- Key disadvantages of mail survey:
A) Nonresponse.
B) Self-selection bias.
C) A&B.

26- Information collected specifically for the problem at hand.
A) Primary information.
B) Secondary information
C) None of the above

27-The principles that determine how scientific investigation tools are deployed and interpreted.
A) Method.
B) Methodology.
C) A&B.

28- A part of the report contains all of the sources from which information was collected for the report.
A) Reference list.
B) Endnotes.
C) Limitations.

10- Exploratory research methods include:

A) Case Analysis
B) Focus Groups
C) A&B

11- The following are key advantages of Person-Administered surveys except:

A) Humans make errors
B) Feedback
C) Quality control

12-Results, limitations, and conclusions appear at:

A) Front Matter
B) Body
C) End Matter

13- Is the "skeleton" of the report and serves as a summary for the busy executive or a preview for the in-depth reader.

A) Reference list
B) Endnotes
C) Abstract/Executive Summary.

14- The .... consists all pages that precede the first page of the report.

A) Front Matter
B) Body
C) End Matter

15- A process used to define the size, location, and/or makeup of the market for a product or service.

A) Marketing
B) Marketing research
C) Market research.

16- Research design that collecting information in an unstructured and informal manner.

A) Exploratory Research
B) Descriptive research
C) Causal studies

17-..... measure units from a sample of the population at only one point in time.

A) Cross-sectional studies
B) Longitudinal studies
C) None of the above

18- .....is a set of advance decisions that make up the master plan specifying the methods and procedures for collecting and analyzing the needed information.

A) Research objectives
B) Methodology.
C) Research design

19- The group that has been exposed to a change in the independent variable:

A) Experimental group
B) Control group
C) None of the above

Assiut University	Faculty of Science	Date : 28/ 5/2025
Faculty of Commerce	Applied Industrial Chemistry	Duration: 2 hours
Business Administration Department	Final exam Marketing Research	Year : 2

QUESTION ONE:

CHOOSE THE CORRECT ANSWER: **(30 marks)**

1-.....is the process of designing, gathering, analyzing, and reporting information that may be used to solve a specific marketing problem.

A) Marketing
B) Marketing research.
C) Market research

2- ..... repeatedly measure the same sample units of a population over time.

A) Longitudinal studies.
B) Cross-sectional studies
C) Case Analysis.

3- ..... state what the researchers must do.

A) Research problem
B) Research objectives
C) Research Design

4- When is marketing research NOT needed?

A) The information is already available
B) Funds are not available for marketing research
C) A&B

5- Statement that are taken as true for the purposes of argument or investigation.

A) Research problem
B) Research objectives
C) Hypotheses.

6- ..... refers to determining how many elements of the population should be included in the sample.

A) Population.
B) Sample plan.
C) Sample size

7- A survey which is useful for interviewing busy executives.

A) Telephone Surveys
B) In-Home Surveys
C) In-Office Surveys

8- Using of pictures, audiovisuals and graphics is one of the key advantages of:

A) Computer-Assisted Surveys
B) Person-Administered Surveys
C) In-Office Surveys.

9-The product that represents the efforts of the marketing research team.

A) Research design
B) Marketing Research Report.
C) Marketing Research System.