

1969	COURSE TITLE:	PRINCIPLES OF ANALYTICAL CHEMISTRY		COURSE CODE: CH2105
DATE:	15-1-2017	TERM: FIRST TERM	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2HRS

Question (1): Choose the correct answer and give the reasons (30 Marks)

Choose only "ten" of the following;

- The pH value of half way to the equivalence point for the titration of ammonium hydroxide by hydrochloric acid is ($K_b = 1.85 \times 10^{-5}$)
a) 4.9 b) 4.73 c) 4.5 d) 5.0
- If 6 mL of 1 mole/L hydrochloric acid is exactly neutralized by 3 mL of potassium hydroxide, the molarity of potassium hydroxide is
a) 1.0 mole/L b) 2 mole/L c) 3 mole/L d) 2.5 mole/L
- The indicator used in the determination of metal ions with EDTA by alkalimetric method is.....
a) M.O b) Ph.Ph c) Erio-T d) a and b are correct
- Which solution will be exactly neutralized by 1.0 L of 1.0 mole/L of sodium hydroxide.
a) 1.0 L of 0.5 mole/L hydrochloric acid
b) 1.0 L of 2.0 mole/L hydrochloric acid
c) 0.5 L of 0.5 mole/L hydrochloric acid
d) 0.5 L of 2.0 mole/L hydrochloric acid
- The oxidation state of carbon in oxalate ion is
a) +3 b) -3 c) +4 d) -4
- Mohr's method is used only for the determination of.....
a) chloride and iodide ions b) bromide and chloride ions
c) chloride and iodide d) for all halides
- The requisites of a metal ion indicator used in EDTA titration is
a) metal-indicator complex is less stable than metal-EDTA complex.
b) metal-indicator complex is more stable than metal-EDTA complex.
c) the indicator must be less sensitive to the metal ion.
d) all are wrong.
- The pH at the second stoichiometric point for the titration of diprotic acid with potassium hydroxide is.....
a) $\text{pH} = 1/2\text{pK}_w + 1/2 \text{pK}_2 + 1/2 \log c_{\text{salt}}$
b) $\text{pH} = 1/2\text{pK}_1 - 1/2 \log c_{\text{acid}}$
c) $\text{pH} = \text{pK}_2 + 1/2 \log c_{\text{salt}}/c_{\text{acid}}$
d) a, b, and c are wrong

- 6) Write on the methods used to increase the selectivity of EDTA to be able to analysis mixtures of metal ions.

Question (4): Solve the following problems

(15 Marks)

Calculate the pH value of the following solutions;

- (a) 50 mL of 0.2 N sodium hydroxide added to 100 mL of 0.1 N acetic acid ($k_a=1.85\times 10^{-5}$).
- (b) 50 mL of 0.1 N hydrochloric acid added to 50 mL of 0.1 N ammonium hydroxide ($k_b=1.85\times 10^{-5}$).
- (c) 20 mL of 0.1 N hydrochloric acid with 50 mL of 0.1 N sodium hydroxide.

Good Luck

Examiners	<p><i>Prof. Dr. Mohamed Yousry El-Shiekh</i> <i>Prof. Dr. Hanaa Salah El-Desoky</i> <i>Dr. Marwa Nabeeh El-Nahass</i></p>
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Tanta University
Faculty of Science
Chemistry Department

Examination for freshmen 2nd level students (Chemistry)

	Course Title	Organic 3	Course Code: CH 2214
DATE:	JUNE, 2017	TERM: SECOND	TOTAL ASSESSMENT MARKS: 150

Section (A); Bifunctional compounds:

[75 Marks]

Answer the following questions:

1- With chemical equations, give one method to prepare each of the following compounds:

[15 Marks]

- i- Isoprene ii- Propargyl alcohol iii- Crotonaldehyde

2- Mark (✓) or (X) for the following statements. With equations, correct the wrong one and give briefly the reason if needed: [20 Marks]

- i- Free radical addition of simple alkenes goes faster than those of conjugated dienes. ()
- ii- Methyl benzoate undergoes Claisen condensation. ()
- iii- Reaction of HCN with methyl vinyl ketone gives cyanohydrine. ()
- iv- Mesityl oxide is obtained by the aldol condensation of acetaldehyde. ()


3- With chemical equations, illustrate the mechanism of the following reactions and name the type of reaction as well as the final product: [20 Marks]

- i- Propanal with allyl chloride and triphenylphosphine in the presence of phenyl lithium.
- ii- Acetophenone with ethyl 2-bromopropionate in the presence of Zn followed by hydrolysis.

4- With chemical equations, explain the following conversions: [20 Marks]

- i- Ethyl acetate into butanone.
- ii- Diethyl malonate into 2,3-dimethylpentanoic acid.

Please, look at the back

	Tanta University Faculty of Science Chemistry Department Final Exam. of chemical Thermodynamic Level Two-Special Chemistry Students		CH 2101
	First Semester -January 2017	Date; Jan. 5, 2017	
	Total Assessment Marks: 150	Time allowed; 2 hours	

Question (1); choose the correct answer for the following:

1)-The temperature of the system decreases in an;

- i)-Adiabatic compression ii) Isothermal compression iii)-Isothermal expansion iv) Adiabatic expansion

2-A thermodynamic state function is;

- i)-One which obeys all laws of thermodynamics ii) One which is used in thermochemistry
 iii) A quantity whose value depends on only on the state of the system
 iv) A quantity which is used in measuring thermal changes

3-When Fe_(s) is dissolved in aqueous HCl in closed vessel the work done is-----

- i)- Positive ii) Negative iii) Zero iv) Cannot be defined

4-For an isothermal process, ΔS equals;

- i) q ii) q_{rev}/T iii) q_{rev} iv) T q_{rev} v) q + w

iv)- For a spontaneous process in an isolated system, the change in entropy is positive

5-ΔS will be highest for the reaction;

- i)- Ca_(s) + 1/2 O_{2 (g)} -----→ CaO_(g) ii) CaCO_{3 (s)} -----→ CaO_(s) + CO_{2 (g)}
 iii)- C_(s) + O_{2 (g)} -----→ CO_{2 (g)} iv) N_{2 (g)} + O_{2 (g)}-----→ 2NO_{2 (g)}

6-The second law of thermodynamics says that in cyclic process;

- i)- Work cannot be converted into heat ii) Heat cannot be converted into work
 iii) Work cannot be completely converted into heat iv) Heat cannot be completely converted into work

7- On passing CO₂ gas in water, its entropy

- i)- Remains constant ii) Decreases iii) Increases iv) May increase or decrease

8- When does the reaction occur spontaneously on the basis of the relation, ΔG⁰ = - RT ln K

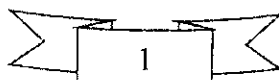
- i)- K = 0 ii) K = 1 iii) K > 1 iv) K < 1

9- Spontaneous adsorption of a gas on a solid surface is exothermic process because;

- i)- Enthalpy of the system increases ii) entropy increases iii) Entropy decreases iv) Free energy change increases

10-The internal energy change when a system goes from state A to B is 40 kJ/mole. If the system goes from A to B by a reversible path and return to state A by an irreversible path, what would be the net change in internal energy;

- i)- < 40 kJ ii) Zero iii) 40 kJ iv) > 40 kJ



3-If a closed system goes through a cyclic process; the net work done by the system is necessarily zero. ()

4- Useful work done by a closed system in going from state 1 to state 2 is less than the total work done by the system if $V_2 > V_1$ ()

5- In an isothermal expansion of a gas, entropy of the gas increases. ()

B- Complete the missing parts on the following table

ΔH°	ΔS°	ΔG°	The nature of the process
Negative	-----	Negative	Spontaneous at all temp
Negative	Negative	Negative	-----
-----	Negative	positive	Nonspontaneous at high temp
positive	positive	-----	Nonspontaneous at low temp
positive	positive	Negative	-----
-----	negative	positive	Nonspontaneous at all temp.

C- Define each of the following;

- i) Statistical thermodynamics ii) Internal energy iii) Molar specific heat iv) Carnot cycle
 v) Enthalpy vi) heat engine vii) Enthalpy of combustion viii) Entropy

Question (3);


1- Calculate ΔG for the following reaction at 25°C. Will the reaction occur (be spontaneous)? How do you know? $\text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \rightarrow \text{NH}_4\text{Cl}(\text{s})$ if $\Delta H = -176.0 \text{ kJ}$, $\Delta S = -284.8 \text{ J}\cdot\text{K}^{-1}$

2- In the Haber process, ammonia is synthesized from nitrogen and hydrogen according to the following equation $\text{N}_2 + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$. The ΔG° at 298 K is -33.3 kJ/mol .

Calculate the value of ΔG at 298 K for a reaction mixture that consists of 1.9 atm. of N_2 , 1.6 atm. of H_2 , and 0.65 atm. of NH_3

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Tanta University Faculty of Science Chemistry Department	Final Examination of Chemical Kinetics		
	Level Two	Course code: CH 2202	
	June 2017	Total Assessment Marks: 100	
Special Chemistry Students		Time allowed: 2 h	Date : 3/6/2017

ملحوظة: الامتحان في ثلاثة صفحات

Question (I): Choose the correct answer for the following?

1- An 8.00 g piece of magnesium was placed into 6.0 M HCl. After 25 s, 3.50 g of unreacted magnesium remained. The average rate at which magnesium was consumed is

- (i). 0.14 g/s (ii). 0.18 g/s (iii). 0.32 g/s (iv) 4.50 g/s

2-Consider the following reaction; $N_2(g) + 3 H_2(g) \rightarrow 2NH_3(g)$

If the rate of formation of NH_3 is 9.0×10^{-4} mol/s, then the rate of consumption of N_2 is

- (i) 4.5×10^{-4} mol/s. (ii) 6.0×10^{-4} mol/s. (iii) 9.0×10^{-4} mol/s. (iv) 1.4×10^{-3} mol/s

3-Consider the following reaction; $NaOH(aq) + HCl(aq) \rightarrow NaCl(aq) + H_2O(l)$

The rate of this reaction could be determined by monitoring the change in concentration of:

- (i) H^+ (ii) Cl^- (iii) Na^+ (iv) H_2O

4-Which of the following properties could be used to measure the rate of the following reaction taking place in an open container; $Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$

- (i)-mass of Zn (ii) solubility of HCl (iii) concentration of Cl^- (iv) color of the solution

5-Consider the following reaction: $2 S(s) + 3 O_2(g) \rightarrow 2 SO_3(g) + heat$

The rate of this reaction could be increased by

- (i) Decreasing the temperature. (ii) Adding a catalyst (iii) Increasing the concentration of $S(s)$
(iv) Increasing the concentration of $SO_3(g)$

6-Which of the following are necessary for effective collisions to occur?

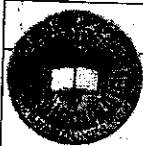
- I. Favorable collision geometry. II. Sufficient kinetic energy. III. Large ΔH .
(i) I only (ii) I and II only (iii) II and III only (iv) I, II and III

7-Which of the following factors affects the rate of heterogeneous reactions only?

- (i) Nature of reactants (ii) temperature of system
(iii) surface area of reactants (iv) concentration of reactants

8-Collision theory states that:

- (i) all collisions lead to chemical reactions. (ii) Most collisions lead to chemical reactions.
(iii) Very few reactions involve particle collisions. (iv) Effective collisions lead to chemical reactions.



Tanta University – Faculty of Science – Department of Chemistry

Final Examination for Second Level Students
Chemistry Section



Course Title:	Organic Chemistry 1	Course Code: CH2109
Jan. 2017	Term: First	Total Marks: 150 Marks
		Time allowed: 2 Hours

Answer the following questions :

- 1) Illustrate by mechanistic equations the following: (40 Marks)
- a- An addition - elimination mechanism. (8 marks)
 - b- An elimination - addition mechanism. (8 marks)
 - c- Sulphonation of naphthalene. (8 marks)
 - d- Liebermann's nitrosation reaction of phenol. (8 marks)
 - e- Mechanism of formation of aryl diazonium salt and its coupling with phenol. (8 marks)
- 2) Attempt the following conversions: (40 Marks)
- a- Cyclohexanone to biphenyl - 4,4' - dicarboxylic acid. (8 marks)
 - b- Phthaloyl chloride to anthracene - 9 - sulphonic acid. (8 marks)
 - c- 2,2' - Dimethyl biphenyl to fluorene. (8 marks)
 - d- Benzene to m-chloro bromobenzene. (8 marks)
 - e- Benzene to both anthranilic acid and p-aminobenzoic acid. (8 marks)
- 3) a- NH_2 is an activating group, that is also o/p-directing, while NH_3^+ is a deactivating group and m-directing in $\text{S}_{\text{E}}^{\text{Ar}}$. Explain in detail this fact. (16 marks)
- b- Attempt the following conversions: (24 marks)
- i) Benzaldehyde to 9 - aminophenanthrene. (8 marks)
 - ii) Acetylene to hippuric acid. (8 marks)
 - iii) Aniline to 7- amino-1- methyl naphthalene. (8 marks)

Please Turn Over

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**Tanta University – Faculty Of Science – Department Of Physics
Examination For 2nd Level Students Of Chemistry Group
(Credit Hour System)**

Course Title	Crystallography and X-Ray		Course Code : PH2191
Date:1January 2017	Term:First	Total Assessment Marks :50	Time Allowed: 2Hours

(Answer the following questions)

The first question (12.5 Marks)

a-Define and explain by drawing the following :-

- 1- the plane of symmetry**
- 2- the crystal lattice**
- 3- the unit cell**
- 4- primitive and non primitive cells**
- 5- zones and zone axes**

b- what is the Miller index of plane intercepts on a,b,c

$$\frac{1}{4} , \frac{2}{3} , \frac{1}{2}$$

The second question (12.5 Marks)

a- show by drawing how the x-rays are produced and write four of its characteristics

b- Describe how the two types of x-ray spectra are produced

The third question (12.5 Marks)

محمد النور



TANTA UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF CHEMISTRY

EXAMINATION FOR SOPHOMORES (SECOND YEAR) STUDENTS OF CHEMISTRY

COURSE TITLE: ORGANIC 3

COURSE CODE: CH2214

DATE: MAY, 20016

TERM: SECOND

TOTAL ASSESSMENT MARKS: 150

TIME ALLOWED: 2 HOURS

Section (A) Bifunctional :

(75 points)

1] Put (✓) or (x) and correct the wrong answer (Explain by equations): (20 points)

- a) Addition of HCl to 6-heptenoic acid gave 7-chloro-heptanoic acid. ()
- b) Addition of CH_3MgCl to pent-3-ene-2-one followed by hydrolysis gave 25 % of 2-methyl-pent-3-ene-2-ol. ()
- c) Crossed Aldol condensation between benzaldehyde and propanal followed by reduction with NaBH_4 gave 4-phenyl-but-3-ene-1-ol. ()
- d) Ethyl acetate is much stronger acid than acetoacetic ester. ()

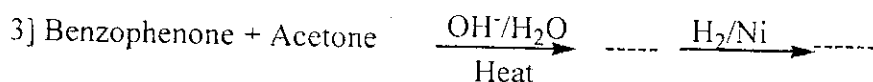
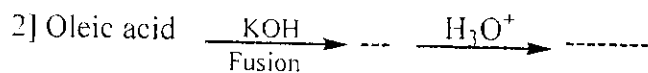
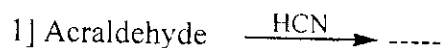
2] Carry out the following conversions : (25 points)

- a) Ethyl bromo acetate to n-butanol.
- b) Acetylene to 1,2,3,6-tetrahydro phthalic anhydride.
- c) Diethyl malonate to 2-methyl-pentanoic acid.
- d) Glycerol to 3-chloro-propanoic acid.


3] Write the mechanism of the following reactions: (10 points)

- a) Ethyl formate + ethyl acetate (NaOH/H^+) \rightarrow ethyl formyl acetate
- b) 1,4-Addition of hydrazine to methyl vinyl ketone.

4] Complete the following equations and name the final products: (20 points)



وحدة ضمان الجودة
كلية العلوم - جامعة طنطا
QUALITY ASSURANCE UNIT
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	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY		
	EXAMINATION FOR SECOND YEAR STUDENTS (DOUBLE MAJOR PROGRAMS)		
COURSE TITLE:	INSTRUMENTAL ANALYSIS (1)	COURSE CODE: CH2244	
DATE: JUNE 4, 2016	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions

Question (1):

A. Answer the following:

[20 marks]

1. Illustrate with drawing the "Jablonisky diagram" and define the different processes of dissipating energy.
2. Explain with examples, the different electronic transitions in organic and inorganic molecules.

B. Write short notes on (THREE ONLY) of the following:

[18 marks]

1. The mole-ratio method to determine the stoichiometry of a complex.
2. The atomization steps in the flame technique of the atomic absorption spectroscopy.
3. The schematic diagram of the flame photometer and what is the idea of working?
4. Determination of dissociation constant (pK_a) using UV-VIS absorption spectroscopy.

Question (2):

A. In brief, Compare between each pair of the following (FOUR ONLY):

[20 marks]

1. Potassium bromide and Nujol technique techniques in IR measurement.
2. Phototube and Photomultiplier.
3. Gratings and filters monochromators.
4. Nernst glower and Gliber lamps.
5. Single and double beam spectrometers.

B. Mark (✓) or (X) and give the reasons for each:

[15 marks]


1. In an ultraviolet-visible spectrometer, the sample placed after the monochromator?
2. Excitation source in flame photometer is "Gas discharge lamp".
3. Internal conversion is radiative process from excited singlet to ground states.
4. Unknown concentration of saturated hydrocarbons can be determined by UV spectrometers.
5. Spectra of Nitrogen molecule can be recorded by Infrared spectrometer.

Question (3)

A. Describe what it does and how it works:

[15 marks]

1. Photomultiplier tube.
2. Hollow cathode lamp.
3. Absorption filters.

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF PHYSICS			
	EXAMINATION FOR SOPHOMORES (SECOND LEVEL) STUDENTS OF CHEMISTRY (SEMESTER 1) المستوى الثاني شعبه كيمياء			
COURSE TITLE:	Electronics and Semiconductors الكترونييات وأشباه موصلات	COURSE CODE: PH2181		
DATE: 27	DECEMBER 2016	TERM: FIRST	TOTAL ASSESSMENT MARKS: 50	TIME ALLOWED: 2 HOURS

Answer The Following:

First question:

A) Define the following:

{10 Marks}
(4 Marks)

1- Donor (semiconductors).

2- Dielectric constant.

3- Photoelectric effect

4- Depletion Region

B) Chose the correct answer:

(6 Marks)

- 1) For any electric circuit, the maximum value of dissipated power occurred when:
 - a) Internal resistance > external resistance
 - b) Internal resistance < external resistance
 - b) Internal resistance = external resistance.
- 2) In an AC current, pass through Ohmic resistance, the following items change with time:
 - a) Current.
 - b) Voltage.
 - c) Phase angle.
 - d) All above maintained a, b and c.
- 3) In Half wave rectifier circuits, the output frequency is
 - a) Equal to the input frequency
 - b) less than the input frequency
 - c) greater than the input frequency
- 4) In Full wave rectifier circuits, the output frequency is
 - a) Equal to the input frequency
 - b) less than the input frequency
 - c) greater than the input frequency
- 5) In Half wave rectifier circuits, the output voltage is
 - a) Equal to the input voltage
 - b) less than the input voltage
 - c) greater than the input voltage
- 6) In Full wave rectifier circuits, the output voltage is
 - a) Equal to the input voltage
 - b) less than the input voltage
 - c) greater than the input voltage

Second question:

{14 Marks}

A) Write short notes on the following:

(6 Marks)

I) Seven-Segment Display.

II) Half wave rectifier circuits.

B) Design a resonance circuit to give an output signals wave form 100 times the input signal, draw the circuit, and calculate the magnitude of every element you may be use.

Given:, the maximum input signals $V_s = 0.15 \text{ V}$

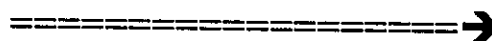
(4 Marks)

C) In an AC Circuit which $i = I_o \sin \omega t$, prove that, the power, p

Given by $P = \frac{I_o}{\sqrt{2}} \cdot \frac{V_o}{\sqrt{2}} \cos \phi$

(4 Marks)

Please turn over



Third question:

{13 Marks}

A) A capacitor with capacity $C=5\ \mu\text{F}$ connected in series with resistor equal $R=500\ \text{Ohm}$ and also with ac current has e.m.f. equal $V=200\ \text{Volt}$, its frequency equal $50\ \text{Hz}$; Determine the following:

- 1) Impedance of capacitor.
- 2) Total impedance of capacitor and resistor.
- 3) Current–Voltage across resistor.
- 4) Voltage across capacitor.
- 5) Phase angle.

(5 Marks)

B) Resistance , capacitance and a coil connected in series , deduce how you could determine the following:

- 1) Resonance frequency.
- 2) the impedance of the circuit

Given: $I = I_0 \sin \omega t$

(4 Marks)

C) Discuss briefly the application of the following:

1. Resonance circuit
2. Zener diode.
3. Photodiode
4. Optocoupler

(4 Marks)

Fourth question:

{13 Marks}

a) Design a circuit to give an output SQUARE wave form at 1.5 Volts, knowing that the input signal is sinusoidal wave form, and draw the circuit.

(4 Marks)

b) Design a circuit to give an output fifth times the input voltage?

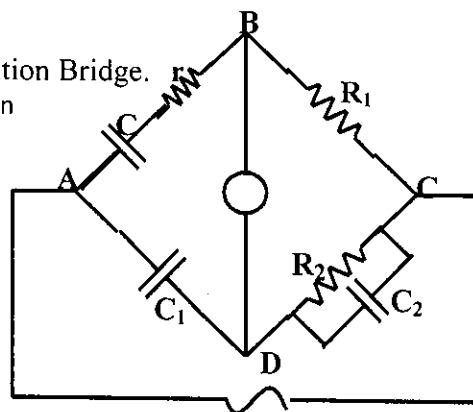
(4 Marks)

If the input voltage is (6 volts) calculate the actual output voltage?

- 1) First- if the diode is (silicon).
- 2) Second-if the diode is (germanium)

c) Deduce the two balance equations of the mention Bridge.

Maintain the application of such similar bridge in Materials science.



(5 Marks)

Examiners	Prof. Talaat M. Meaz	Dr. Magda Zaki
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Tanta University
Faculty of Science
Department of Chemistry

Exam for Level Two., chemistry section

CH 2204

Chemistry of Transition Elements

Term: Second

June 2016

Total Assessment Marks: 100

Time Allowed: 2 h

Answer the following questions:-

1-) Complete the following:

(25 marks)

- How would you define the transition elements: 1... , 2... , 3....
- Octahedral complexes are more stable and more common than tetrahedral because 1..... , 2..... and tetrahedral complexes are favored because 1....., 2....., 3., 4.....
- The colour in transition metal compounds arises from 1....., 2....., 3... ,4...

2-) Why are?

(25 marks)

- Zr and Hf compounds are similar.
- Compounds of Ti (IV) and Zn (II) white.
- The size of transition elements decrease from left to right.

3) Discuss the following:-

(25 marks)

- The splitting of d^3, d^4, d^5 and d^6 octahedral low spin and high spin.
- The splitting of d^4 and d^8 square planer.
- Draw the shape of d-orbitals.


4) Write down on the following:-

(25 marks)

- The rusting of iron.
- The electronic structure and oxidation state of Scandium group.
- Nonstoichiometry.

"GOOD LUCK"

Examiners: Prof. Dr. Gad El-Hefnawy

 1969	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY				
	EXAMINATION FOR SECOND STAGE STUDENTS OF SPECIAL CHEMISTRY PROGRAM.				
	COURSE TITLE:	INSTRUMENTAL ANALYSIS		COURSE CODE: CH2206	
DATE:	JUN, 2016	TERM: FIRST	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS	

Answer the following questions:

The first question (50 marks).

- Ten milliliters aliquots of a natural water sample were pipetted into five 50 mL volumetric flasks. Followed by exactly 0.00, 5.00, 10.00, 15.00 and 20.00 mL of a standard solution containing 11.1 ppm of Fe^{3+} were added to each followed by an excess of thiocyanate ion to give a red complex $Fe(SCN)^{2+}$. After dilution to the volume the absorbance measured (cell length 1cm), the results were tabulated as follows:
(20 marks)

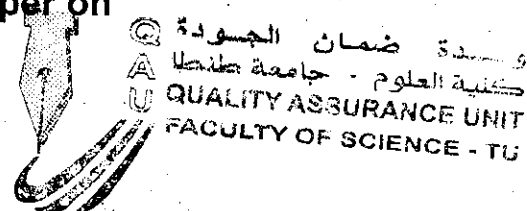
Fe^{3+} ppm	0.00	5.00	10.00	15.00	20.00
Absorbance A	0.215	0.424	0.685	0.826	0.967

- What does the equation of straight line that fit these data? What do the slope and intercept represent? (15 marks)
 - What is the concentration of $[Fe^{3+}]$ ppm in water sample? (5 marks)
 - What is the amount of Fe^{3+} in micro-gram present in 500 mL water bottle sample? (5 marks)
- A solution containing 6.23 ppm $KMnO_4$ has a transmittance of 19.5% in 1.00 cm cell at 425 nm, calculate the molar absorptivity of $KMnO_4$ at 425 nm. (15 marks).
 - Draw the photometric titration graph for the titration of Cu^{2+} and Bi^{3+} with EDTA at 745 nm. (10 marks)

The second question: (50 marks)

- Mention the detector and the principle of its operation that used in the following spectrometers: UV- VIS, IR, fluorescence, atomic absorption, and NMR. (20 marks)
- Explain the base-line method for determination of absorbance in IR spectroscopy. (10 marks)
- Mention the techniques of measurements of IR spectra of solid samples and liquids. (10 marks)
- Draw a block diagram for Reflectance spectrometer. What are the chemical applications of reflectance spectroscopy? (10 marks)

Please turn the paper on



TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY				
EXAMINATION FOR SOPHOMORES (SECOND LEVEL) STUDENTS OF SPECIAL CHEMISTRY SECTION				
COURSE TITLE:		STEREOCHEMISTRY		COURSE CODE: CH 2212
DATE: 1	JUNE , 2016	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer The Following Questions :


- 1) Compare between each of the following: (13 Marks)
 i- Stereoselective addition to cis- and trans-2,3-diphenyl-2-pentene.
 ii- Diastereomers and Racemic mixture.
 iii- Cationic and anionic racemization.
- 2)a-Describe the separation of (\pm)-2-aminopentane by (R)-(-)-mandelic acid.(18 Marks)
 b-Describe the separation of (\pm)-phenylglycine using chiral stationary phase (C.S.P).
- 3) Mark (\checkmark) or (X) and correct the false statments : (16 Marks)
 i- Mutarotation is the conversion of glucose to lactose. ()
 ii-The stretching vibration of C=C bond for trans-2-butene is slightly higher than that of cis- isomer, while the stretching vibration of C-H bond for trans-isomer is very lower than that of cis-isomer with IR-Spectra . ()
 iii-Trans-isomer of 2-pentene has slightly lower λ_{max} and very lower ϵ than that of cis- isomer with UV- spectra . ()
 iv- Fumaric acid readily forms a cyclic anhydride with heating while maleic acid does not give an anhydride under the same conditions. ()
- 4)a-Starting with acetic acid explain the synthesis of (\pm)-3-ethyl-2-hexanol. (18 Marks)
 b-Using Camphor asymmetric reagent describe the synthesis of (2S)-2-ethyl-1-hexanol.
- 5)a-Using Mayer's asymmetric reagent describe the synthesis of (3R)-3-phenylpentanoic acid . (9 Marks)
 b-The chemical shift of ethylenic proton δ_H was found experimentally to be 7.55 ppm for α - methyl ethyl cinnamate. What is the geometrical isomerism of the above ester? (substituent constants for chemical shift are : $-\text{Ph}_{gem} = 1.35$, $-\text{COOEt}_{cis} = 1.25$, $\text{COOEt}_{trans} = 0.47$, $-\text{CH}_3_{cis} = -0.26$, $-\text{CH}_3_{trans} = -0.29$ ppm) . (9 Marks)
- 6)a-Draw and name the isomers of the following compounds (with comment):(12Marks)
 i- Aldotetrose. ii-Tartaric acid . iii-Dichlorocyclohexane.
 b- Draw the following compounds : (5 Marks)
 i- (S)-3-Methylhexane. ii- (2R,3S)-2,3-Dibromopentane.

Examinars:

Prof.Dr. Adel Selim

Dr. Mohamed Azam

2

	Tanta University- Faculty of Science-Chemistry Department		
	Examination for second level students of chemistry section		
	Course Title	Chemical Kinetics	Course code:CH2240
Date:	4-6-2016	Total Assessment Marks: 100	Time Allowed: 2 hrs

Answer the following questions

(20 Marks for each)

- 1- a- write down the rate equation for chemical reaction and show how can you determine it?
 b- The decomposition of $2\text{HI} \longrightarrow \text{H}_2 + \text{I}_2$ at 308°C has the following data

Initial pressure of HI /atmo.	0.1	1
Half life time/min.	135	13.5

Find out the order and calculate the rate constant for this reaction

- 2- a- Discuss the factor affecting the reaction rate?
 b- Write short notes about characteristics, classification of Chemical Catalyses, and discuss the mechanism of Catalysis by enzymes.
- 3- a- Define the order of chemical reaction and discuss the initial rate method for determine it.
 b- For the reaction $2\text{NO} + \text{Br}_2 \longrightarrow 2 \text{NOBr}$ The following data were obtained

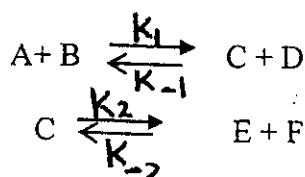
Initial rate	Initial [NO]	Initial [Br ₂]
12	0.1	0.1
24	0.1	0.2
36	0.1	0.3
48	0.2	0.1
108	0.3	0.1

Write down the rate equation which is consistent with this data and calculate the value of the rate constant of this reaction.

- 4- -a- What is the structure of chain reaction?
 b- Confirm that the rate equation for the chain reaction $\text{H}_2 + \text{Br}_2 \longrightarrow 2\text{HBr}$ is given by

$$\frac{d[\text{HBr}]}{dt} = \frac{k [\text{H}_2] [\text{Br}_2]^{3/2}}{[\text{Br}_2] + k[\text{HBr}]}$$


- 5- a- Calculate the $t_{1/5}$ for 1st and 3rd order of the reaction.
 b- For the reaction proceeded in a sequence of reversible steps



Prove that the equilibrium constant for this reaction is the product of all rate constants ratio

Best wishes

Examiner Prof.Dr. Hosny El-Daly

	TANTA UNIVERSITY FACULTY OF SCIENCE CHEMISTRY DEPARTMENT		
	FINAL EXAM FOR SOPHOMORE STUDENTS (CHEMISTRY SECTION)		
	COURSE TITLE:	NUCLEAR CHEMISTRY (CH2210)	TIME ALLOWED:
DATE: JUNE 06, 2016	TERM: SECOND	TOTAL ASSESSMENT MARKS: 50	2 HOURS

Question 1: (20 Marks)

A) Compare between each of the following:

- i) Chemical reactions and nuclear reactions.
- ii) Isotopes, isobars and isotones. Illustrate with examples.
- iii) The external and the internal beam radiation for cancer treatment.
- iv) Positron emission and electron capture.

B) If the half-life of a hypothetical isotope is 15 years, how many grams do remain if 20 g decays after 45 years?

Question 2: (30 Marks)

A) Explain each of the following: (24 Marks)

- 1) Radioactive displacement law.
- 2) The application of radioisotopes in finding leaks and blockages.
- 3) Some radioactive nuclides are especially damaging because they tend to concentrate in particular parts of the body.
- 4) Sterile insect technique.
- 5) The role of fuel rods, control rods and the moderator in the nuclear reactor core.
- 6) How 202.5 MeV are resulted from uranium-235 fission?
- 7) On the contrary of gamma radiation, alpha and beta radiation are more body harmful when emitted from internal sources and are less harmful when emitted from external sources.
- 8) Pebble-bed nuclear reactor: contents and advantages.


B) Show by diagram only: (6 Marks)

- 1) The liquid drop model of the uranium fission.
- 2) Nuclei belt of stability diagram. (Show the regions)

Good Luck

Examiners: Prof. Kamal Elbaradie

Dr. Wael A. Amer


	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY			
	EXAMINATION FOR SOPHOMORES (SECOND LEVEL) STUDENTS OF SPECIAL CHEMISTRY SECTION			
	COURSE TITLE:	STEREOCHEMISTRY		COURSE CODE: CH 2212
DATE: 1	JUNE , 2016	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer The Following Questions :

- 1) Compare between each of the following: (13 Marks)
 i- Stereoselective addition to cis- and trans-2,3-diphenyl-2-pentene.
 ii- Diastereomers and Racemic mixture.
 iii- Cationic and anionic racemization.
- 2)a-Describe the separation of (\pm)-2-aminopentane by (R)-(-)-mandelic acid. (18 Marks)
 b-Describe the separation of (\pm)-phenylglycine using chiral stationary phase (C.S.P).
- 3) Mark (\checkmark) or (X) and correct the false statments : (16 Marks)
 i- Mutarotation is the conversion of glucose to lactose. ()
 ii-The stretching vibration of C=C bond for trans-2-butene is slightly higher than that of cis- isomer, while the stretching vibration of C-H bond for trans-isomer is very lower than that of cis-isomer with IR-Spectra . ()
 iii-Trans-isomer of 2-pentene has slightly lower λ_{max} and very lower ϵ than that of cis- isomer with UV- spectra . ()
 iv- Fumaric acid readily forms a cyclic anhydride with heating while maleic acid does not give an anhydride under the same conditions. ()
- 4)a-Starting with acetic acid explain the synthesis of (\pm)-3-ethyl-2-hexanol. (18 Marks)
 b-Using Camphor asymmetric reagent describe the synthesis of (2S)-2-ethyl-1-hexanol.
- 5)a-Using Mayer's asymmetric reagent describe the synthesis of (3R)-3-phenylpentanoic acid . (9 Marks)
 b-The chemical shift of ethylenic proton δ_H was found experimentally to be 7.55 ppm for α - methyl ethyl cinnamate. What is the geometrical isomerism of the above ester? (substituent constants for chemical shift are : $-\text{Ph}_{gem} = 1.35$, $-\text{COOEt}_{cis} = 1.25$, $\text{COOEt}_{trans} = 0.47$, $-\text{CH}_3_{cis} = -0.26$, $-\text{CH}_3_{trans} = -0.29$ ppm) . (9 Marks)
- 6)a-Draw and name the isomers of the following compounds (with comment):(12Marks)
 i- Aldotetrose. ii-Tartaric acid . iii-Dichlorocyclohexane.
 b- Draw the following compounds : (5 Marks)
 i- (S)-3-Methylhexane. ii- (2R,3S)-2,3-Dibromopentane.

Examinars: Prof.Dr. Adel Selim

Dr. Mohamed Azam

	Tanta University Faculty of Science Chemistry Department		
	Examination for Second Level Students of special chemistry		
Course Title	Organic Chemistry 4	Course Code: CH2216	
Date:	8-6-2016	Total Assessment Marks: 150	Time Allowed: 2 hrs

Answer the following questions

1- Show by equations the reaction mechanism of the following: Mark 40

- Addition of HBr to Propene in presence of Peroxide.
- Reaction of hydroxylamine with a carbonyl compound and factors affecting such reaction.
- Favorski re-arrangement.

2- Answer by mechanism the following: Mark 40

- Using Carbon isotope show how you interpretate the reaction of acetate with BrCN
- Discuss by examples the reaction of Ambident Nucleophiles
- Cannizaro and crossed Cannizaro reaction. Show the mechanism.

3- Show by equations the following: Mark 35

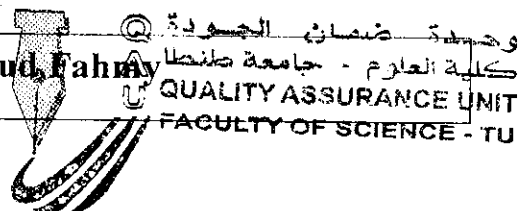
- Write the mechanism of treatment of 2-bromo-2-methylbutane with ethanol.
- Benzil-Benzilic acid re-arrangement. Show the mechanism'
- SN² mechanism and factors affecting such reaction. Explain


4- Answer the following questions: Mark 35

- Addition of HCl to 3, 3-dimethyl-1-butene, Show the mechanism.
- Neighbouring group participation reaction type and its stereochemistry. Explain.
- How can you prepare DDT ' Show the mechanism

EXAMINER

Prof. Dr. Mahmoud Fahmy



	TANTA UNIVERSITY, FACULTY OF SCIENCE, DEPARTMENT OF CHEMISTRY			
	FINAL EXAMINATION OF (SECOND YEAR) STUDENTS			
COURSE TITLE:	<u>Chemistry of Main groups</u> For all sections		COURSE CODE: CH 2107	
DATE: 29, DEC., 2016	TERM: FIRST	TOTAL ASSESSMENT MARKS: 100		TIME ALLOWED: 2 HOURS

Please answer all The following questions:

1-) Compare between each of the following:

(25 marks)

- a-) The reaction of groups I & II elements with nitrogen (5 marks)
 - b-) Carbon and group IV elements (5 marks)
 - c-) ortho and para hydrogen (5 marks)
 - d-) The hydrides of group V elements (5 marks)
 - e-) The reaction of group II elements with water (5 marks)
-

2-) Comment on each of the following:

(25marks)

- a-) Covalent hydrides are seldom completely covalent (5 marks)
 - b-) Beryllium salts are acidic when dissolved in water (5 marks)
 - c-) The elements of group II elements are harder than group I (5 marks)
 - d-) Graphite can conduct electricity (5 marks)
 - e-) Nitrogen is unable to form pentahalides (5 marks)
-

3-) Write short notes on each of the following:


(25marks)

- a-) Silicones compounds (5 marks)
 - b-) Interhalogens compounds (5 marks)
 - c-) Sulphurous acid series (5 marks)
 - d-) Preparations and reactions of diborane (5 marks)
 - e-) Hydrides of group VI elements (5 marks)
-

- 4-) a-) Give reasons for trivalency and monovalency in group III elements (5 marks)
- b-) Explain why HF has low acidic strength compared with HI (5 marks)
- c-) Compare between alkanes and silanes (5 marks)
- d-) Why fluorine is unable to form oxyacids (5 marks)
- e-) Why SiCl_4 is hydrolysed but CCl_4 is not hydrolysed (5 marks)

Good Luck

Examiners: Prof. Dr : Kamal Elbaradie, Prof. Dr: saeed Anwer and Dr: Dina Abd EL-Aziz


	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY		
	FINAL EXAM FOR SECOND YEAR STUDENTS		
	COURSE TITLE:	KINETIC THEORY OF GASES	COURSE CODE: CH2103
DATE	12 JANUARY, 2017	TOTAL ASSESSMENT MARKS: 50	TIME ALLOWED: 2 Hrs

Answer All Questions. 50 marks distributed equally for all questions

- 1- Discuss the molecular effusion of gases.
- 2- A) Discuss the barometric formula.
 - B) In one dimensional random walk of 4 steps,
 - i. Write down all possible sequences to reach point 2 after 4 steps.
 - ii. What is the probability to reach point 2 after 4 steps?
- 3- A) Discuss the kinetic theory of gas viscosity.
 - B) The viscosity of hydrogen gas at 0°C is 8.41×10^{-5} poise; determine the mean free path of the molecules at this temperature and 1 atmosphere.
- 4- A) Derive an equation explaining the relation between entropy and probability.
 - B) Calculate the average energy for triatomic linear and nonlinear molecules.

Best Wishes

Prof. Ahmed Borhan Zaki

	TANTA UNIVERSITY		FACULTY OF SCIENCE	DEPARTMENT OF CHEMISTRY
	EXAMINATION FOR SOPHOMORES (SECOND LEVEL) STUDENTS OF SPECIAL CHEMISTRY SECTION			
	COURSE TITLE:	STEREOCHEMISTRY		COURSE CODE: CH 2212
DATE: 31	MAY, 2017	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer The Following Questions :


- 1) Describe the separation of each of the following : (18 Marks)
 a- (\pm)-3-Aminohexane using (R)-(-)- mandelic acid.
 b- (\pm)-Phenylglycine using chiral stationary phase (C.S.P.).
- 2)a- Describe the synthesis of (\pm)-3-ethyl-2-hexanol . (18 Marks)
 b-Using Camphor asymmetric reagent describe the synthesis of (2S)-2-ethyl-1-hexanol.
- 3) Mark (\checkmark) or (X) and correct the false statments : (12 Marks)
 a- Mutarotation is the conversion of glucose to galactose . ()
 b-Trans- stilbene has slightly lower λ_{\max} and very higher ϵ than that of cis- isomer with UV- spectra . ()
 c- The asymmetric C-atom is that atom which attaced with four similar groups. ()
 d- Fumaric acid readily give a cyclic anhydride with heating while maleic acid does not give an anhydride under the same conditions. ()
- 4) Describe each of the following: (15 Marks)
 a- Stereoselective addition to cis- and trans-2,3-diphenyl-2-hexene .
 b- Diastereomers and racemic mixture .
 c- Stability of cyclic hydrocarbons .
- 5)a-Using Mayer's asymmetric reagent describe the syntheses of (3R)-3-phenylhexanoic acid. (9 Marks)
 b-The chemical shift of ethylenic proton δ_{H} was found experimentally to be 7.55 ppm for **Ph-CH=C(Me)-COOMe**. What is the geometrical isomerism of the above ester ? Write its chemical name.(substituent constants for chemical shifts are : $-\text{Ph}_{\text{gem}} = 1.35$, $-\text{COOMe}_{\text{cis}} = 1.25$, $-\text{COOMe}_{\text{trans}} = 0.67$, $-\text{Me}_{\text{cis}} = -0.26$, $-\text{Me}_{\text{trans}} = -0.29$ ppm). (8 Marks)
- 6)a-Draw and name the isomers of the following compounds (with comment):(11Marks)
 i-3,4-Dichlorohexane. ii-3-Bromo-2-pentanol. iii-1,4-Dimethylcyclohexane.
 b- Draw the following compounds : (9 Marks)
 i- (2R,3S)-Aldotetrose. ii-(2S,3S)-Tartaric acid. iii-(2Z,5R)-2,5-Dibromohexane.

Examinars:

Prof.Dr. Adel Selim

Dr. Mohamed Azam

Dr. Atef El-Garably

	TANTA UNIVERSITY		FACULTY OF SCIENCE	DEPARTMENT OF CHEMISTRY
	EXAMINATION FOR SOPHOMORES (SECOND LEVEL) STUDENTS OF SPECIAL CHEMISTRY SECTION			
1969	COURSE TITLE:	STEREOCHEMISTRY		COURSE CODE: CH 2212
DATE: 31	MAY, 2017	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer The Following Questions :



- 1) Describe the separation of each of the following : (18 Marks)
 a- (\pm)-3-Aminohexane using (R)-(-)- mandelic acid.
 b- (\pm)-Phenylglycine using chiral stationary phase (C.S.P.).
- 2)a- Describe the synthesis of (\pm)-3-ethyl-2-hexanol . (18 Marks)
 b-Using Camphor asymmetric reagent describe the synthesis of (2S)-2-ethyl-1-hexanol.
- 3) Mark (\checkmark) or (X) and correct the false statments : (12 Marks)
 a- Mutarotation is the conversion of glucose to galactose . ()
 b-Trans- stilbene has slightly lower λ_{max} and very higher ϵ than that of cis- isomer with UV- spectra . ()
 c- The asymmetric C-atom is that atom which attaced with four similar groups. ()
 d- Fumaric acid readily give a cyclic anhydride with heating while maleic acid does not give an anhydride under the same conditions. ()
- 4) Describe each of the following: (15 Marks)
 a- Stereoselective addition to cis- and trans-2,3-diphenyl-2-hexene .
 b- Diastereomers and racemic mixture .
 c- Stability of cyclic hydrocarbons .
- 5)a-Using Mayer's asymmetric reagent describe the syntheses of (3R)-3-phenylhexanoic acid. (9 Marks)
 b-The chemical shift of ethylenic proton δ_H was found experimentally to be 7.55 ppm for Ph-CH=C(Me)-COOMe. What is the geometrical isomerism of the above ester ? Write its chemical name.(substituent constants for chemical shifts are : $-\text{Ph}_{gem} = 1.35$, $-\text{COOMe}_{cis} = 1.25$, $-\text{COOMe}_{trans} = 0.67$, $-\text{Me}_{cis} = -0.26$, $-\text{Me}_{trans} = -0.29$ ppm). (8 Marks)
- 6)a-Draw and name the isomers of the following compounds (with comment):(11Marks)
 i-3,4-Dichlorohexane. ii-3-Bromo-2-pentanol. iii-1,4-Dimethylcyclohexane.
 b- Draw the following compounds : (9 Marks)
 i- (2R,3S)-Aldotetrose. ii-(2S,3S)-Tartaric acid. iii-(2Z,5R)-2,5-Dibromohexane.

Examinars:

Prof.Dr. Adel Selim

Dr. Mohamed Azam

Dr. Atef El-Garably

	TANTA UNIVERSITY FACULTY OF SCIENCE CHEMISTRY DEPARTEMENT			 1969
	Examination of Second level students of Special Chemistry			
	Course title:	Organic Chemistry (4)	Course code: CH 2216	
	27/5/2017	Total Marks: 150	Time allowed: 2 hrs.	

Answer the following questions:

1- Answer by mechanism the following:

- a- Addition of water to C=O group. Discuss the mechanism and factors affecting such reaction.
- b- Effect of acid on 1,2-diols.
- c- Explain in details the Benzyne mechanism.
- d- Hoffmann hypobromide reaction. Show the mechanism.

2- Explain by mechanism the following reactions:

- a- Transformation of cumene to phenol and acetone. Show mechanism.
- b- Diazo coupling mechanism. Explain in details.
- c- Explain by mechanism how cyanide ion can be used as ambident nucleophiles.
- d- Addition of HCl to 3,3-dimethyl-1-butene. Show mechanism.

3- Answer the following reaction:

- a- Reaction of Bromine with benzene ring. Show the mechanism.
- b- Discuss in details the factors affecting of aliphatic nucleophilic substitution reaction.
- c- Explain the both Saytzeu and Hoffmann rules in elimination.
- d- 1,2-chlorohydrin can act as neighbouring group participation. Explain the mechanism.

4- Answer the following reactions:

- a- Correlate between the mechanism of both SN1 and SN2 mechanism.
- b- Addition of Br₂ to alkenes is Trans addition. Explain the mechanism.
- c- Explain the mechanism of Elimination reaction.
- d- Show the mechanism of S_Ni and S_Ni⁻.

Kind regards ...

Prof. Dr. Mahmoud Fahmy

Answer the following questions:-

1) Comment on each of the following: (25 marks)

- The melting point and boiling points of the transition elements are high.
- Compounds of transition elements are usually paramagnetic.
- Many transition elements and their compounds have catalytic properties.
- The high density of transition elements.

2) Discuss the followings: (25 marks)

- Extraction of titanium.
- Compare and contrast the chemistry of Fe, Ru and Os.
- The chemical properties of Sc group.

3) Write on: (25 marks)

- The assumptions of the crystal field theory.
- Draw energy level diagram and indicate the type of hybridization of:
 d^4 , d^5 , d^6 , d^7 and d^8 square planar, octahedral and tetrahedral.


4) Explain: (25 marks)

- The electronic configuration and The variable valency of d-block elements.
- The general properties of the transition elements comparing with the main elements.

(Good luck)

Examiners: Prof. Dr. Gad El-Hefnawy



	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY		
	Final Examination For Second Level Students (Special Chemistry)		
	COURSE TITLE: The Phase Rule		COURSE CODE: CH2208
	DATE: 24/5/2017	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions (label each area line and point in your diagram):

1- a) What is the phase rule ? For what systems it is applied? What is the phase equilibrium diagram? (15 marks)

b) Evaluate P, C and F for the following systems: (15 marks)

i) A mixture of four gases enclosed in a cylinder. ii) Ice/water/vapor.

iii) Hydrogen, oxygen and water enclosed in a vessel at room temperature.

iv) $2\text{H}_2\text{O} \leftrightarrow 2\text{H}_2 + \text{O}_2$ at 1800°C starting from water.

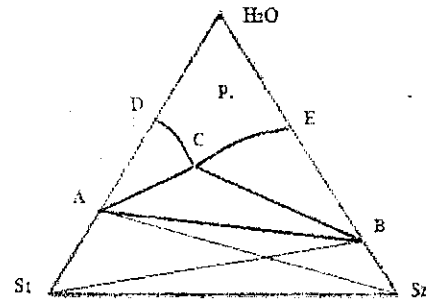
v) S_{Rubic} , $S_{\text{Monoclinic}}$, S_{Liquid} and S_{Vapor} .

2- Draw the vapor pressure composition phase diagram at constant temperature and the temperature composition phase diagram at constant pressure for two liquids which forms zeotropic mixture, azeotropic mixture, partially miscible liquids and immiscible liquids.

(20marks)

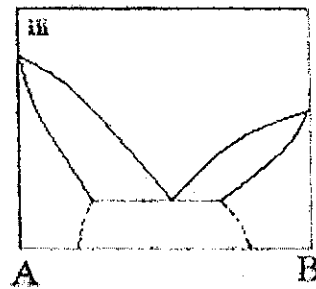
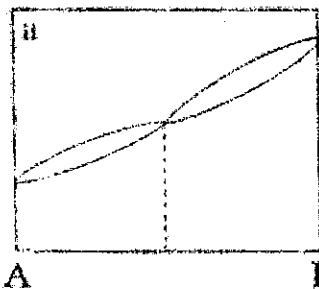
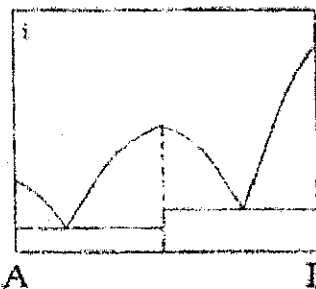
3- Discuss the following phase diagram of aqueous salt solution, apply the phase rule at each area and point in your phase diagram. Show the product of isothermal dehydration of solution P.

(20marks)



4- Define the following phase diagrams of a binary condensed system, apply the phase rule at each region, line and point in your phase diagrams.

(30marks)



(Good luck)



Answer the following questions:-

(25 marks)

1) a) Complete the following:

- i) The assumptions of the crystal field theory are 1.....,2.....,and 3.....
- ii) The factors affecting Δ_o values are 1.....,2.....and 3.....
- iii) Oxidation number is defined as
- iv). IUPAC organization defined transition elements as those elements that.....

2- Why are:-

(25 marks)

- i- Mn^{+2} compounds very pale in colour.
- ii- Co^{+3} complexes more stable than Co^{+2} complexes.
- iii- Zr and Hf compounds are similar.
- iv- Compounds of Ti (IV) and Zn (II) white.

3) Discuss the following:-

(25 marks)


- a) The splitting of d^3, d^4, d^5 and d^6 octahedral low spin and high spin.
- b) The splitting of d^4 and d^8 square planer.
- c) Compare and contrast the chemistry of Mn and Re

4) Write down on the following:-

(25 marks)

- a) - The rusting of iron.
- b).- Ziegler-Natta catalyst for production of high-density polyethylene.
- c) - Nonstoichiometry.
- d) - Separation of lanthanides (Three methods only).

"GOOD LUCK"

	TANTA UNIVERSITY FACULTY OF SCIENCE CHEMISTRY DEPARTMENT		
	FINAL EXAM FOR SENIOR STUDENTS(CHEMISTRY SECTION)		
COURSE TITLE:	NUCLEAR CHEMISTRY (CH 2110)		TIME ALLOWED: 2 HOURS
DATE: 6-6-2018	SECOND TERM	TOTAL ASSESSMENT MARKS: 50	

Answer the flowing questions

1- A) Discuss the following points (12Marks)

- i. Fuel used in fusion nuclear reactor
- ii. Smoke detectors
- iii. Similarity between nuclear fission and atomic bomb
- iv. Effects of nuclear explosions

B) Choose the correct answer and give reason for your answer: (6Marks)

- i. The relation between ^{40}S , ^{40}Cl is
 - a) Isotopes
 - b) Isobars
 - c) Isotones
- ii. The beta particles are stopped of human tissue
 - a) 5 to 10 mm
 - b) 1 to 4 mm
 - c) 20 to 30 mm
- iii. Fission nuclear reactor produce energy
 - a) Chemical
 - b) electrical
 - c) kinetic

2- A) Draw the diagram for fission nuclear reactor (4 Marks)

B) Compare between: (9 Marks)

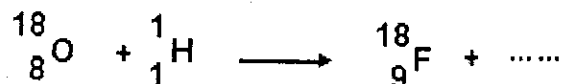
- i. Discovery of Marie Curie and Irène Joliot-Curie.
- ii. Isotones and isotopes
- iii. Radioactive and nonradioactive nucleus

3- Give the reason for the following: (10 Marks)

- i. Electron capture decrease atomic number of atom by 1.
- ii. Gama ray penetrate to internal body.
- iii. Atomic bomb is used in the formation hydrogen bomb.
- iv. Enriching uranium.


4-A) A rock contains 0.313 mg of Pb for each milligram of U. The half-life for the decay of U to Pb is 4.5×10^9 year. How long ago was the rock formed? (5 Marks)

B) Complete the following equation, Write it as nuclear equation and define bombarding particle and ejected particle: (4 Marks)



Examiners Prof. Dr. Kamal El-Baradie

Dr/ Nadia El-Wakiel

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY		
	Final Examination For Second Level Students (Special Chemistry)		
	COURSE TITLE: The Phase Rule		COURSE CODE: CH2208
	DATE: 19/5/2018	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions (label each area line and point in your diagram):

Each question (25 marks)

1- Write explanatory notes on the following:

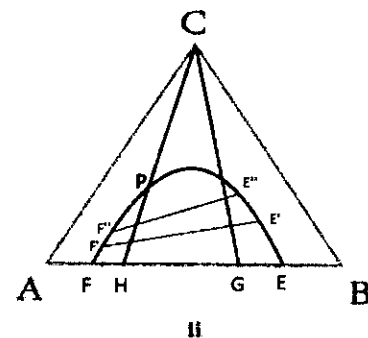
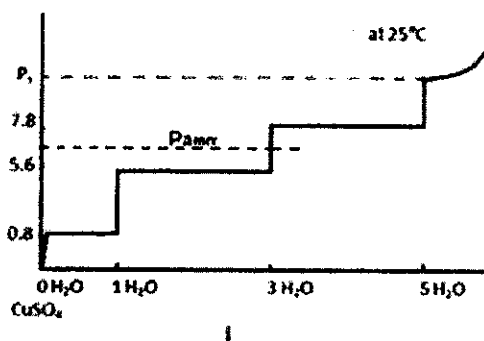
- Vapor pressure.
- Ideal solution.
- True, metastable and apparent equilibrium.
- Heterogeneous equilibrium.
- For a binary condensed system a eutectic is an invariant point.

2- a) Draw sketches for a binary condensed systems with simple eutectic, peritectic and eutectoid temperature.


b) If the normal boiling point of benzene is 80.1°C and its latent heat of vaporization is 103.04 cal/gram . Calculate its boiling point at 76 mmHg .

3- Two liquids show an upper critical solution temperature (C.S.T.). Indicate by means of diagrams and discussion the features of isothermal and total vapour pressure curves (a) Above C.S.T. (b) Below C.S.T.

4- Discuss the following phase diagrams.



(Good luck)

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY		
	Final Examination For Second Level Students (Special Chemistry)		
	COURSE TITLE: The Phase Rule		COURSE CODE: CH2208
	DATE: 19/5/2018	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer the following questions (label each area line and point in your diagram):

Each question (25 marks)

1- Write explanatory notes on the following:

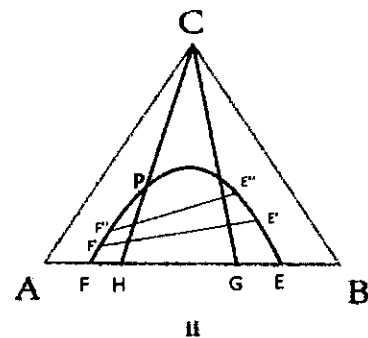
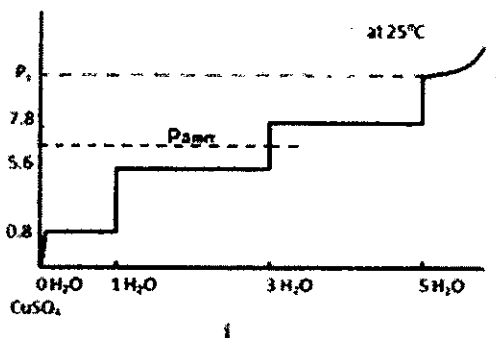
- Vapor pressure.
- Ideal solution.
- True, metastable and apparent equilibrium.
- Heterogeneous equilibrium.
- For a binary condensed system a eutectic is an invariant point.

2- a) Draw sketches for a binary condensed systems with simple eutectic, peritectic and eutectoid temperature.



b) If the normal boiling point of benzene is 80.1° C and its latent heat of vaporization is 103.04 cal/gram. Calculate its boiling point at 76 mmHg.

3- Two liquids show an upper critical solution temperature (C.S.T.). Indicate by means of diagrams and discussion the features of isothermal and total vapour pressure curves (a) Above C.S.T. (b) Below C.S.T.

4- Discuss the following phase diagrams.



(Good luck)

	TANTA UNIVERSITY FACULTY OF SCIENCE CHEMISTRY DEPARTEMENT			
	Examination of Second year students of Chemistry section			
	Course title:	Organic Chemistry (4)	Course code: CH 2216	
	26.05.2018	Total Marks: 150	Time allowed: 2 hrs.	

1- Answer by equations the following reactions (50 Marks)

- a- Addition of water on carbonyl group. Discuss by mechanism.
- b- Hoffman Hypobromide reaction. Show the mechanism.
- c- Treatment of α - bromoketone with sod.alkoxide. Explain the mechanism
- d- Cumene to acetone and phenol

2- Explain by mechanism the following reactions. (50 Marks)


- a- Explain in details the type of Elimination reaction.
- b- Diazo-coupling reaction. Explain the mechanism
- c- Benzyne mechanism.
- d- Show two examples for Neighbouring group participation.

3- Show by mechanism the following reactions (50 Marks)

- a- Alkylation of benzene. Show the mechanism
- b- Nucleophilic substitution reaction, Show the mechanism.
- c- Cyanide ion can be used as Ambident nucleophile. Explain.
- d- Pinacole- Pinacolone rearrangement. Show the mechanism

Kind regards


Prof. Mahmoud Fahmy

	TANTA UNIVERSITY		FACULTY OF SCIENCE	DEPARTMENT OF CHEMISTRY
	EXAMINATION FOR SOPHOMORES (SECOND LEVEL) STUDENTS OF SPECIAL CHEMISTRY SECTION			
1985	COURSE TITLE:	STEREOCHEMISTRY		COURSE CODE: CH 2212
DATE: 30	MAY, 2018	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

Answer The Following Questions :

- 1) Mark (✓) or (X) and correct the false statements : (8 Marks)
- a- Trans- cinnamic acid has slightly higher λ_{max} and very lower ϵ than that of cis- isomer with UV- spectra . ()
- b- Cyclobutane is the most stable cyclic hydrocarbons . ()
- c- Fumaric acid readily give a cyclic anhydride with heating while maleic acid does not give an anhydride under the same conditions. ()
- 2) Describe each of the following: (18 Marks)
- a- Stereoselective addition to cis- and trans-2,3-diphenyl-2-pentene .
- b- Diastereomers , racemic mixture and mutarotation .
- c- Anionic and cationic racemization .
- 3) Describe the separation of each of the following : (18 Marks)
- a- (\pm)-2- Phenyl-2- aminobutane using (R)-(-)- mandelic acid .
- b- (\pm)-Phenylglycine using chiral stationary phase (C.S.P.) .
- 4)a- Describe the synthesis of (\pm)-3-benzyl-2-pentanol . (18 Marks)
- b- Using Camphor asymmetric reagent describe the synthesis of (2S)-2-ethylhexanoic acid.
- 5)a- Starting with poly methylmethacrylate (PMMA) describe the syntheses of (3R)-3-phenyl-1-hexanol . (9 Marks)
- b- The chemical shift of ethylenic proton δ_H was found experimentally to be 7.60 ppm for **Ph-CH=C(Et)-COOEt**. What is the geometrical isomerism of the above ester ? Write its chemical name. (substituent constants for chemical shifts are: $-\text{Ph}_{gem} = 1.35$, $-\text{COOEt}_{cis} = 1.25$, $-\text{COOEt}_{trans} = 0.67$, $-\text{Et}_{cis} = -0.26$, $-\text{Et}_{trans} = -0.29$ ppm). (9 Marks)
- 6)a- Draw and name the isomers of the following compounds (with comment): (11 Marks)
- i-3,4-Dibromohexane. ii-3-Chloro-2-pentanol. iii-Dimethylcyclohexane.
- b- Draw the following compounds : (9 Marks)
- i-(2R,3S)-Aldotetrose. ii-(2R,3S)-Tartaric acid. iii-(2E,5R)-2,5-Dibromoheptene.

Examinars: Prof.Dr. Adel Selim Dr. Mohamed Azam Dr. Atef El-Garably

	Tanta University Faculty of Science Chemistry Department		
	Examination for Second Level Students (Credit Hours System)		
	Course Title	Stereochemistry	Course Code: CH2246
Date:	30/ 5/ 2018	Total Assessment Marks: 50	Time Allowed: 2 hrs

1. Draw and name the stereo-isomers of the following: (10 marks)

- i. Tartaric acid
- ii. Aldotetrose

2. Discuss the following: (15 mark)

- i. Conformations of n-butane
- ii. Synthesis of (\pm)-2-methyl-1-hexanol using malonate ester
- iii. Separation of (\pm)-sec.butylamine by (R)-O-methyl mandileic acid

3. The δ expected for stilbene was found to be 6.5 ppm. Determine the isomer type? (where, $H_{trans} = 0$, $Ph_{cis} = 0.37$, $Ph_{gem} = 1.35$, $H_{cis} = 0$, $Ph_{trans} = -0.1$)? (5 marks)

4. Define each of the following: (8 marks)

- i. Specific rotation and its measurements
- ii. Diastereomers
- iii. Plane of symmetry

5. Compare between each of the following: (12 mark)

- i. Stereoselective hydroxylation of maleic and fumaric acid
- ii. Racemization of α -chloroethylbenzene and mandelic acid
- iii. Conformations of 1,2- and 1,4-dimethylcyclohexane

***** *With Best Wishes*,*****

Prof. Dr. Adel selim

Dr. Mohamed Azaam

Dr. Atif El-Gharably

©

TANTA UNIVERSITY - FACULTY OF SCIENCE- CHEMISTRY DEPARTMENT

Chemical kinetics final exam for the second year students (Chemistry section)

Course code: CH2202

Date: 16 May 2018

Time allowed: Two hours

Total marks: 100

هذا الإمتحان مكون من جزئين (PART I & PART II) موزعه على ثماني صفحات على النحو التالي:.

PART I: Choose the correct answer

(50 marks, 2 marks each)

اختر الإجابة الصحيحة في كل سؤال ثم ضع الإجابات الصحيحة في هذا الجدول

	A	B	C	D
1				
2				
3				
4				
5				

(C)

TANTA UNIVERSITY - FACULTY OF SCIENCE- CHEMISTRY DEPARTMENT

Chemical kinetics final exam for the second year students (Chemistry section)

Course code: CH2202

Date: 16 May 2018

Time allowed: Two hours

Total marks: 100

هذا الامتحان مكون من جزئين (PART I & PART II) موزعه على ثمانى صفحات على النحو التالى:.

PART I: Choose the correct answer

(50 marks, 2 marks each)

اختر الإجابة الصحيحة في كل سؤال ثم ضع الإجابات الصحيحة في هذا الجدول

	A	B	C	D
1				
2				
3				
4				
5				

Question (II)

1-The rate constant for a reaction at 30 °C is found to be exactly twice the value at 20 °C. Calculate the activation energy?

2-The following data were obtained for the decomposition of N₂O₅ in CCl₄. The following data were collected

Time (s)	0	423	753	1116	1552	1986	2343
[N ₂ O ₅] mol/L	1.46	1.09	0.89	0.72	0.54	0.43	0.35

Determine the following: (i)- the order with respect to N₂O₅

(ii)- The rate law for this reaction (iii)- The [N₂O₅] at 3500 s after the start of reaction

3-Discuss three techniques for follow-up the rate of chemical reaction?

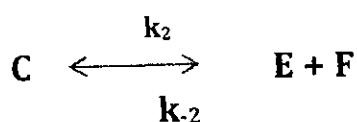
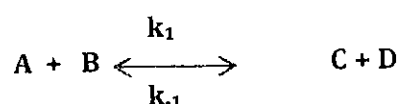
Question (III):

1-Discuss the factors affecting the rate of chemical reactions?

2-Write short notes about characteristics, classification of chemical catalysts, and discuss the mechanism of chemical catalysis according to Arrhenius concept?

3-Enumerate the methods for determination of the order of chemical reactions and discuss one of them?

4- For the reaction proceeded in a sequence of reversible steps;




Prove that the equilibrium constant for this reaction equal the product of all rate constants ratio?

Good Luck for all

Prof. Ali Gemeay

Prof. Hosny El-Daly

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY		
	EXAMINATION FOR JUNIOR (SECOND YEAR) STUDENTS OF PHYSICAL BIOCHEMISTRY		
	COURSE TITLE:	CHEMISTRY OF CARBOHYDRATES AND LIPIDS	COURSE CODE: BC2202
	DATE:	19-6-2017	TERM: SECOND TOTAL ASSESSMENT MARKS: 50 TIME ALLOWED: 1 HOUR

Answer all the questions

1) Correct the under lined word of each of the following: (7 marks)

- A. 3 carbons are removed from fatty acyl coA in one turn of β -oxidation.
- B. Beta oxidation of fatty acid takes place in cytosol.
- C. A fatty acid with 14 carbon atoms will undergo 6 cycles of beta oxidation
- D. Stereoisomers that differ only in configuration about one chiral carbon is called enantiomers.
- E. Liquid oil can be changed into solid fats by halogenations of unsaturated fatty acids.
- F. Any compound containing a carbohydrate group linked to a lipid moiety is called proteolipids.
- G. Glycerophospholipids are compounds contain sphingosine as an alcohol.

2) Compare between each of the following (12 marks)

- A. Alpha and beta isomers
- B. Glycolysis and gluconeogenesis
- C. Wax and neutral fat
- D. Amylose and Amylopectin

3) Give an account of the following (16 marks)

- A. carnitine shuttle
- B. classification of fatty acid
- C. polyunsaturated fatty acids
- D. Transport of glucose into cells

4) Draw the structure of the following (15 marks)

- A. Active form of fatty acid
- B. maltose
- C. Cholesterol
- D. Fructose
- E. Phosphatidyl ethanol amine

Final Examination for the 2nd year students
For Material Sciences

Answer the following Questions :

Total Assessment Marks:150

1-) A- Choose the correct Answer : (In Chemical equations) . Each item 7 marks

- (1) Markovnikov's addition of HBr is not applicable to
- | | |
|---------------|--------------|
| (a) Propene | (b) 1-butene |
| (c) 1-pentene | (d) 2-butene |
- (2) In the reaction of $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2$ with HCl , the H of the HCl will become attached to which carbon ?
- | | |
|---------|---------|
| (a) C-1 | (b) C-2 |
| (c) C-3 | (d) C-4 |
- (3) 2-Butene reacts with HBr to give
- | | |
|-------------------|-----------------------|
| (a) 1-Bromobutane | (b) 2,3-Dibromobutane |
| (c) 2-Bromobutane | (d) 2,2 Dibromobutane |
- (4) Which of the following alkenes will give a mixture of acetone and acetaldehyde on ozonolysis ?
- | | |
|--------------|-----------------------|
| (a) 1-butene | (b) 2-methyl-2-butene |
| (c) 2-butene | (d) 2-methylpropene |
- (5) Addition of two moles of HCl to propyne gives :
- | | |
|-------------------------|-------------------------|
| (a) 2,2-Dichloropropane | (b) 1,3-Dichloropropane |
| (c) 1,2-Dichloropropane | (d) None of these |
- (6) Oxidation of a secondary alcohol with $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}^+$ produces
- | | |
|-----------------------|--------------|
| (a) a carboxylic acid | (b) a Ketone |
| (c) an aldehyde | (d) an ester |
- (7) Ketones are prepared by the oxidation of
- | | |
|----------------------|-----------------------|
| (a) Primary alcohol | (b) Secondary alcohol |
| (c) Tertiary alcohol | (d) None of these |
- (8) The reduction of a ketone
- | | |
|------------------------------------|------------------------------------|
| (a) always gives a primary alcohol | (b) always gives secondary alcohol |
| (c) always gives a carboxylic acid | (d) always gives a ketal |
- (9) Reduction of benzaldehyde in the presence of ammonia gives
- | | |
|------------------|-------------------|
| (a) Toluene | (b) Nitro benzene |
| (c) benzyl amine | (d) Aniline |
- (10) reaction of benzene diazonium chloride with methanol gives
- | | |
|-------------------|-----------------|
| (a) phenol | (b) iodobenzene |
| (c) chlorobenzene | (d) Anisole |
- (11) nitration of Acetanilide followed by hyderolysis gives
- | | |
|------------------|-------------------|
| (a) phenol | (b) iodobenzene |
| (c) nitrobenzene | (d) None of these |

(C)

TANTA UNIVERSITY - FACULTY OF SCIENCE- CHEMISTRY DEPARTMENT

Chemical kinetics final exam for the second year students (Chemistry section)

Course code: CH2202

Date: 16 May 2018

Time allowed: Two hours

Total marks: 100

هذا الإمتحان مكون من جزئين (PART I & PART II) موزعه على ثماني صفحات على النحو التالي:

PART I: Choose the correct answer

(50 marks, 2 marks each)

إختار الإجابة الصحيحة في كل سؤال ثم ضع الإجابات الصحيحة في هذا الجدول

	A	B	C	D
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
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16				
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19				
20				
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22				
23				
24				
25				

ملحوظه هامه: أسئلة الإمتحان موزعة على ثماني صفحات

1. The study of chemical kinetics can provide information about which of the following?
- rates of chemical reactions
 - reaction mechanisms
 - factors that influence rates of chemical reactions
- A. i only B. i and ii C. i and iii D. ii and iii
- 2- For the reaction ; $2\text{NO}_2 + \text{F}_2 \rightarrow 2\text{NO}_2\text{F}$
- A. $(1/2)d[\text{NO}_2] / dt = d[\text{F}_2] / dt$ B. $2d[\text{NO}_2] / dt = d[\text{F}_2] / dt$
 C. $d[\text{NO}_2] / dt = d[\text{NO}_2\text{F}] / dt$ D. $d[\text{F}_2] / dt = d[\text{NO}_2\text{F}] / dt$
- 3- In which rate law is the overall reaction order equal to 3
- A. rate = $k[\text{A}]^2[\text{B}]^0$ B. rate = $k[\text{A}]^2[\text{B}]^{-1}$
 C. rate = $k[\text{A}]^1[\text{B}]^3$ D. rate = $k[\text{A}]^3[\text{B}]^0$
- 4- What is an appropriate rate law for the following reaction?
 $2 \text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2 \text{NO}_2(\text{g})$
- A. Rate = $k[\text{NO}]^2$ B. Rate = $k[\text{NO}]^2[\text{O}_2]$ C. Rate = $k[\text{NO}_2]^2$
 D. Cannot be determined from the information given.
- 5- Which of the following statements correctly describes a reaction for which a plot of $\log [\text{A}]$ versus time produces a straight line?
- the rate constant for the reaction can be obtained from the value of the intercept on the vertical axis.
 - the rate constant is proportional to slope of the line.
 - the rate of the reaction does not depend on the concentration of X.
 - the initial concentration of X can be calculated from the intercept on the horizontal axis.
- 6- A certain second-order reaction is found to have a rate constant of $0.135 \text{ M}^{-1} \text{ s}^{-1}$. What is the half-life of the reaction?
- A. 5.1 s B. 6.5 s C. 7.4 s
 D. impossible to determine from this information
- 7- The following reaction is described by the rate equation, rate = k [ester]
- $$\text{ester} + \text{H}_2\text{O} \rightarrow \text{alcohol} + \text{acid}$$
- The order of this reaction is:
- A. Second order. B. First order.
 C. Pseudo-first order. D. Zero order.

8- An increase of 10°C is found to double the rate of many chemical reactions. This is the result of

- A. Doubling the molecules average velocities.
- B. Doubling the molecules average kinetic energy.
- C. Doubling the number of collisions.
- D. Doubling the number of molecules with minimum activation energy.

9. According to collision theory, not all collisions between molecules lead to reaction. Which of the following statements provide reasons why this is so?

- 1. The total energy of the two colliding molecules is less than some minimum amount of energy.
- 2. Molecules cannot react with each other unless a catalyst is present.
- 3. Molecules that are improperly oriented during collision will not react.
- 4. Molecules in different states of matter cannot react with each other.

- A. 1 and 2 B. 1 and 3 C. 2 and 3 D. 1 and 4

10- Consider the data for several systems for the conversion of reactants to products at the same temperature:

System	$E_a(\text{kJ})$	$\Delta H(\text{kJ})$
1	40	-25
2	60	+30
3	15	+20
4	90	-55

Which system is most likely the fastest endothermic reaction?

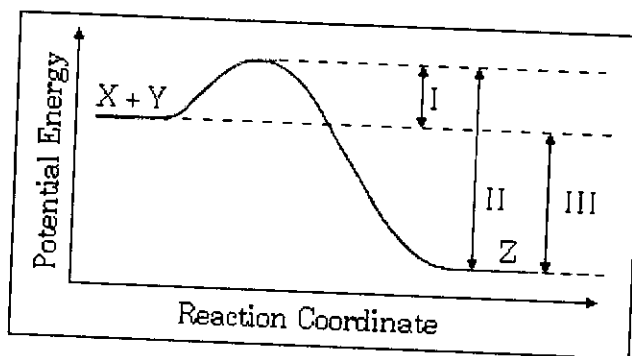
- A. 1 B. 2 C. 3 D. 4

11- If the rate constant increases from $0.40 \text{ M}^{-1} \text{ s}^{-1}$ at 25°C to $0.80 \text{ M}^{-1} \text{ s}^{-1}$ at 35°C , what is the activation energy for this reaction?

- A. between 0 and 40 kJ/mol
- B. between 41 and 80 kJ/mol
- C. between 81 and 120 kJ/mol
- D. between 121 and 160 kJ/mol

12- The catalytic converter in an automobile uses Pd or Pt metal to speed the combustion of CO to CO_2 . This is an example of:

- A. homogeneous catalysis
- B. heterogeneous catalysis
- C. acid hydrolysis
- D. enzyme catalysis



The energy diagram for the reaction $X + Y \rightarrow Z$ is shown above. The addition of a catalyst to this reaction would cause a change in which of the indicated energy differences?

- A. I only B. II only C. III only D. I and II only

14- The reaction $2 \text{NO}_2 + \text{O}_3 \rightarrow \text{N}_2\text{O}_5 + \text{O}_2$ obeys the rate law, $\text{Rate} = k [\text{NO}_2][\text{O}_3]$

Which of the following mechanisms is consistent with this experimental rate law?

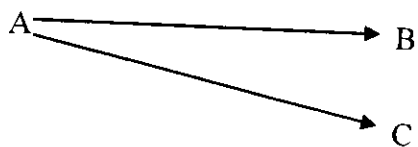
- (a) $\text{NO}_2 + \text{NO}_2 \rightleftharpoons \text{N}_2\text{O}_4$ (fast equilibrium)
 $\text{N}_2\text{O}_4 + \text{O}_3 \rightarrow \text{N}_2\text{O}_5 + \text{O}_2$ (slow)
- (b) $\text{NO}_2 + \text{O}_3 \rightarrow \text{NO}_5$ (fast)
 $\text{NO}_5 + \text{NO}_2 \rightarrow \text{N}_2\text{O}_5 + 5/2 \text{O}_2$ (slow)
- (c) $\text{NO}_2 + \text{O}_3 \rightarrow \text{NO}_3 + \text{O}_2$ (slow)
 $\text{NO}_3 + \text{NO}_2 \rightarrow \text{N}_2\text{O}_5$ (fast)
- (d) $\text{NO}_2 + \text{NO}_2 \rightarrow \text{N}_2\text{O}_2 + \text{O}_2$ (slow)
 $\text{N}_2\text{O}_2 + \text{O}_3 \rightarrow \text{N}_2\text{O}_5$ (fast)

- A. (a) B. (b) C. (c) D. (d)

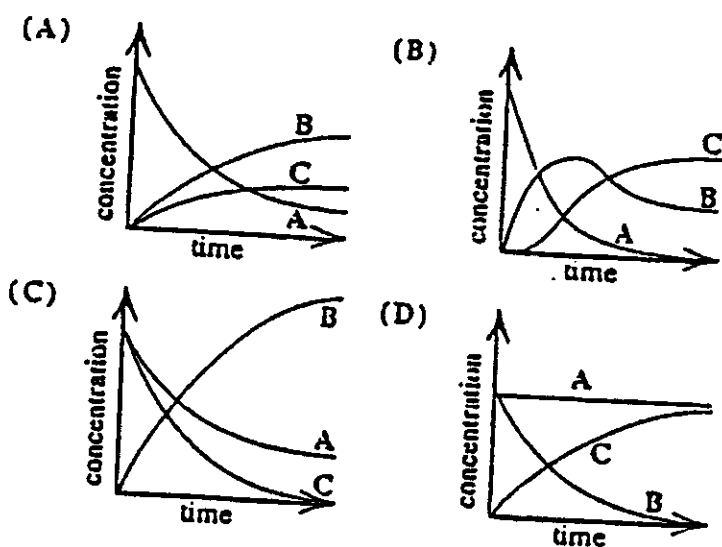
15- Which of the following statements is TRUE?

- A. Endothermic reactions have higher activation energies than exothermic reactions.
- B. The rate law for a reaction depends on the concentrations of all reactants that appear in the stoichiometric equation.
- C. The rate of a catalyzed reaction is independent of the concentration of the catalyst.
- D. There is a single rate-determining step in any reaction mechanism.

16- For the reaction:



Which concentration –time profile is consistent with this mechanism:



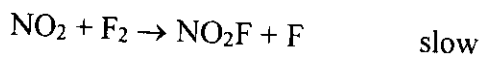
A. (A)

B. (B)

C. (C)

D. (D)

17- The following mechanism has been proposed for the reaction of NO_2 with F_2 .



Which of the following are **true** concerning this reaction:

1. The stoichiometric equation is $2 \text{NO}_2 + \text{F}_2 \rightarrow 2 \text{NO}_2\text{F}$.

2. F is an intermediate.

3. NO_2 is an intermediate.

A. 1 and 2 only

B. 2 only

C. 3 only

D. 1 only

18- In protolytic mechanism for acid catalyzed reactions:

A. The protonated substrate transfers its proton to the catalyst in the first step.

B. The protonated substrate formed in the first step transfers its proton to the solvent molecule in the second step.

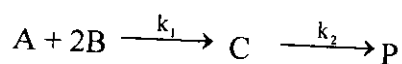
C. The protonated substrate transfers its proton to the basic molecule.

D. The protonated substrate is formed in the second step.

- 19- The advantage of heterogeneous catalysis is:
- The reaction can be easily quenched.
 - The catalyst can be easily isolated from the reaction medium.
 - The product can be easily isolated from the reaction medium.
 - All of the above.

- 20- The steady-state approximation assumes that:
- Reactants are in equilibrium with the intermediate.
 - The concentration of intermediate is equal zero.
 - The rate of disappearance of the reactants is equal to the rate of formation of the products.
 - The rate of change of concentration of all intermediates are negligibly small (equal zero).

21. For the complex reaction:



The rate of reaction with respect to C is:

- $k_1[A][B] - 2k_2[C]^2$
- $2k_1[A][B] - k_2[C]$
- $k_1[A][B]^2 - k_2[C]$
- $2k_1[A][B] - 2k_2[C]^2$

22. In the retardation step of the chain reactions:

- The chain carrier formed in the first step generates another chain carrier in a subsequent step.
- The chain carrier interacts with the reactant molecules.
- The chain carrier interacts with the product molecules.
- Radicals are combine with each others.

- 23- The acid dissociation constant of aqueous hydrofluoric acid, HF, is $10^{-3.15}$ at 25°C . The rate constant for the elementary reaction $\text{HF} \rightarrow \text{H}^+ + \text{F}^-$ was found to be $10^{7.85} \text{ Liter mol}^{-1} \text{ sec}^{-1}$. The rate constant for the formation reaction $\text{H}^+ + \text{F}^- \rightarrow \text{HF}$ is therefore:

- $10^{-3.15} \text{ sec}^{-1}$
- $10^{14.15} \text{ sec}^{-1}$
- $10^{-14.15} \text{ sec}^{-1}$
- 10^{11} sec^{-1}

- 24- An autocatalytic reaction is;

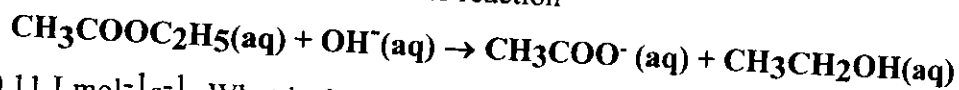
- Reaction catalyzed by acids.
- Reaction catalyzed by bases.
- Reaction catalyzed by both acids and bases.
- Reaction catalyzed by its product.

25- The intermediate formed in acid catalyzed reaction is called Arrhenius complex when;

- A. The rate of product formation is greater than the rate of dissociation of the intermediate $k_2 \gg k_{-1}$.
- B. The rate of product formation is lower than the rate of dissociation of the intermediate $k_2 \ll k_{-1}$.
- C. Both rates are equal.
- D. The temperature of the reaction increased.

PART II- Answer the following:

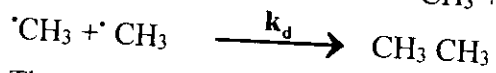
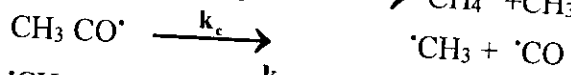
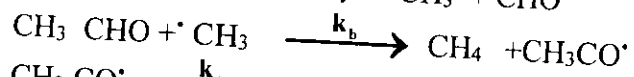
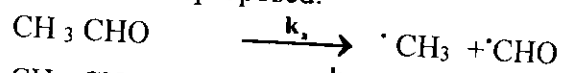
1- The second-order rate constant for the reaction



is $0.11 \text{ L mol}^{-1} \text{ s}^{-1}$. What is the concentration of ester after (a) 10s, (b) 10 min when ethyl acetate is added to sodium hydroxide so that the initial concentrations are $[\text{NaOH}] = 0.050 \text{ mol L}^{-1}$ and $[\text{CH}_2\text{COOC}_2\text{H}_5] = 0.100 \text{ mol L}^{-1}$?

(Ten marks)

2- The following mechanism for the pyrolysis of acetaldehyde, $\text{CH}_3\text{CHO (g)} \rightarrow \text{CH}_4 \text{(g)} + \text{CO (g)}$, was proposed.

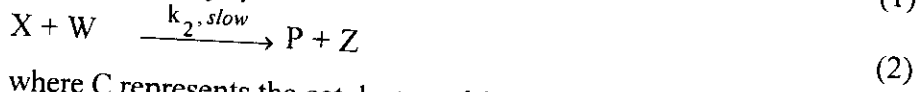
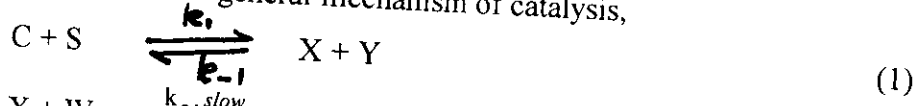


The experimental rate law is given by:

$$\frac{d[\text{CH}_4]}{dt} = k[\text{CH}_3\text{CHO}]^{\frac{3}{2}}$$

Label each step as initiation, propagation and termination, then confirm that this mechanism is in agreement with the experimental rate law. *(Twenty marks)*

3- Consider the general mechanism of catalysis,



where C represents the catalyst, and S the substrate, X is the intermediate complex, and Y some substance which is formed in addition to it. W is a molecule which reacts with the complex to give the product or products P. Explain by equation and graph how the rate of reaction depends on both the concentration of catalyst and the substrate.

(Twenty marks)