



Tanta University
Faculty of Science
Department of Chemistry

Final Examination for Second and Third Level Students of Chemistry/ Geology,
Zoology, Microbiology, Botany, Entomology. Biochemistry)

Chemical Kinetics Chemistry

Course code: CH 2240

June 13th, 2015 Term: Second Total Assessment Marks: 100 Time Allowed: 2h

Answer all the following questions : (20 marks for each)

- 1- a) Discuss the factors affecting the reaction rate?
- b) An elementary reaction $2A + C \rightarrow D$, is second order in A and first order in C and the rate of this reaction is 2.5×10^{-1} M/S .when the concentration of A, C and D are all 1.0 M. What is the rate constant of this reaction?
- 2- a) Define the rate equation of chemical reaction and discuss how can you determine it ?
- b) The following data were obtained in the decomposition of N_2O_5 in CCl_4 at 40 °C

t (sec)	600	1200	1800	2400	3000	ω
O ₂ (ml)	6.30	11.40	15.53	18.90	21.70	34.75

Find out the order of this reaction and its half life time?

- 3- a) Enumerate the methods for determination the order of chemical reaction and discuss the differential method?
- b) The half-life for radioactive disintegration of radium is 1590 Yr . calculate the decay constant .In how many years will three-quarter of the radium have undergone decay? (The decay is first order)

(انظر خلفه)

- 4- a) Deduce the integrated rate equation of the opposing first-order reaction



- b) The half-life of thermal denaturation of hemoglobin first order process has been to be 3460 Sec at 60 °C and at 65 °C. Calculate the activation energy (ΔE).

- 5- a) Write short notes about characteristics and classifications of catalysts and discuss the mechanism of chemical catalysis according to Arrhenius concept (Equilibrium treatment).


- b) The reaction mechanism, $A + B \xrightleftharpoons[k_{-1}]{k_1} C \xrightarrow{k_2} P$ if $k_{-1} \gg k_2$. Find out the rate law and the order of this reaction.

GOOD LUCK

Prof. Dr M. Y. EL SHEKH

Prof. Dr Hosny EL-Daly

لے الے تیوی

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY			
	FINAL EXAM FOR LEVEL2 STUDENTS (DOUBLE MAJOR)			
	COURSE TITLE:	KINETIC THEORY OF GASES		COURSE CODE: CH2242
DATE	JUNE10, 2015	TERM: SECOND	TOTAL ASSESSMENT MARKS: 50	TIME ALLOWED: 2H

Answer All Questions (50 marks)

1- Put true or false sign and correct the false answer? (10 marks)

1. Heavier gas molecules move faster than lighter molecules.
2. The gas viscosity increases as the pressure increases.
3. Collision cross section is the average distance a molecule travels between collisions.
4. A diatomic molecule has 5 degrees of freedom.
5. The mean free path decreases as the gas density increases.

2- Complete the following sentence: (20 marks)

1. Effusion of gases is defined as
2. All gases at a given temperature have the same
3. According to the equipartition of energy principle the average energy for each vibrational degree of freedom is.....
4. Increasing the number of gas molecules will the mean free path.
5. For triatomic molecule the average total energy per mole is.....
6. is the number of variables required to describe the motion of a particle completely.
7. When the two gas molecules are headed in the same direction the consequent collision is called.....

Turn over the paper

8. The viscosity of gases increases as temperature increases. This is because
9. The r.m.s. velocity for hydrogen at 25°C will be m/s.
10. The molecular collisions are assumed to be elastic this means.....

(4)- Write the mathematical equations (define its parameters) describes the following: (14 marks)


1. Mean free path
2. The collision frequency if each sphere is collides with the other.
3. Heat capacity at constant pressure for a gas.
4. Poiseuille's equation
5. The dependency of the barometric pressure on the altitude.
6. The volume excluded per mole of gas.
7. The relation between the thermal conductivity coefficient of a gas and the viscosity of a gas.

(5)- Answer the following? (6 marks)

1. If equal amounts of helium and hydrogen are placed in a porous container and allowed to escape, which gas will escape faster and how much faster?
2. Use the van der Waals equation to calculate the pressure of a sample of 5 moles of oxygen gas in a 10 L vessel at 10°C where $a(\text{O}_2) = 1.36 \text{ L}^2 \text{ atm/mol}^2$ and $b(\text{O}_2) = 0.032 \text{ L/mol}$.

Best Wishes ...

Dr. Eman Fahmy Aboelfetoh

	TANTA UNIVERSITY				
	FACULTY OF SCIENCE				
	DEPARTMENT OF ZOOLOGY				
	EXAMINATION FOR SOPHOMOR (SECOND YEAR) STUDENTS OF ENTOMOLOGY AND CHEMISTRY				
COURSE TITLE	INSECT INTERRELATIONSHIPS WITH OTHER LIVING ORGANISMS			COURSE CODE:EN 2242	
DATE:	JUNE, 2015	TERM: SECOND	TOTAL ASSESSMENT MARKS:150	TIME ALLOWED: 2 HOURS	

PLEASE NOTE THE EXAM IS IN TWO (2) PAGES

Answer the following questions:

The First Question..... (Total 37½ Marks)

- A. "Human exposure to sensitizing insect antigens causes immunological reactions ". Explain, giving examples whenever possible..... (17½ Marks)
- B. Complete the following sentences.....(10 Marks, 2 Marks each)
- 1) Transstadial biological transmission of pathogens by insects means.....
 - 2) Eggs or larvae of insects inhaled or ingested with host food cause..... myiasis.
 - 3) Blister beetles contain cantharadin that effects on thesystem of vertebrates
 - 4) Delusory parasitosis means
 - 5) Maggot therapy means.....
- C. Indicate whether the following statements are True or False(10 Marks, 2 Marks each)
- 1) The chewing lice on birds and mammals are beneficial to human
 - 2) The passive transfer of pathogenic organisms by insects is called mechanical transmission
 - 3) Insects cannot provide valuable evidence for criminal investigations
 - 4) Insects that tunnel within living plants and cause plant damage are harmful to human
 - 5) Dermestid beetle adults attack materials of animal origin

The Second Question..... (Total 37½ Marks)

- A. Choose from the brackets the correct answer and rewrite it in your paper..... (10 Marks, 2 Marks each)
- 1) The colony of honey bees contains (Two queens---Only one queen--- Several queens).
 - 2) The relationship between the ants and aphids is defined as (cannibalism---symbiosis---parasitism).
 - 3) Female (Ear wig--- Stink bug---*Acromis sparsa*) stays with her offspring until they reach adulthood.
 - 4) The female of (Pentatomidae---Belostomatidae---Carabidae) lays her eggs on the back of the male after mating.
 - 5) (Aphids---Wasps---Locusts)live in social life
- B. Fill in the blanks with the appropriate words..... (10 Marks, 2 Marks each)
- 1) Parental care is defined as.....
 - 2) The simplified model of termite life cycle indicates three castes...,and.....
 - 3) The migratory locust, *Schistocera gregaria* has two different phases.....and.....
 - 4) The remain by day motionless on the trunk of a tree.
 - 5) In the colony of.....all females are able of laying eggs that give rise to both sexes.
- C. Correct the following statements and rewrite in your paper..... (10 Marks, 2 Marks each)
- 1) Cannibalism is a very widespread habit among insects.
 - 2) Some ants are social insects living in large colonies.
 - 3) The male stink bug guards not only the eggs but also the first nymph instars until they become second instars.
 - 4) The female chrysomelid beetle, *Acromis sparsa*, just lays eggs and does not care.
 - 5) Predators live in or on the bodies of their insect host
- D. Write short notes on:
- 1) Two examples of insect predators..... (4 Marks)
 - 2) Migration of dragon flies..... (3½ Marks)

The Third Question..... (Total 37½ Marks)

- A. Complete the following sentences..... (10 Marks, 2 Marks each)
- 1) Commensalism is a relationship in which one population.....but the other.....
 - 2) Phytophagous insects are....., while Entomophagous plants are.....
 - 3) Insects are either polyphagous feed on....., oligophagous feed on.....or monophagous feed on.....

- 4) is an example of bacteria that cause diseases to.....insects.
 5)is an example of fungi that cause disease to house fly in which the dead flies are surrounded by.....

B. Choose from brackets the correct answer and rewrite it in your paper..... (20 Marks, 2 Marks each)

- 1) The muscardine disease of insects is caused by.....(Fungi – Bacteria –Viruses)
- 2) The wilt disease of silk worm is caused by.....(Fungi – Bacteria – Viruses)
- 3) Potato tip burn caused by the feeding of..... (Leafhoppers – *Gryllotalpa* – *Ceratitis capitata*)
- 4)is a plant disease transmitted by insects and caused by the fungus *Ovulinia azalea*.
(Azalea flower spot – Sooty mold – Potato black leg)
- 5) Brown rot of apple is a plant disease transmitted by insects and caused by.....
(*Sclerotinia fructigena* – *Claviceps purpurea* – *Ovulinia azalea*)
- 6) Ergot is a.....plant disease transmitted by insects. (Fungal – Bacterial – Viral)
- 7) is a plant disease transmitted by insects through oviposition wounds
(Tree cricket cancer of apples – Brown rot of apples)
- 8) is an example of plant bacterial disease transmitted by insects.
(Potato blackleg – Muscardine – Wilts disease)
- 9)is a plant viral disease transmitted by insects (Potato leaf roll – Banana bunchy top – Both)
- 10) Aphids transmit..... virus from infected tobacco to healthy tobacco (Mosaic – Leaf roll – Bunchy top)

C. Discuss the following items..... (7½ Marks, 2½ Marks each)

- 1) The main differences between parasitism and predation.
- 2) Mechanism of feeding of Entomophagous plants.
- 3) Symbiosis between acacia plants and ants.

The Fourth Question..... (Total 37½ Marks)

A. Indicate whether the following statements are True or False..... (6 Marks, 2 Marks each)

- 1) Symbiotic bacteria residing in the hindgut chambers of scarab beetle larvae may be useful in paratransgenic approaches to reduce larval root-feeding activities on agricultural crops.
- 2) Nuclear polyhedral viruses affect about 200 species of Lepidoptera and the infected insect usually die.
- 3) The ciliate *Tetrahymena dimorpha* occurs in the gut epithelium of larvae, pupae and adults.

B. Choose from the brackets the correct answer and rewrite it in your paper (9 Marks,3 Marks each)

- 1) *Bacillus thuringiensis* produce that is toxic to insect larvae.
(Crystal protein – Enzymes- Foreign substances)
- 2) Fungi invade insects by penetrating (gut epithelium – their cuticle- their eggs)
- 3) *Tetrahymena dimorpha* is a pathogen of..... (Black flies -Honey bees – Rat fleas)

C. Fill in the blanks with appropriate word(s).....(12 Marks, 3 Marks each)


- 1) The symbiotic bacteria which occur in the gut of *Rhodnius* can synthesize.....
- 2) Viruses invade the insect's body via.....
- 3) Yellow fever is transmitted by
- 4) *Blastocrithidia triatomae* is promising candidate for microbial control of, the vector of human Chagas disease caused by *Trypanosome cruzi*

D. Give short notes on..... (10½ marks)

- 1) The relationship between termites and hyperflagellates.
- 2) Give an example indicates that insects act as a vector of animal protozoan diseases.

GOOD LUCK

EXAMINERS	PROF. IBRAHIM BAKR HELAL	PROF. SAID NOR EL-DEEN
	DR. SAMAR EZZAT ELKHOLY	DR. IMAN M. ELHUSSEINY

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF ZOOLOGY		
	EXAMINATION PAPER FOR FRESHMEN (2 ND YEAR) STUDENTS OF CHEM/ENT		
	COURSE TITLE: JUNE, 2015	INSECT ECOLOGY TERM: SECOND TOTAL MARKS: 150	COURSE CODE: EN 2244 TIME ALLOWED: 2 HOURS

Part 1

1. Fill in the blanks with the appropriate words (10 marks):

- Biodiversity is within a given ecosystem, biome, or an entire planet.
- The future depends on ecological understanding and our ability to..... under different scenarios
- The term Ecosystem emphasizes that.....
- Much of the deviation among populations isolated on islands appears to be due to.....
- The fittest individuals tend to and reproduce better.

2. Indicate whether the following statements true or false and correct the false one (10 marks):

- Insects, as poikilothermic animals, maintain a constant body temperature irrespective to the temperature of the surroundings.
- Deserts are the most productive of the Earth's biomes.
- The rain probably exerts its influence on most insect populations by affecting the availability and quality of food or the incidence of disease.
- Mostly, circadian rhythms are endogenous, but are regulation by other environmental factors.
- The fittest individuals tend to survive and reproduce better.

3. Choose the correct answer (10 marks):

- The organisms that breed together in nature to produce fertile offspring, must be
a) similar. b) different. c) isolated. d) all above mentioned.
- Synchronized eclosion increases the chances to
a) find a mate and food. b) escape potential predators.
c) find oviposition sites. d) all above mentioned.
- Cold hardiness refers to an insect's ability to adapt to and survive
a) low temperature. b) high temperature. c) moderate temperature.
- The study of the interrelationships of living organisms and their environment is.....
a) Ecology b) habit c) biotic
- The number of individuals of a species of organism in a given area at a particular time is the
a) community b) population c) habitat

4. Answer the following Questions (18 marks)

- Define diapause and mention its types.
- Describe the categories of migration in insects, explain only one example.
- Define Ecotype giving an example of the recent publications that showed how ecotypes match to their environments.

Part 2

5. Complete the following sentences (24 marks)

- The ability to extract nutrients from the various textures is primarily due to.....
- In endo-parasitoids, the ovipositing females are able to distinguish between.....

- 3-In most communities; insects occupy an intermediate positions along food chain acting as 1....., 2....., 3....., 4.....
- 4-Generally, insects assimilate less than ...% of ingested materials, most being returned to the soil or water as.....
- 5- Competition is shown in food web when.....
- 6-The seasonal availability of different kinds of seeds in the ecosystem, have evolved in response to.....
- 7- Biomes are biogeographically recognized with differences inand of different parts of the world.
6. Choose the correct answer: (12 marks)
- When new species are formed in isolated peripheral populations; which are isolated and prevented from exchanging genes, speciation is
a) peripatric. b) allopatric. c) sympatric.
 - Polymorphism is the occurrence together in the same habitat of two or more forms of species.
a) discontinuous. b) continuous. c) both.
 - Insects generate a great deal of complexity in food web atlevel.
a) carnivore b) herbivore c) decomposer
 - Insects actually constitute the level after microorganisms except termites
a) third b) second c) first
 - In Paedogenesis the immature stages produce a progeny. Without.....
a) feeding b) suitable conditions c) fertilization
 - In the nitrogen cycle, the transformation of gaseous nitrogen into nitrogen- containing compounds is performed primarily by.....
a) Fungi b) bacteria c) green plants d) herbivores

7. Write short note on: (16 marks)

- Conservation of water by insects. (4 marks)
- The main function of the filter- chamber in Homoptera. (6 marks)
- Nitrification – ammonification. (6 marks)

Part 3

I) Define the following (6 marks)


Community – Disturbance – Species richness.

II) What are the basic patterns of dispersion? If 5 quadrates had 10, 14, 9, 10 and 12 individuals, what type of dispersion would this be calculated? (6 marks)

III) Compare between exponential and Geometric population growth? (10 marks)

IV) Choose the correct answer (28 marks)

- Which of the following could be included in a grasshopper niche, but not a description of its habitat?
a) continent where it lives. b) plant species it eats. c) location where it shelters.
- Cannibalism means: a form of
a) Intraspecific predation b) interspecific predation c) competition

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF ZOOLOGY		
	EXAMINATION PAPER FOR FRESHMEN (2 ND YEAR) STUDENTS OF CHEM/ENT		
	COURSE TITLE:	INSECT ECOLOGY	COURSE CODE: EN 2244
DATE: 6/6/2015	JUNE, 2015	TERM: SECOND	TOTAL MARKS: 150
			TIME ALLOWED: 2 HOURS

Part 1

1. Fill in the blanks with the appropriate words (10 marks):

1. Biodiversity is within a given ecosystem, biome, or an entire planet.
2. The future depends on ecological understanding and our ability to..... under different scenarios
3. The term Ecosystem emphasizes that.....
4. Much of the deviation among populations isolated on islands appears to be due to.....
5. The fittest individuals tend to and reproduce better.

2. Indicate whether the following statements true or false and correct the false one (10 marks):

1. Insects, as poikilothermic animals, maintain a constant body temperature irrespective to the temperature of the surroundings.
2. Deserts are the most productive of the Earth's biomes.
3. The rain probably exerts its influence on most insect populations by affecting the availability and quality of food or the incidence of disease.
4. Mostly, circadian rhythms are endogenous, but are regulation by other environmental factors.
5. The fittest individuals tend to survive and reproduce better.

3. Choose the correct answer (10 marks):

1. The organisms that breed together in nature to produce fertile offspring, must be
a) similar. b) different. c) isolated. d) all above mentioned.
2. Synchronized eclosion increases the chances to
a) find a mate and food. b) escape potential predators.
c) find oviposition sites. d) all above mentioned.
3. Cold hardiness refers to an insect's ability to adapt to and survive
a) low temperature. b) high temperature. c) moderate temperature.
4. The study of the interrelationships of living organisms and their environment is.....
a) Ecology b) habit c) biotic
5. The number of individuals of a species of organism in a given area at a particular time is the
a) community b) population c) habitat


4. Answer the following Questions (18 marks)

1. Define diapause and mention its types.
2. Describe the categories of migration in insects, explain only one example.
3. Define Ecotype giving an example of the recent publications that showed how ecotypes match to their environments.

Part 2

5. Complete the following sentences (24 marks)

- 1-The ability to extract nutrients from the various textures is primarily due to.....
- 2- In endo-parasitoids, the ovipositing females are able to distinguish between.....

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY		
	EXAMINATION FOR SOPHOMORES (SECOND YEAR) STUDENTS OF BIOLOGY (SPECIAL BIOCHEM., CHEM./BIOCHEMISTRY, CHEM./ZOOLOGY AND CHEM./ENTOMOLOGY)		
	COURSE TITLE:	INSTRUMENTAL ANALYSIS (1)	
DATE:	MAY 30, 2015	TERM: SECOND	TOTAL ASSESSMENT MARKS: 100
			COURSE CODE: CH2244
			TIME ALLOWED: 2 HOURS

Question (I):

(25 mark)

A. Answer the following:

- 1- What is a photomultiplier tube? Describe what it does and how it works.
- 2- Most of phosphorescence cannot be recorded in solution at room temperature, why?

B. Choose the correct answer for the following:

- 1) Which of the following is not active in IR absorption spectroscopy?
a) Cl_2 b) CHCl_3 c) CH_4 d) C_6H_6
- 2) Which is the preferred continuum source in visible region?
a) Tungsten filament lamp b) Hollow cathode lamp c) deuterium lamp d) none of above
- 3) A photon whose wavelength is 200 nm is:
a) a visible photon b) an ultraviolet photon c) an infrared photon d) a microwave photon
- 4) The excellent exciting light source used in the atomic absorption spectroscopy is:
a) low pressure lamp b) hollow cathode lamp c) Xenon lamp d) tungsten-halogen lamp
- 5) Fluorescence occurs within:
a) 10 s b) 10 ms c) 10 μs d) 10 ns

Question (II):

(25 mark)

Answer the following:

- 1- List the following in order of increasing energy and wavelength: x-rays, infrared light, visible light, radio waves, and ultraviolet light.
- 2- What are an absorption filter and a monochromator?
- 3- Explain the energy transitions caused by UV-VIS light absorption.
- 4- Describe two light sources used for UV-VIS spectrophotometry.

Question (III):

(25 marks)

A. Discuss briefly on each of the following:

- 1- Hock's law and draw three examples of IR absorption modes.
- 2- Two applications of UV-VIS spectrophotometry?
- 3- Steps of atomization in the flame of atomic absorption spectroscopy.
- 4- Variation of fluorescence intensity with concentration.

Question (IV):

(25 marks)

Draw the following:

- b) Block diagram showing all the components of a basic spectrophotometer.
- c) Energy transitions involved in fluorescence and phosphorescence.

B. Answer the following problem:

What is the absorbance given that the molar absorptivity is $2.30 \times 10^4 \text{ L.mol}^{-1}.\text{cm}^{-1}$, the pathlength is 0.05 cm, and the concentration is 0.0000453 M?

Good Luck

Examiners	Prof. Dr. Mohamad Mohamad Ayad Dr. Nagy Labieb Kamal
-----------	---

لتراس

Tanta University
Faculty of Science
Chemistry Department

Final Exam (Organic Chemistry 3)

(CH2214)

2nd Level (Chemistry- Entomology)

June 2105.

Time: 2 hours.

Total marks: 150

Answer the following questions

1-Discuss the following:

[18 Points]

- A) Diels-Alder reaction (give examples).
- B) Claisen condensation reaction (explain the mechanism of the reaction).
- C) Reformatsky reaction (explain the mechanism of the reaction).

2- Carry out the following conversions:

[12 Points]

- A) Benzaldehyde to cinnamic acid.
- B) Ethyl acetoacetate to 2-pentanone.

3- What statement about the aldol condensation is correct? [4 Points]

- A) A Lewis acid is commonly used as a catalyst.
- B) The initial step is probably the formation of a carbanion.
- C) A Lewis base is employed to induce carbocation formation.
- D) The carbon chain is lengthened through the elimination of 1 mole of water.

4- Write an account on non-kinetic isotope effect.

[5 Points]

5- Discuss the mechanism of the following reactions:

[12 Points]

- A) Addition of HBr to 1,3-butadiene.
- B) Addition of HCN to methyl vinyl ketone.

6- Which of the following reactions exhibits primary kinetic isotope effect? (Explain your answer).

[5 points]

- A) E1 reactions.
- B) E2 reactions.
- C) Nitration reaction of benzene.

7- Discuss the mechanism of the following reaction [5 points]



8- Which of the following is the best leaving group in S_N2 reactions?

- A) Cl⁻
- B) Br⁻
- C) I⁻
- D) F⁻

[5 points]

9 -Which of the following statements correctly describe(s) S_N1 reactions of alkyl halide (RX)? [5 points]

- I) Rate = k [base] II) Rate = k [base][RX]
III) Rate = k [RX] IV) The reactions occur in two steps.
V) The reactions occur in one step.
VI) Rearrangements sometimes occur.
A) II and VI B) I only C) I and III
D) I and IV E) III, IV and VI.

10- The reaction of diethylmalonate with sodium ethoxide produces ethanol and a [4 points]

- i- free radical ii- carbocation iii- molecular species
iv- carbanion v- carboxylate ion.

11 -Discuss S_N1 mechanism (give example) . [5 points]

12 -Arrange the following compounds according to their reactivity towards nucleophilic addition reactions to carbonyl group:[5 points]
Acetone, Formaldehyde, Acetaldehyde.

13 -Discuss the mechanism of nucleophilic addition reactions to carbonyl compounds. [5points].

14- Arrange the following compounds in the order of reactivity towards S_N2 reactions (explain your answer): [5 points]
(A) β -Phenylisopropyl bromide (B) Benzyl bromide
(C) α -Phenylethyl bromide.

15-Which statement is correct for an S_N1 reaction at a chiral carbon atom? [5 points]

- A)The product will be optically active, but have opposite configuration.
B)The reaction will involve racemation.
C) A carbanion is formed as intermediate.
D)The rate of reaction is a function of the concentration of the nucleophile.
E)The attacking group will be a strong electrophile.

16-The addition of Br_2 to trans-2-butene giving meso-2,3-dibromobutane can be explained by a mechanism involving: [5 points]

- A) A free radical. B) A carbocation.
C) A cyclic bromonium ion. D) A carbanion.
E) Simultaneous attack by bromine atoms.

عبد الحامد

17- Discuss the mechanism of Pinacol-Pinacolone rearrangement reaction. [5 points]

18- Which of the following statements correctly describe(s) E2 reactions of alkyl halide (RX)? [5 points]

- I) Rate = k [base] II) Rate = k [base][RX]
III) Rate = k [RX] IV) The reactions occur in two steps.
V) The reactions occur in one step.
A) I and V B) II and IV C) II and V

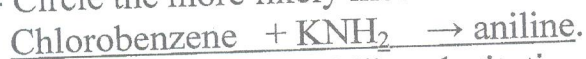
19- The addition reaction of HBr to 1-butene in presence of peroxide can be explained by a mechanism involving: [5 points]

- A) a carbanion. B) a carbocation.
C) a cyclic bromonium ion. D) free radicals.

20- Which two reaction types have the same initial step? [5 points]

- A) S_N1 and E2 reactions B) E1 and S_N1 reactions
C) S_N2 and E1 reactions D) none of the above.

21- Circle the more likely mechanism for the reaction: [5 points]



- A) Aromatic electrophilic substitution.
B) Aliphatic Nucleophilic substitution.
C) Benzyne intermediate mechanism.
D) Nucleophilic aromatic bimolecular displacement mechanism.

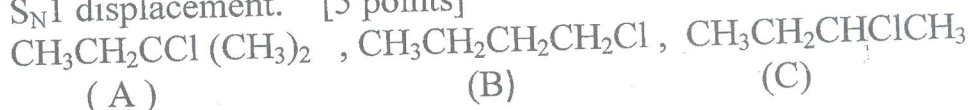
22- Inversion of configuration is associated with which of the following? [5 points]

- A) E1 reaction B) free-radical halogenation
C) S_N1 reaction D) S_N2 reaction E) none of the above.

23- Reaction of 2-Methyl-1-chloropropane with alcoholic potassium hydroxide to 2-methylpropene occurs through what mechanism? [5 points].

- A) S_N1 B) E1 C) E2 D) S_N2 E) A and C.

24- Arrange the following compounds in the order of reactivity towards S_N1 displacement. [5 points]



25- Discuss the Free-energy profile for a reaction with an intermediate. [5 points].