



Answer the following questions:

I- Choose only one answer for each of the following questions: (20 Marks)

1. The variable affecting on the eigen value of wave function for a particle in box is:
i-time ii- position iii- time and position iv- None of them
2. The probability density of negative charge cloud at a node equals:
i-constant ii- imaginary value iii- zero iv- all of them
3. The difference between time-dependent and time-independent Schrödinger equations:
i- Hamiltonian operator ii- Eigen function iii- kinetic energy iv- Non of them
- 4- A wave function affected by kinetic and potential energies is:
i-Eigen function ii- characteristic iii- acceptable iv- All
- 5- Wave function for any system depends on:
i-coordinate X ii- coordinate Y iii- coordinate Z iv- all
- 6- For a particle in box, increasing quantum number n:
i- increasing energy ii- increasing reactivity iii- increasing energy difference iv-All
- 7-The Hamiltonian operator is:
i-square of $\Psi(t)$ ii-square of $\Psi(x)$ iii- square of $\Psi(x,t)$ iv-none of them
- 8- π -overlap is weaker than σ -overlap because of:
i-face to face ii- stronger bond iii- lower energy iv- higher energy
- 9- Noble gas will not exist as a molecule because:
i-bonding and antibonding orbitals are occupied ii-No overlap iii-bond order=0 iv- All
- 10- Eigen value of Harmonic Oscillator depends on:
i-Frequency ii-Mass iii- Length iv-None of them
- 11- Number of overlaps depends on:
i-Number of bonds ii- Order of bond iii- Types of overlap iv- Types of bonds
- 12- The spherical polar function depends on:
i- Radial function ii- Angular Θ function iii- Angular ϕ function iv- All
- 13- Atomic wave function (d-) has quantum numbers:
i- 2,1,0 ii-3,1,1 iii- 1,0,0 iv-3,2,1
- 14- Number of bonds for N_2 molecule equals:
i-One ii- Two iii- Three iv- None of them
- 15- Cartesian coordinates describe the function with:
i-polar shape ii- circular shape iii- radius shape iv- None of them
- 16- 3d orbital has higher energy than 4s orbital because of:
i- Principle number ii- Magnetic quantum number iii- Shape of charge iv- All
- 17- The postulates of molecular orbital theory are:
i- Atomic orbital ii- Molecular orbital iii- Number of overlaps iv- All
- 18- Any wave function should be solved:
i-Mathematically ii- Experimentally iii- Virtually iv- None of them
- 19- Type of overlap is affected by:
i-Symmetry ii-orientation iii- bond order iv-all

20- Quantum chemistry is a branch of:

- i-Quantum physics ii- quantum dot iii- quantum computing iv- None of them

II- Calculate each of the followings: (10 Marks)

- a- Eigen value of a particle of mass (m) in the first energy level of one-dimensional box with walls $x= \pm a$.
- b- Eigen function of a particle in the y-direction box in second energy state with walls $y=0, L$.
- c- The potential energy of a particle inside one-dimensional box with walls with $x= \pm a$ and $x= -a$.
- d- The bond order of the formed molecule from atoms with atomic number =3.
- e- The number of molecular wave function for the anion H_2^{+1} .

III-1- The formation of molecular wave function is explained by molecular orbital theory, Draw the correlation diagram for F_2 molecule showing the atomic and molecular orbitals and the type of overlap for each molecular orbital.

(At. Number, C=6, N=7, O=8 and F=9) (10 Marks)

- 2- How many overlaps in a F_2 molecule? (2 Mark)
- 3- Calculate the bond order of N_2 molecule. (2Mark)
- 4- Explain the bond in H_2 molecule? (2 Mark)
- 5- What type of bond in C_2 molecule? (2 Mark)
- 6- Differentiate between bonding overlap in O_2 and Be_2 . (2 Mark)

Good Luck

Prof. Dr. Mohamed K. Awad

Prof. Dr. Faten M. Atlam



Answer the following questions: Questions I and II in Bubble Sheet

Question I: Multiple Choice

(25 Marks)

- Which of the following is not an iron ore?
a. Magnetite b. Hematite c. Pyrohotite d. Siderite
- The most stable oxidation state for Co is, but is an oxidizing agent
a. +2, +3 b. +2, +4 c. +3, +2 d. +4, +2
- Which one has not a strong magnetic properties?
a. Iron b. Nickel c. Silver d. Cobalt
- H₂O rusts..... but doesn't react with.....,
a. Fe, Ru, Os b. Ru, Os, Fe c. Os, Fe, Ru d. None of these
- One of the 3d elements form XCl and XCl₂....
a. Zn b. Fe c. Cu d. Ni
- forms square planer complexes while forms octahedral complexes.
a. Pt(II), Pt(IV) b. Pt(IV), Pt(II) c. Pd(II), Pd(III) d. Pd(IV), Pd(II)
- OsO₄ formed when Os react with O₂ and
- Which mineral group provides most of the world's economic iron (Fe) for steel production?
a. Silicates b. Sulfides c. Carbonates d. Oxides
- $2\text{Cu}^+ \rightarrow \text{Cu}^{2+} + \text{Cu}^0$ This is an example of
a. comproportionation b. disproportionation c. synproportionation d. proportionation
- Which metal is the most widely used (accounts for 95% of total metal production in world)?
a. Iron b. Nickel c. Gold d. Silver
- Which of these metals will be oxidized by the ions of cobalt?
a. Tin b. Nickel c. Silver d. Iron
- Ferrous metals have similarity like lanthanides.
a. horizontal b. vertically c. diagonal d. groupal
- Which of the following transition ions show **3d³** electronic configuration? (Atomic number of: V = 23, Cr = 24, Mn = 25, Fe = 26)
a. V²⁺, Cr³⁺, Mn⁴⁺, Fe⁵⁺ b. V⁴⁺, Cr⁶⁺, Mn⁷⁺, Fe²⁺ c. V³⁺, Cr³⁺, Mn³⁺, Fe³⁺ d. V³⁺, Cr⁴⁺, Mn⁵⁺, Fe⁴⁺
- Cobalt is passive towards
- a. dil. HCl b. aqua regia c. dil. HNO₃ d. dil. H₂SO₄
- Iron rusts slowly with water forming at red heat.
a. Fe(OH)₃ b. Fe₂O₃ c. FeO.OH d. Fe₃O₄
- Pure iron is
- a. soft and quite reactive b. highly reactive c. hard and reactive d. white and hard
- Iron is:
a. More reactive than lead c. More reactive than Calcium
b. Less reactive than copper d. Less reactive than mercury
- Iron (IV) sulfide is produced when Fe reacts with
- a. the exact amount of S b. less sulfur c. excess sulfur d. sulfur dioxide
- The state of cobalt can be determined from the color of the metal.
a. oxidation b. reduction c. solid d. liquid

- 20 is used as a catalyst, but..... is used as an electroplated
 a. Pt & Pd b. Pt & Ni c. Ni & Pt d. Ni & Pd
- 21 The role of limestone in the extraction of iron from its oxides is
 a. make Fe complexes b. increase the temperature c. reduce slag d. remove silicates
- 22 Which of the following statements about the given reaction are correct? $3\text{Fe}_{(s)} + 4\text{H}_2\text{O}_{(g)} \rightarrow \text{Fe}_3\text{O}_{4(s)} + 4\text{H}_{2(g)}$
 (i) Iron metal is getting oxidized (ii) Water is getting reduced (iii) Water is acting as a reducing agent
 (iv) Water is acting as an oxidizing agent
 a. (i), (ii) and (iii) b. (iii) and (iv) c. (i), (ii) and (iv) d. (ii) and (iv)
- 23 Which ore contains both iron and copper?
 a. Cuprite b. Malachite c. Chalcocite d. Chalcopyrite
- 24 Galvanized iron sheets have a coating of
 a. aluminum b. tin c. zinc d. copper
- 25 Cobalt is the active center of a group of coenzymes called.....
 a. cobaltimin b. cobalamin c. cobalimin d. cobaltase

Question II: State whether the following statements are True or False. (10 Marks)


- A ligand is a molecule or ion that is ionically bonded to the central metal ion.
- An oxidation number is a specific number of molecules or ions with which a transition metal will combine.
- Fe_3O_4 is a mixture of FeO and Fe_2O_3 .
- It is difficult to extract gold from its complexes.
- Cobalt has the ability to react with water at room temperature but doesn't react with most acids.
- Silver is rarely found in the +1 oxidation state
- The alloy of copper and zinc is known as Brass
- Nickle carbonyl is considered to be highly toxic.
- Cu is silvery white and not attacked by air at room temperature
- Nichrome is an alloy of nickel and chromium with small amounts of carbon.

Question III: Answer each of the following: (15 Marks)

- Why is copper a good conductor of electricity but not an electrolyte?
- Why is gold not affected by the addition of acids?
- What are the uses of gold nanoparticles when they are colored other than yellow?
- What happens when osmium reacts with oxygen?
- Give examples of Cu, Au, and Ag complexes.

BEST WISHES

EXAMINERS PROF. DR. MOHAMED GABER
 Dr. YUSUF S. AL-NAJJAR

	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF CHEMISTRY			
	Final Examination of for third year students (All Double Major)			
	COURSE TITLE:	Physical Organic Chemistry		COURSE CODE: CH3151
DATE:	3/1/2023	TERM: FIRST	TOTAL ASSESSMENT MARKS: 50	TIME ALLOWED: 2 HOURS

Answer the following questions: (50 marks)

1] Choose the correct answer from the alternatives a,b,c and d. (10 marks)

1) The sign of ρ in the ionization of m-and p-substituted phenyl acetic acid is

- a) +ve b) neither c) +ve & -ve d) -ve

2) The rate of saponification of p- amino ethylbenzoate is.....

- a) 1.0 b) <1.0 c) zero d) >1.0

3) The rate of alkylation of p-methoxy N-methyl aniline is

- a) <1.0 b) >1.0 c) zero d) 1.0

4) Reaction that facilitated by electron with donating groups will have the value of ρ

- a) +ve b) -ve c) +ve & -ve d) neither

5) ρ value for standard ionization reaction of benzoic acid in water at 25 °C

- a) <1.0 b) zero c) >1.0 d) 1.0

6) The sign of ρ in ionization of p-cyano-phenol in H₂O at 25 °C is

- a) -ve b) neither c) +ve & -ve d) +ve

7) Which of the following substituents increase the rate of alkylation of phenoxide ion

- a) p-OCH₃ b) m- NO₂ c) p-NO₂ d) m-OCH₃

8) Insertion of single carbene with propane gave

- a) n-Butane b) 2-methyl propane c) 1-Butene d) Both a and b

9) Hammett substituent constant (σ) is a measure of

- a) The electronic effect exerted by a substituent on the reaction center.
 b) The sensitivity of a reaction to the electronic effect of a substituent.
 c) The sensitivity of a reaction to the steric effect of a substituent. d) None of the above

10) Free radical with $t_{1/2} < 10^{-3}$ second are:

- a) Stable radical b) Stabilized & Destabilized radicals c) Persistent radicals d) Both a and c

2] Explain by equation: σ_{p-OMe} substituent in base catalyzed hydrolysis of ethyl benzoate is (-ve) sign while σ_{m-OMe} in the same hydrolysis is (+ve) sign. . (4 points)



3] Put (✓) or (x) and correct the wrong answer (Explain by answers): (16 marks)

- a) The sign of ρ in the solvolysis of benzylchloride in acetone is +ve value.
- b) The rate of base initiated hydrolysis of p-hydroxy ethylbenzoate is more than unity.
- c) Addition of phenyl radical to *tert*-butyl benzene gave 2-phenyl-*tert*-butyl benzene as a major product.
- d) For a reaction in which there is no free energy change ΔG° , all starting materials converted into products.
- e) Increasing the temperature and using polar solvent increase the value of ρ .
- f) The constant, (σ) in Hammett equation with (+ve) sign indicates that the substituent is an electron withdrawing group.
- g) CH_3COOEt is more acidic than CH_3COCH_3 .
- h) $\text{S}_\text{N}1$ solvolysis of 3-chloro-1-butene in ethyl alcohol form one product of ether

4] Provide the product of the following reactions. (6 points)

- a) Triplet carbene + $\text{CH}_3\text{-CH}_3 \rightarrow$
- b) $\text{H}_2\text{O}_2 + \text{Fe}^{+2} \rightarrow$
- c) $\cdot\text{CH}_3 + \text{CH}_2=\text{CHCOOH} \rightarrow$

5] How could you prepare: (8 points)



- a) Ethyl radical from Ag^+ , methyl radical from H_2O
- b) Benzoic acid from benzaldehyde
- c) Cis 1,2-dimethyl cyclopropane from ketene

6] Arrange the following radicals according to their stability (Explain and draw structure) (6 points)

- a) Methyl radical
- b) DPPH
- c) Isopropyl radical
- d) Allylic radical

Good Luck

Prof. Dr. Mahmmoud Taha & Ass. Prof. Dr. Sahar El-khalafy

	<p style="text-align: center;">Tanta University Faculty of Science Chemistry Department</p>		
Final Examination for The Third Double Major (CH-BO, CHMB , CH-GE, BC)			
Course Title	Heterocyclic Chemistry		Course Code CH3153
Date 27/12/2022	First Term	Total assessment:100	Time allowed 2hrs

1-Answer by equations the following questions. (34 Marks)

- a- Synthesis of 3-Methyl-2-Phenyl Pyrrole using Vilsmeier reaction.
- b- o-Nitrotoluene to Indole-2-Carboxylic acid.
- c- Using Skraup synthesis how you prepare 4- Methylquinoline.
- d- 2-Phenylethylamine to 1-Methylisoquinoline.


2- Explain by mechanism the following. (33 Marks)

- a- Aldopentose to 3- Nitrofurane.
- b- Hoffman exhaustive methylation of TetrahydroPyrrole.
- c- Indole to Tryptophan.
- d- Discuss by examples the reactivity of different types of Picoline.

3- Answer the following questions. (33 Marks)

- a- Draw the resonating structure of Pyrrole.
- b- Reduction and oxidation of Pyridine.
- c- Show by mechanism the ring opening of Quinoline.
- d- Trimerization of Thiophene.

Prof.Dr. Mahmoud Fahmy

	TANAT UNIVERSITY		
	FACULTY OF SCIENCE		
	DEPARTMENT OF ZOOLOGY		
	EXAMINATION for third Year students OF Chemistry/Entomology		
	COURSE TITLE	Insect Behavior	COURSE CODE: EN3141
DATE: JAN 2023	TERM: FIRST	TOTAL ASSESSMENT MARKS: 150	TIME ALLOWED: 2 HOURS

(يكون الامتحان من صفتين)

1-Fill in the blanks with the appropriate words : (30 Marks, 3 Marks each)

- 1) The external limiting factors of insect flight are.....,.....and.....
- 2)is flight of insects in a direction and for a distance over which they have control and which result in temporary or permanent change in habitat.
- 3) If the wind-speed is high over long periods flight occurs mainly during
- 4)is a condition of immobilization where all reflexes of the organism for locomotion and the correction of posture are inhibited.
- 5) Flight activity is divided into.....and.....
- 6)is the analysis of the movements of the whole organism into a series of reflexes or observed correlation between stimulus and response.
- 7)is the learning without obvious reward.
- 8) Night flights in migratory *Schistocerca* starts sun set.
- 9) Dragonflies make round trip journey over theOcean from to and back.
- 10) When an organism continuously samples the environment to determine the direction of a stimulus is called.....

2-Identify each of the following (Total 36 marks, 4 mark for each):

1-kineses	2- Telotaxis	3-Reflex arch
4- Klinokineses	5- Klinotaxis	6-Orientation by humidity
7-Association learning	8-habituation	9-Orientation by contact

3-Give the scientific term of each of the following (Total 15 marks, 3 mark for each):

- 1) It is a coordinated movement (walking, flying, swimming, etc.) that occur in response to an external stimulus.
- 2) It is the change in a response to a stimulus that does not involve associating the presented stimulus with another stimulus.
- 3) An internally directed system of adaptive activities that facilitate survival and reproduction
- 4) Learning results from an association of sensory experience.
- 5) Movements of insects in a direction and for a distance over which they have control and result in temporary or permanent change in habitat.

4- Write in details about each of the followings (Total: 69 Marks)

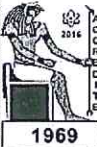
- 1) Waggle dancing in bees' life (9 marks)
- 2) Grass hopper migration (10 marks)

- 3) Discrimination on the basis of host attributes by herbivores (10 marks)
- 4) Host discrimination and super-parasitism in parasitoids (10 marks)
- 5) Annual migration of the monarch butterfly (10 Marks)
- 6) Factors limiting flight activity (10 marks)
- 7) Hunger and thirst in insects (10 Marks)

Good luck ☺!

Examiners

Prof. Dr. Mervat Abou Seada

 1969	TANTA UNIVERSITY FACULTY OF SCIENCE DEPARTMENT OF ZOOLOGY		
	EXAMINATION FOR JUNIORS (THIRD YEAR) STUDENTS OF CHEMISTRY/ENTOMOLOGY		
COURSE TITLE:	CHEMICAL ECOLOGY		COURSE CODE: EN3145
DATE: JAN 2023	SEMESTER: FIRST	TOTAL ASSESSMENT MARKS: 100	TIME ALLOWED: 2 HOURS

(ويتكون الامتحان من صفتين)

Part I (Total: 50 marks)

1 – Identify: (12 marks)

a) <u>Primer pheromones</u>	b) <u>Synomone</u>	c) <u>Infochemicals</u>
d) <u>aphrodisiac</u>	e) <u>paraphermones</u>	f) <u>Dufour's gland</u>
g) <u>Aggregation pheromones</u>	h) <u>OBP</u>	i) <u>Trichogen</u>
j) <u>Tormogen</u>	k) <u>Allomone</u>	l) <u>corpora allata</u>

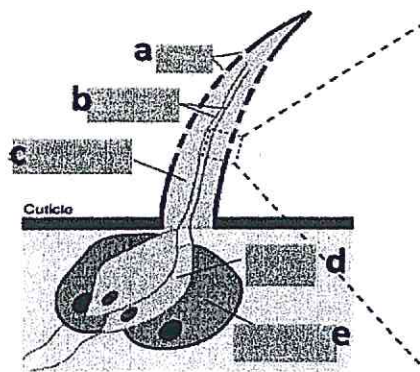
2. Fill in the blanks belowwith the appropriate words (25 mark)

1. Production of allomones is a common form of, such as by plant species against or prey species against
2. Mate location and courtship may involve chemicals in two stages, with acting at a distance, followed by employed prior to mating.
3. "....."are attractant pheromone chemicals exist, as seen in the queen butterfly (Nymphalidae: *Danausgilippus*).
4. The males of Lepidoptera often produce scent from glands which are commonly associated with are known as and are located on
5. Types of chemoreceptive (olfactory) sensilla such as a)..... , b)and c)
6. Female silk moth emits a sex pheromone, called to attract males from a pair of sacs called that are found on the last abdominal segment
7. Source of alarm pheromones in hymenopterans commonly produced from and
8. Trail pheromones in ants are commonly excreted by the
9. Insects use chemical communication for, and
10. Two main ecological cues are provided by kairomones; they generally either indicate a for the receiver, or giveof the presence of a

3. Answer the following questions:(13 mark)

a. Mention the labeled parts from (a-e)

(3 marks)



- b. Write on Trickey sexual signaling. (5 marks)
c. Write on allomones and Mimic with example (5 marks)

Part II (Total: 50 marks)

1- Give an account on each of the following (Total : 20 marks)

- a) Elicitation of plant responses and HIPV after herbivore attack
b) Insect chemical defenses.
c) Functions of secondary plant metabolites

2- Compare between each of the following(Total : 30 marks)

- a) Bees, beetles, and flies pollination syndrome
b) Alkaloids, phenolic and terpenoids as secondary plant metabolites
c) Biochemical, mechanical and behavioral adaptations of Insect herbivores to plant defense.

GOOD LUCK☺!

Examiners

Prof. Dr.MervatAbouSeada

Dr.RaghdaZuhair