

Assiut University  
Faculty of Science  
Chemistry Department

Aug. 2019  
Time : 2 hours

**Final Exam. for ( 211C )( Student not Chemistry , Summery Term)**

**Write the name of all compounds.**

**Answer for the following questions:**

**1) A- What mining by ( give examples):- ( 7 only)----- ( 10 marks):**

- |                      |                      |            |          |
|----------------------|----------------------|------------|----------|
| 1- Toludine          | 2-Quinone.           | 3- Anilide | 4- Oxime |
| 5- Ter. (3°)alchol . | 6- Benzyl / Benzoyl  |            | 7- PVC.  |
| 8- TNPh              | 9- Ac <sub>2</sub> O |            | 10- DMS  |

B- Compound (A) its molecular formula (C<sub>5</sub>H<sub>12</sub>O ). Draw the structural isomers of this compound.

**2) A-Give examples for the following reactions (Four only)--(10 marks):**

- |  |                                |
|--|--------------------------------|
| 1- polymerisation reaction.                | 2- Re-arrangment reaction.     |
| 3- Cainzaro reaction.                      | 4- Elecrophilic Sub. Reaction. |
| 5- Elemination reaction of butyl chloride. |                                |

B- Write one method to prepare the following compounds (**Three only**):  
Saccharin \* Salycilic acid \* *p*- bromoaniline \* Iodoform.

**3) A- How do you convert : (Three only)----- (10 marks):**

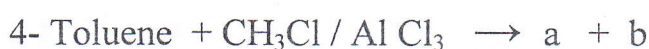
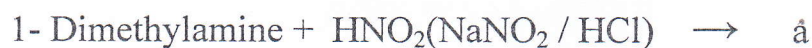
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|--|--------------------|
| 1- Acetaldehyde → Sec.(2°) alchol by Grinuard reagent. |                    |
| 2- Tolune → Benzene.                                   | 3- Anline → Phenol |
| 4- Benzene → Glycozal.                                 |                    |

**B-Write on Three only:**

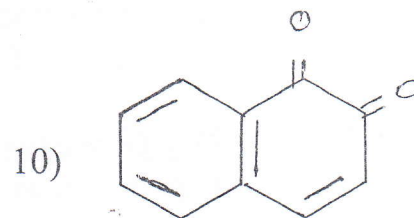
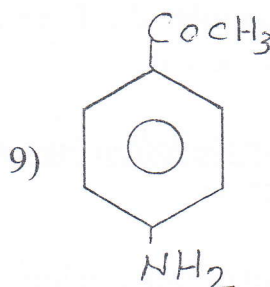
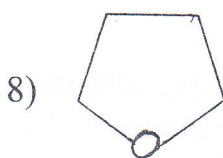
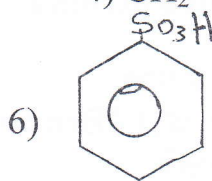
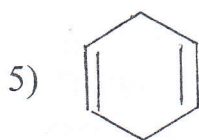
- |                        |   |
|------------------------|---|
| 1- Markownikoffs rule  | 2- Ald-ol Condencation.   |
| 3- Phthaline reaction. | 4- Addition of conc.H <sub>2</sub> SO <sub>4</sub> to 1- propene. |

\*\*\*\*\* أنظر خلفه \*\*\*\*\*

4)- A- complete the following equations (Four only)----- (20 marks)



B- Write the name of the following compounds .



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

cyclooctatetrene \*

Gamexane \*

succinimide

sodium salicylate \*

o-cresole \*

Benzamide

\*\*\*\*\*

Good Luck  
Prof. Dr Osama Shehata Moustafa  
Aug. 2019

Final Exam of Physical Chemistry II (C-232) for second level students

Answer the following:

Part I Phase Rule

- 1) Explain briefly Only Two of the following: (10 marks)
  - (i) Sodium chloride-water system.
  - (ii) Two component system A and B forming compound AB with congruent melting point.
  - (iii) The ternary system  $\text{NH}_4\text{NO}_3\text{-AgNO}_3\text{-H}_2\text{O}$  at  $30^\circ\text{C}$ , where the binary compound  $\text{NH}_4\text{NO}_3\text{-AgNO}_3$  is formed.
- 2) Compare between the phase diagram of water system with that of sulphur system. (4 marks)
- 3) Complete each of the following: (3 marks)
  - (i) For pure gas and a mixture of two gases ( $\text{H}_2$ ,  $\text{O}_2$ ) the degree of Freedom is.....and ....., respectively.
  - (ii) The addition of salt to ice result in considerable lowering of temperature, if there is no external source of heat, owing to .....
  - (iii) In order to completely define a three component system ..... variables are required, namely .....

Part II Electrochemistry

Answer Only Two from the following questions:

- 1) (i) Explain the electrode reaction of silver-silver chloride electrode and its Nernst equation. (4 marks)  
(ii) What is the reduction potential of silver electrode  $\text{Ag, AgCl/KCl}(0.1\text{M})$  at  $25^\circ\text{C}$ ? where its  $E^\circ = 0.2224\text{V}$ . (4 marks)
- 2) (i) Determine the oxidation number of chromium in the following species:  $\text{Cr, CrO, Cr}_2\text{O}_3, \text{K}_2\text{CrO}_4, \text{K}_2\text{Cr}_2\text{O}_7$ . (2.5 marks)  
(ii) Complete and balance the following redox reaction in acidic solution: (5.5 marks)
$$\text{Fe}^{2+} + \text{Cr}_2\text{O}_7^{2-} \rightarrow \text{Fe}^{3+} + \text{Cr}^{3+}$$
- 3) (i) Consider the cell:  $\text{H}_2(1\text{ atm}) | \text{Pt(s)} | \text{H}^+(\text{xM}) || \text{Cu}^{2+}(1\text{M}) | \text{Cu(s)}$ , where  $E^\circ_{\text{Cu}^{2+}|\text{Cu}} = 0.34\text{V}$ . (4 marks)  
If the emf of this cell is  $0.44\text{V}$  at  $25^\circ\text{C}$ , calculate the pH of the unknown acidic solution in this cell.  
(ii) What is the standard free energy change for the following reaction at  $25^\circ\text{C}$ ? (4 marks)
$$3\text{Ca(s)} + 2\text{Au}^{3+} \rightarrow 3\text{Ca}^{2+} + 2\text{Au(s)} \quad [E^\circ_{\text{Ca}^{2+}/\text{Ca}} = -2.87\text{V}, E^\circ_{\text{Au}^{3+}/\text{Au}} = 1.5\text{V}, F = 96500\text{ C/mol}]$$

Part III Colloidal Chemistry

Answer the following questions:

- 1) Choose the correct answer for each of the following: (3 marks)
  - (i) The lyophobic colloids are -----  
a) Liquid heating      b) liquid loving      c) not stable
  - (ii) The lyophobic sols are ..... Sols  
a) stable      b) true      c) irreversible      d) turbid
  - (iii) The lyophobic need ..... for their preparation.  
a) Heating      b) cooling      c) stabilizing agents

(باقى الأسئلة بالخلف)



(5 marks)

2) Complete each of the following:

- (i) The number average molecular weight:  $M_n = \dots\dots\dots$
- (ii) The weight average molecular weight:  $M_w = \dots\dots\dots$
- (iii) The colloidal ion of  $As_2S_3$  after dispersion of  $Hs^-$  ions  $\dots\dots\dots$
- (iv) The reason for the stability of lyophobic colloids is their  $\dots\dots\dots$
- (v) To precipitate a colloid, the particle must come  $\dots\dots\dots$  to form  $\dots\dots\dots$

(4 marks)

3) Discuss Two methods for the purification of sols.

(5 marks)

4) Show by equation how can you calculate:

- (i) The actual dimensions of a single particle in a colloidal system.
- (ii) The mass of the single particle (m) and molar mass (M) of the dispersed phase.

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مع اطيب التمنيات

ا.د. ماهر حامد

ا.د. أبو الحجاج عبدالعزيز

ا.د. صديق أحمد



Final Exam .of Inorganic and Physical Chemistry (C-250)

Section I (Inorganic Chemistry)

(Mark: 25)

Answer the following questions:

1. Show how can you prepare Three only of the following?  
Water gas, Mg,  $B_2O_3$  and  $HNO_2$
2. In the following acid pairs which is stronger and why?  
i) HF and HI, ii)  $H_2SO_3$  and  $H_2SO_4$  and iii)  $HClO_4$  and  $HOCl$ .
3. Give reason(s) that explains Five only of the following:  
i) Group II metals have higher melting and boiling points than group I metals.  
ii) Al has smaller atomic size than Na.  
iii) CO is toxic gas.  
iv)  $SF_6$  is known while  $OF_6$  is not.  
v) Li has higher ionization energy than Cs while Cs ions have higher electrical conductivity than Li ions.  
vi) In water Be salts are acidic.
4. What are the resonance structures and resonance hybride of  $O_3$ ?
5. What is the structure of the following: pyrophosphorous acid, Hydrogen azide and  $XeF_4$ ?
6. How does  $Ca_3(PO_4)_2$  react with each of sulphuric and phosphoric acids

See Next Page→

## Section II (Physical chemistry)

(Mark:25)

Answer the following questions:

I) Choose the correct answer:

(Mark:5)

1) The ratio of  $P_1$  and  $P_2$  correspond to variable  $T$  as:

$$\frac{P_1}{P_2} = \dots \quad \text{a) } \frac{H_1}{H_2} \quad \text{b) } \frac{V_1}{V_2} \quad \text{c) } \frac{T_2}{T_1} \quad \text{d) } \frac{T_1}{T_2}$$

2) If the  $V$  is keeping constant, then

$$\Delta H = \dots \quad \text{a) } \Delta F^\# \quad \text{b) } q_v \quad \text{c) } \Delta H^\# \quad \text{d) } q_p$$

3) For reversible processing:  $q_{irrev} = \dots$  a)  $\Delta F^\#$ , b)  $\Delta G^\#$  c)  $q_{rev}$

4)  $\Delta H = \Delta E + \dots$  a)  $\Delta F^\#$ , b)  $\Delta R$ , c)  $\Delta(PV)$ , d)  $\Delta C_p$

5) If  $\Delta H^\#$  and  $Q_p$  are negative, the reaction will be:

a) irreversible b) endothermic c) reversible d) exothermic

II) Complete the Following:

1) Under isothermal expansion of ideal gas:  $\Delta S^\# = \dots$

$$2) \frac{dH}{dT} = \frac{\dots}{\dots} + \frac{\dots}{\dots} \quad 3) \Delta G^\# - \Delta G^{\#0} = \dots$$

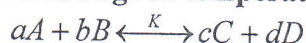
$$4) C_p = \dots + \dots \quad 5) \frac{d \ln K}{dT} = \frac{\dots}{\dots}$$

III -a) Show, how can you calculate the work done ( $W$ ) in each operation, maximum work ( $W_{\max}$ ), and efficiency ( $\eta$ ) during Carnot cycle (Mark:6)

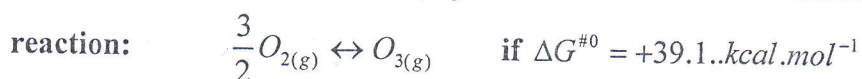
vi) calculate the efficiency  $\eta(\%)$  at:

$T_1 (K)$	0.0	45	60	100	200	300
$T_2 (K)$	300	50	40	80	400	0.0
$\eta(\%)$						

IV-a) Prove that the equilibrium constant ( $K$ ) for the chemical reaction is affected by the change in temperature ( $T$ ):



b) When gaseous of Ozone ( $O_3$ ) is formed from the molecular oxygen by the



What is the value of  $K$  for this reaction at:  $T = 300, 350, \text{ and } 400.K$  (Mark:4)

V) The  $K$  for the reaction:  $2NO_{2(g)} \xrightleftharpoons{K} N_2O_{4(g)}$  is:

$K_1 = 9.5.$ , at  $T = 320.K$ ,  $\Delta H^{\#0} = -13.75 \text{ kcal/mol}$ ,  $R = 1.98 \text{ cal/mol-deg}$

Calculate: (i)  $K_2$ , at  $T = 273.K$ , (ii)  $\Delta G^{\#0}$ , at  $T = 320.K$  (Mark: 5)

Good Luck

Examiners: Prof. Dr. S M Ahmed,

2) Dr. M A Ibrahim





**Final Exam. Organic Chemistry (Aromatic and Heterocyclic Chemistry 212 C) for 2<sup>nd</sup> Level Students**

**Section (A): (Aromatic chemistry) (25 Marks)**

**Answer the following questions:**

1- Predict the product(s) of the reduction of the following compounds: (4 Marks)

(a) Nitrobenzene by Sn/HCl.

(b) Azobenzene by NaOH/Zn.

(c) Azobenzene by H<sub>2</sub>/Pt.

(d) Toluene using H<sub>2</sub>/Pt.

2- Give three methods for the synthesis of **benzene**. (3 Marks)

3- Starting from benzene, Show by equations how you can prepare the following compounds: (10 Marks)

(i) Saccharin.

(ii) *p*-Bromoaniline.

(iii) Benzonitrile.

(iv) Trinitrobenzoic acid. (v) Picric acid.

4. Show by equations the mechanism of the following reactions: (4 Marks)

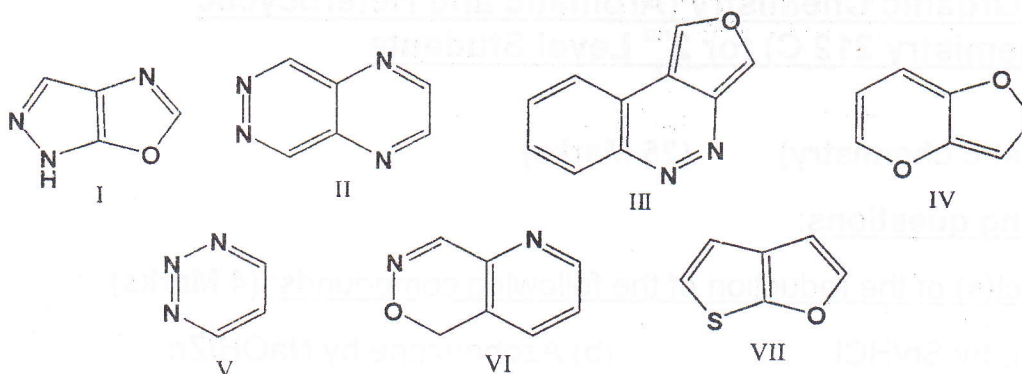
a- Benzidine rearrangement.

b- Nitration of benzene.

5. Complete FOUR ONLY the following equations: (4 Marks)



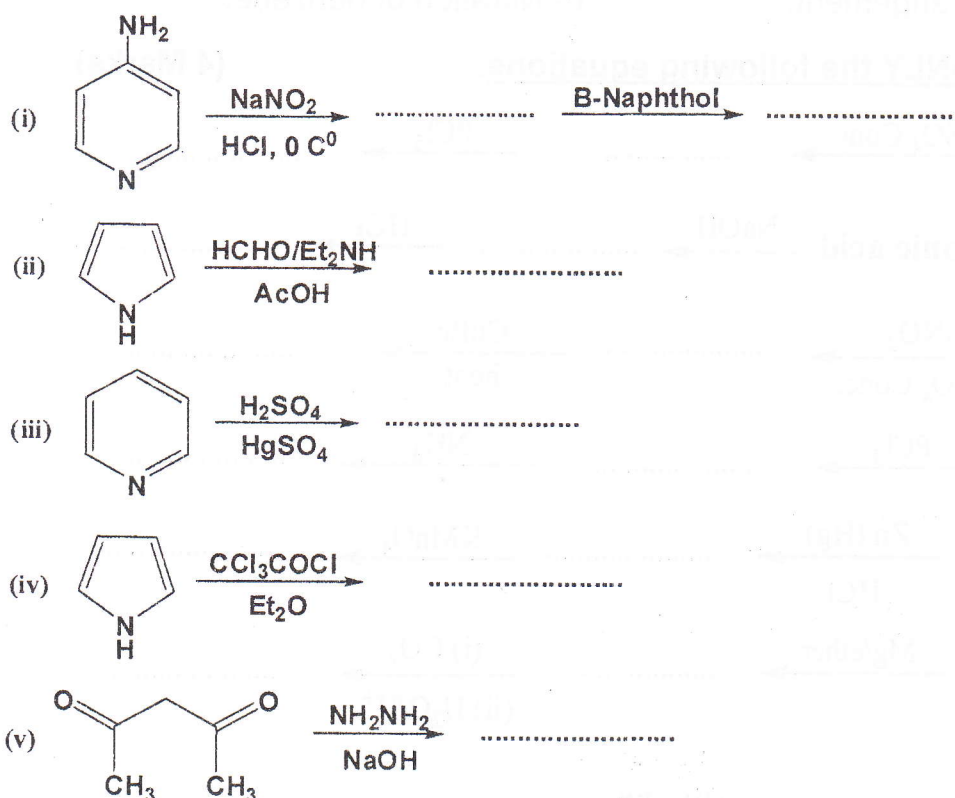
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**Section (B): (Heterocyclic Chemistry)****(25 Marks)****Answer the following questions:****1- Write the systematic names of SIX ONLY of the following structures****( 6 Marks )****2- Give ONE METHOD for synthesis of the following heterocycles: (12 Marks)**

- (a) Furan derivative. (b) Pyrrole ring. (c) Indole derivative  
(d) Pyridine ring. (e) Quinoline compound. (f) Pyrimidine ring.

**3- Give short notes about:****(4 Marks)**

- (i) The typical reactivity of pyrroles, thiophenes and furans.  
(ii) The synthesis of vitamin B6 (using chemical equations).

**4- Complete the following equations:****(3 Marks)****Good Luck****Dr. Ahmed Abdou O. Abeed**





**Final Exam of Green Chemistry (214C) for the 2<sup>nd</sup> Level Students**

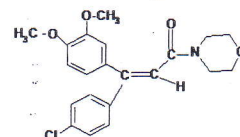
**Choose the correct answer for *twenty five* only of the following? (25×2 = 50 M)**

**1- Which of the following reactions represent the hydrogen abstraction by the OH<sup>•</sup>?**

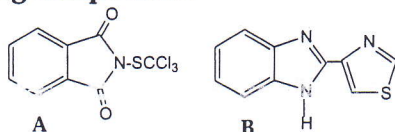
- a)  $\text{NH}_3 + \text{HO}^\bullet \rightarrow \text{H}_2\text{N}^\bullet + \text{H}_2\text{O}$
- b)  $\text{CO} + \text{HO}^\bullet \rightarrow \text{CO}_2 + \text{H}$
- c)  $\text{CH}_4 + \text{HO}^\bullet \rightarrow \text{H}_3\text{C}^\bullet + \text{H}_2\text{O}$
- d) a & c

**2- Dimethomorph fungicide is belong to**

- a) 1,4-Oxathiins
- b) Benzimidazoles
- c) Morpholines
- d) Acylalanines



**3- Choose the correct names for the following compounds?**



- a) A. Thiabendazole; B. Folpet
- b) A. Benomyl; B. Thiabendazole
- c) A. Folpet; B. Thiabendazole
- d) A. Thiabendazole; B. Folpet

**4- Which type of reactions would best explains what has occurred?**

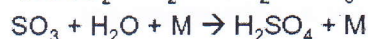
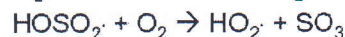
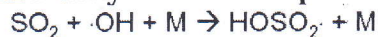


- a) Inactivation of chlorine atom
- b) Chlorine reacts directly with ozone
- c) Synthesis of carbon dioxide
- d) Revolution of chlorine

**5- Which of the following statements is false regarding OH-radical?**

- a) It unable to abstract hydrogen atom to produce carbon centered radicals
- b) Hydroxyl radicals do not add to  $\text{CO}_2$ , however, it adds to CO
- c) Hydroxyl radical is the prominent oxidizing species in the atmosphere.
- d) Always it reacts by adding itself to another molecule

**6- Which of the following statements most accurately describe the process?**



- a) Oxidation of  $\text{SO}_2$  in gas and aqueous phase
- b) Oxidation of  $\text{SO}_2$  in coal-fired power plants
- c) Injected into the atmosphere
- d) Oxidation of  $\text{SO}_2$  in rich fossil fuels

**7- Green chemists reduce risk by?**

- a) Reducing the hazard inherent in a chemical product or process
- b) Minimizing the use of all chemicals
- c) Inventing technologies that will clean up toxic sites
- d) Developing recycled products

**8- The most important reactive intermediate of atmospheric chemical phenomena is**

- a)  $\text{HO}^\bullet$
- b)  $\text{H}_3\text{C}^\bullet$
- c)  $\text{HOO}^\bullet$
- d)  $\text{O}^\bullet$

1	2	3	4	5	6	7	8

9- Which of the following is inorganic fungicide used as seed dressing?

- a) Elemental sulfur
- b) phenyl mercuric acetate
- c) Bordeaux mixture
- d) Thiram

11- Which of the following is the greenest solvent?

- a) Formaldehyde
- b) Benzene
- c) Ethanol
- d) Water

13- Which of the following reagents sequences used in the Dithiocarbamates synthesis?

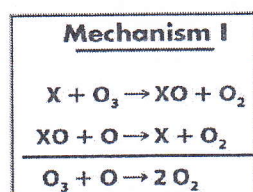
- a) a: CS<sub>2</sub>, b: oxidation
- b) a: reduction, b: CS<sub>2</sub>
- c) a: oxidation, b: CS<sub>2</sub>
- d) None of the above

15- In the given SO<sub>2</sub>-reaction series, which type of processes would be described?

1.  $2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3$
2.  $\text{SO}_2 + \text{O}_3 \rightarrow \text{SO}_3 + \text{O}_2$
3.  $\text{SO}_2 + \text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{SO}_4$

- a) Oxidation of SO<sub>2</sub> in smog
- b) Oxidation of SO<sub>2</sub> in Troposphere
- c) Burning of fossil fuels containing sulphur
- d) SO<sub>2</sub>-Oxidation of ozone

17- In the following mechanism, which specie initiates the catalytic destruction of ozone?



- a) Hydroxyl free radical as a catalyst
- b) Nitric oxide as a catalyst
- c) Inactive form of chlorine
- d) Free radicals are readily converted into stable forms

10- The use of solar power is covered within green chemistry principles, which is?

- a) Atom economy
- b) Design for energy efficiency
- c) Design benign chemicals
- d) Less hazardous synthesis

12- Industrial production of Captan-fungicide is carried out by reaction between

- a) Butadiene and phthalimide
- b) Butadiene and maleic anhydride
- c) 2-Methylbutadiene and maleic anhydride
- d) 2-Methylbutadiene and phthalic anhydride

14- Amongst the following, identify one is not amongst the components of photochemical smog?

- a) O<sub>3</sub>
- b) Unsaturated hydrocarbon
- c) SO<sub>2</sub>
- d) NO<sub>2</sub>

16- Among aerosols distribution modes, the nuclei mode explained as

- a) Small particles (0.01 μm) are formed by the cycloaddition of vapors of pollutants
- b) Small particles (0.01 μm) are formed by the condensation of vapors of pollutants
- c) Small particles (0.02 μm) are formed by the condensation of liquids of pollutants
- d) Small particles (0.01 μm) are formed by the precipitation of vapors of pollutants

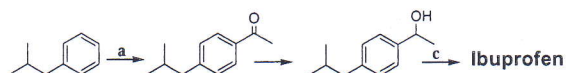
18- Which of the given statements is the best define of cloud condensation nuclei (CCN)?

- a) Particles that can become activated to grow to fog or cloud droplets in the presence of a supersaturating of water vapor
- b) Particles that can become deactivated to fog or cloud droplets in the presence of a supersaturating of water vapor
- c) Particles that can become activated to grow to fog or cloud droplets in the presence of a supersaturating of sulphur dioxide gas
- d) Particles that can become activated to grow to fog or cloud droplets in the presence of a supersaturating of nitrogen dioxide gas

9	10	11	12	13	14	15	16	17	18



19- Which of the following reagents would be a good choice for shown two steps (a & c) in the Ibuprofen scheme?



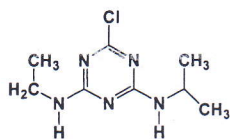
- a) a:  $\text{Ac}_2\text{O}/\text{HF}$ , c:  $\text{CO}/\text{Pd-Cat.}$
- b) a:  $\text{Ac}_2\text{O}/\text{HF}$ , c:  $\text{H}_2/\text{Cat.}$
- c) a:  $\text{H}_2/\text{Catalyst}$ , c:  $\text{Ac}_2\text{O}/\text{HF}$
- d) a:  $\text{CO}/\text{Pd-Catalyst}$ , c:  $\text{H}_2/\text{Cat.}$

21- Mushrooms and truffles are cultivated as food and belong to

- a) Saprophytic Fungi
- b) Parasitic Fungi
- c) Synthetic Fungicides
- d) Natural Fungicides

23- Choose the correct name for the following structure?

- a) Atriazine
- b) Diquat
- c) Trifluralin
- d) Paraquat



25- Dow process used for the production of --- herbicides.

- a) Phenoxyalkane carboxylic acids
- b) Substituted ureas
- c) Bipyridyls
- d) Tetrachlorodioxin

20- What is the troposphere?

- a) The lowest layer in the atmosphere
- b) The part of the atmosphere that absorbs optical light
- c) The part of the atmosphere that absorbs ultraviolet
- d) The part of the atmosphere that absorbs X rays

22- Bio-polymers exemplify green chemistry principle # 10, which is?

- a) Catalysis
- b) Prevent waste
- c) Benign solvents & auxiliaries
- d) Design for degradation

24- Dimethirimol is belong to ---- fungicides.

- a) pyrimidines
- b) morpholines
- c) benzimidazoles,
- d) imidazoles and triazoles

26- What is the Parathion?

- a) Method of destroying PCB mixtures in oils
- b) Contact herbicides destroy only the plant tissue
- c) Organophosphate insectides
- d) Named as 2,3-dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate

19	20	21	22	23	24	25	26

انتهت الأسئلة مع أطيب التمنيات

Examiner: Dr. Hassan Abdou Kotb

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