Chemistry Department

Faculty of Science

Assiut University

June 2021

Time: 3h

Final exam of 324 C student course (inorganic chemistry III)

ملحوظة 1: الامتحان في ست صفحات مرقمة ملحوظة 2: يتم طمس (تسويد) الاجابة بالقلم الجاف فقط

Section I: Final exam "50Marks"

Q1 :Shade (T) for true statements or (F) for false statements (1 Mark each)

1. Owing to the lanthanide contraction the basic character of the hydroxides decreases with increasing atomic number due to the decreased covalent character between the lanthanide ion and the hydroxide.
2. Sulphates of lanthanides are more soluble in cold water than in hot water.
3. There is a general increase in the complex formation ability of lanthanides according to the trend $Ln^{4+} < Ln^{3+} < Ln^{2+}$.
4. Acid reactions of uranium salts increases due to hydrolysis in the order $U^{+3} > UO^{2+} > U^{+4}$.
5. Actinide compounds are more basic than lanthanide ones.
6. Pure thorium metal can be obtained by thermal decomposition of ThF_4.
7. Among the actinide elements Am is the only element that forms stable +2 oxidation state.
8. Due to the high binding energy of the 5f orbital actinides show higher oxidation states such as +5, +6 and +7.
9. Lanthanides have no tendency to form oxocations while actinides do.
10. Smaller Sc^{+3} possesses greater polarizing power that induces greater covalent with chelating ligands such as acetyl acetone.
11. The chemistry of lanthanides is predominantly ionic.
12. Yttrium possesses atomic and ionic sizes close those of terbium and dysprosium.
13. The great similarity of the lanthanide chemical properties is attributed to the very effective shielding of the 4f electrons so that they do not take part in bonding.

14-$[Cr(CN)_6]^{-4}$ complex has higher$\Delta 0$ energy than $[Cr\{H_2O)_6]^{+2}$ complex

15- C^{-} and NH^{2-} is π - acceptor ligand while CO is π - donor ligand

16- Total number of orbitals in octahedral complexes equal 36 orbitals

17- In MO theory the σ – donor only case in metal dsp orbitals and ligand spy orbitals

18- Three orbitals of T_{2g} so triply degenerate d_{xy} , d_{yz}, and d_{xz} orbitals

19- The d_{xy} , d_{yz}, and d_{xz} orbitals are not of correct symmetry to σ – bond with ligands

20- In nonbonding metal orbitals the d_{xy} , d_{yz}, and d_{xz} orbitals have E_g symmetry

21- In bonding metal orbitals px,py,and pz orbitals have T_{1u} symmetry

22- In bonding metal orbitals d_{x2-y2} and d_{z2} have e_g symmetry

23- The d- electrons from the metal ion will fill in the T_{2g} and E_g^* MO theory

24- $[HgI_3]^-$ has a trigonal planar geometry.

25- On the basis of CFT the bonding between metal cation and ligands is purely ionic.

26- If the crystal field splitting (Δ_o) is large, then the pairing energy in comparison will be small and the complex will be high-spin.

27- Δ_o values of halide complexes increase in the order $F^- > Cl^- > Br^- > I^-$

28- $[Cu(NH_3)_6]^{2+}$ has sp^2d hybridization.

29- $Ni(dmg)_2$ is diamagnetic.

Q2: Shade the correct answer A, B, C or D (1Mark each)

30. Oxidation state +7 is shown by :

A. Pa and U B. Np and Pu C. Am and Cm D. all of these pairs

31. Among the quadrivalent lanthanides, it was found that one of the following quadrivalent lanthanide ions is sufficiently stable in solution as well as in solid state:

A . Ce(IV) B. Pr (IV) C. Tb(IV) D. Dy (IV)

32.Solution chemistry of uranium are complex due to:

A) Only presence of four oxidation states B)only complex reactions with anions in solution
C) formation of polymeric species only D) all the three reasons.

33. The anhydrous lanthanide trichlorides are obtained by heating the oxides or oxalates with:

A) Cl_2 B) HCl C) NH_4Cl D) the three reactions are possible.

34- Total electrons in MO diagram for CO equal:

A. 12 electrons B. 10 electrons C.15 electrons D.14 electrons

35- CN- ion is:

A. π –acceptor ligand B. π –donor ligand C. σ – donor ligand D. σ - ligand

36- In MO diagram for CO lone pair electron occupied :

A. σ – bond B. π – bond C. π^* – bond D. σ^*- bond

37-In an octahedral environment , the five d-orbitals splitting to:

A. T_{2g} and E_g^* B. E_g and T_{2g} C. T_2g and E_g D. E_g^* and T_{2g}

38- Eg two orbitals so double bond degenerate :

A. $d_{x2-y2}$and d_{y2} B. d_{xy} and d_{yz} C. d_{y2} and d_{x2-y2} D. d_{x2-y2} and d_{z2}

39- d8 octahedral complexes have only one possible arrangement of the electron in:

A. T_{2g} and E_g* B. T_{2g} and E_g C. E_g and T_{2g} D. E_g* and T_{2g}

40- Of ....the d- electrons from the metal ion will fill in the T_{2g} and Eg*

A. CFT theory B. MO theory C. LFT theory D. All of them

41- Which pair is correct?

A. $[Zn(H_2O)_6]^{2+}$; paramagnetic

B. $[Co(NH_3)_6]^{3+}$; diamagnetic

C. $[CoF_6]^{3-}$; diamagnetic

D. $[V(H_2O)_6]^{2+}$; diamagnetic

42- The CFSE for a high spin d^4 octahedral complex is:

A. $-0.6\ \Delta_o$ B. $-1.8\ \Delta_o$ C. $-1.6\ \Delta_o$ D. $-1.2\ \Delta_o$

43- Which of the following does explain the nature of bonding in coordination compounds?

A. VSEPR theory B. Valence bond theory C. Crystal field theory D. All of them

44- Which statement regarding $[Ni(CO)_4]$ is incorrect?

A. It has tetrahedral geometry

B. It has sp3 hybridization

C. It is paramagnetic

D. None of these

45- The geometry of $[Au(CN)_2]^-$ Complex ion is:

A. Square planar B. Tetrahedral C. Octahedral D. Linear

46- Identify the incorrect statement regarding VBT:

A. It can explain the colour of complexes

B. It does explain the kinetic stabilities of complexes

C. It cannot distinguish between strong and weak ligands

D. It does not predict the geometries of 4-coordinate complexes

47- A complex of a metal has magnetic moment equals 4.91 BM, another complex of the same metal with the same oxidation state has zero magnetic moment. The metal ion is

A. Fe^{3+} B. Fe^{2+} C. Mn^{2+} D. Co^{2+}

48- The tetrahedral $[CoCl_4]^-$ and square planar $[Ni(CN)_4]^{2-}$ complex ions are respectively:

A. Low spin, high spin B. High spin, low spin C. Both high spin D. Both low spin

49- For which of complexes is the order of Δ correct?

A. $[Rh(NH3)_6]^{3+} > [Co(NH3)_6]^{3+}$

B. $[Cr(H2O)_6]^{2+} > [Cr(H2O)_6]^{3+}$

C. $[Fe(CN)_6]^{4-} > [Fe(CN)_6]^{3-}$

D. $[CrF_6]^{3-} > [Cr(CN)_6]^{3-}$

50- The sequence of splitting of d-orbital in square planar field is:

A. d_{xy}, d_{xz}, d_{yz}, d_{z2}, d_{x2-y2}

C. d_{xz}, d_{yz}, d_{z2}, d_{xy}, d_{x2-y2}

B. d_{xz}, d_{yz}, d_{xy}, d_{z2}, d_{x2-y2}

D. d_{z2}, d_{xz}, d_{yz}, d_{xy}, d_{x2-y2}

Part II: Midterm, oral, activity "50 Marks"

Q3: Shade (T) for true statements or (F) for false statements (1Mark each)

51. Uranium trifluoride is volatile and used for the separation of uranium isotopes.
52. UCl_3 can be prepared by passing Cl_2 over UH_3 at 200 C.
53. The fourth ionization energy of scandium is very high.
54. La, Gd and Lu exhibit only +3 oxidation state.
55. The first and second ionization energies of lanthanides are close to those of calcium.
56. Due to the radioactivity of actinide elements the emitted particles upon their decay are energetic enough to break bonds and to disrupt crystal structures of the compounds.
57. Uranium oxides are usually non-stiochoimetric.
58. Sm^{2+} causes evolution of hydrogen upon its reaction with water indicating its reducing character.
59. Uranyl nitrate crystallizes with six, three or two water molecules depending on the concentration of nitric acid.
60. Lower oxidation states than +4 of Th can be obtained by using suitable reducing agents in solutions.
61. The lanthanide fluorides are insoluble even in 3M HNO_3 and this can be considered as a test for lanthanides.
62. Electronegativity values of lanthanides are comparable to aluminium.
63. There is a slight decrease in electronegativity in the lanthanide series by increasing atomic number due to lanthanide contraction.

64- All octahedral complexes will have the exact same MO theory diagram, only the number of P- electrons will change

65-The d-electrons in the T_{2g} and e_g^* of MO theory use in determine the ligand field and shape

66- Strong field- ligands have e_g^* is raised in energy and Δ_0 is small

67-Ligands whose interact weakly with metal ions in strong -field ligands

68- E_g^* is raised only slightly in energy and is small Δ_0 in weak-field ligands

69-Low spin define by least number of paired electrons favoured by strong field ligands

70-$[Co(NH_3)_6]^{+3}$ absorbs light with wavelength at 437nm, the Δ_0=274 kJmole^{-1}

($h=6.626\times10^{-34}$ JS, $C=3.0\times10^{8}ms^{-1}$)

71- HOMO definition of σ – bonding electron pair donor to metal ion

72-In antibonding orbitals , the electrons in these orbitals push atoms apart from each other

73-The vivid colors are due to the electronic transitions between the d- orbitals of the ligand

74- Hybridization in tetrahedral geometry includes s, p_x, p_y orbitals.

75- The Jahn-Teller theorem states that: Non linear systems are stable; they will undergo a distortion.

76- The square planar crystal field splitting energy is larger than in octahedral and tetrahedral fields.

77- Tetrahedral d^4 complexes have 4 unpaired electrons.

78- Square planar d^7 complexes are paramagnetic.

79- The d-orbitals that feel strong repulsion in octahedral geometry are: d_{xy}, d_{x^2}, d_{yz}.

80- Crystal field strength of the ligand is inverse proportional to splitting energy.

81- $K_4[Cu(CN)_6]$ is diamagnetic.

82- CFSE for d^8 complex ion in tetrahedral field is $-0.8\ \Delta_t + 3P$.

83- $[Ti(H_2O)_6]^{3+}$ has magnetic moment equals 1.73 B.M.

Q4: Shade the correct answer A, B, C or D (1 Mark each)

84. Both thorium and uranium nitrates are soluble in:
A. Water B. Alcohols C. Ketones D. In all of them

85. Due to lanthanide contraction the following two elements have almost similar atomic size:
A. Fe and Ru B. Ni and Pd C. Zr and Hf D. All

86.The stability of the lanthanide oxidation states is connected with the presence of:
A.Empty, half filled or completely filled 4f orbital B.Thermodynamic factors
C. kinetic factors D. all of them.

87.Actinide contraction leads upon increase of atomic number to:
A. Decrease in basicity of elements B. increase in basicity of elements
C. irregularity in basicity D. no effect.

88- .....due to maximum number of unpaired electrons and favored by small Δ0
A. Low spin B. High spin C. Non spin D. All of them

89-Strong field ligands have large Δ_0 favors pairing up in T_{2g} MO theory with :
A. $\Delta_0 > \prod$ B. $\Delta_0 < \prod$ C. $\Delta_0 = \prod$ D. Non of them

90- In LFSE the treat electrons in T_{2g} orbitals as stabilized by:

A. $-3/5\ \Delta_0$ B. $+2/5\ \Delta_0$ C. $-2/5\ \Delta_0$ D. $+3/5\ \Delta_0$

91- In LFSE the treat electrons in E_{g^*} orbitals as de stabilized by:

A. $+3/5\ \Delta_0$ B. $+2/5\ \Delta_0$ C. $-3/5\ \Delta_0$ D. $-2/5\ \Delta_0$

92- d7 metals in weak field ligands have LFSE (Δ_0) equal:

A. $-4/5\ \Delta_0$ B. $-2/5\ \Delta_0$ C. $-9/5\ \Delta_0$ D. $+4/5\ \Delta_0$

93- In $[Co(NH_3)6]^{+3}$ complex have a total of :

A.16 molecular orbitals B. 12 molecular orbitals C. 15 molecular orbitals D. non of them

94-Atom in the ligand with a p-orbital directly approaching the metal ion to from :

A. σ -- bond B. π – bond C. π^* -- bond D. σ^*- bond

95- Out of the following which is inner orbital complex?

A. $[Fe(CN)_6]^{3-}$ B. $[FeF_6]^{3-}$ C. $[Ni(H_2O)_6]^{2+}$ D. None of the above

96- The magnetic moment of $[V(CN)_6]^{3-}$ is expected to be:

A. more than 2.83 B.M. B. less than 2.83 B.M. C. equals 2.83 B.M. D. diamagnetic

97- $[Mn(CN)_6]^{4-}$ has magnetic moment equals to:

A. 3.87 B.M. B. 5.92 B.M.

C. 1.73 B.M. D. 4.90 B.M.

98- Valence bond theory often requires measurement of:

A. Optical activity C. Dipole moment

B. Molar conductance D. Magnetic moment

99- Which of the following complex ions shows zero CFSE:

A. $[Mn(H_2O)_6]^{3+}$ B. $[Co(H_2O)_6]^{2+}$ C. $[Fe(H_2O)_6]^{3+}$ D. $[Co(H_2O)]^{3+}$

100- The d-orbitals which can be involved in the hybridization of $[CuCl_5]^{3-}$ complex ion are:

A. d_{z2} or d_{x2-y2} B. d_{x2-y2} C. d_{z2} D. None of them

Atomic numbers:Ti=22;V=23;Cr=24;Mn=25;Fe=26;Co=27;Ni=28;Cu=29;Zn=30;Rh=45;Au=79;Hg=80.

Good Luck

ExaminarsProf. Dr. Aref Aly, Prof. Dr. Mohamed Abd elhakeem, Prof. Dr. Asma Ibrahim

Assiut University Faculty of Science Chemistry Department	Second Semester Analytical Chemistry (I) (C-342) Third Level (Credit Hours)	2021 Time Allowed: 2 hours

Answer the Following Questions:

Section (A): Final Examination (50 Marks)

Mark (√) for the correct statement and (X) for the wrong statement:

1. Auxiliary electrode is used in polarography to reduce the residual current.
2. The current is due to concentration gradient of electroactive species in polarography is diffusion current.
3. Supporting electrolyte is a reactive electrolyte used in electrochemical cells.
4. Convection current in polarography is eliminated by addition of KCl.
5. In polarography, the electroactive species will undergo always oxidation.
6. Polarizable electrode such as DME can take up any potential applied to it.
7. Hg is oxidized; it restricts the use of electrode as cathode.
8. Heyrovsky-Ilkovic equation determines the number of electrons from the intercept.
9. Working electrode does not enter in the redox reaction while it is so important in keeping a constant reference electrode potential.
10. Carbon working electrodes have faster electron transfer rates than metal electrodes.
11. Solvents used in voltammetry should not undergo electrochemical reactions over a wide range of potential.
12. Current of polarizable electrode remains unchanged with changes in the electrode potential.
13. Various functional groups, such as C=O and NO_2 are oxidized in the polarographic range.
14. In anodic stripping methods, the reference electrode behaves as a cathode during the deposition step.
15. Reference electrodes should possess a high signal-to-noise ratio characteristic.
16. For reversible systems E_{pa} and E_{pc} are dependent on the scan rate.
17. One problem with data detection in DC polarography is that current varies over lifetime of drop, giving variation on current over curve.
18. For a fast one electron transfer, the peak separation (ΔE_P) = 59 mV.

19. The relationship between the half-peak potential ($E_{P/2}$) to the polarographic half-wave potential ($E_{1/2}$) is $E_{P/2}$ (mV) = $E_{1/2} \pm 29/n$

20. The pulse waveforms are designed to enhance the capacitive current relative to the Faradaic current, leading to significantly improved detection limits.

21. In cyclic voltammetry the half-wave potential defined simply as a median between the cathodic and the anodic peak potentials.

22. The shape of the cyclic voltammograms gives information about the type of the electrode reaction and the number of electrons involved in the electrochemical transformation.

23. In linear sweep voltammetry, the potential scan rate is usually much faster than with DC polarography.

24. In normal pulse voltammetry, the output of the current response is a symmetric peak.

25. Diffusion is the movement of ions from a region of lower concentration to a region of higher concentration.

26. Differential pulse polarography is more sensitive than normal pulse.

27. The potential of the working electrode versus a reference electrode is varied linearly with concentration.

28. Electrochemical cell is made up of three electrodes immersed in a solution containing the analyte and also an excess of a reactive electrolyte.

29. The principle function of a potentiostat is to control potential and measure current.

30. Microelectrodes reach the state of polarization very rapidly.

31. The presence of O_2 often interferes with the accurate determination of other species.

32. The half wave potential ($E_{½}$) can be used to identify the analyte concentration.

33. Faradaic processes are those which involve the transfer of electrons across the electrode-solution-interface and do not obey Faraday's Law.

34. Working electrodes should possess a high signal-to-noise ratio characteristic.

35. Supporting electrolyte is used in polarography to minimize diffusion current.

36. Auxiliary electrode is used in polarography to reduce the convection current.

37. The potentiostat's internal feedback circuits prevent current from flowing between the working electrode and reference electrode.

38. Surface area of polarizable electrode is very small.

39. Normal pulse is about 5-10 times more sensitive than differential pulse polarography.

40. Migration is the movement of ions from a region of lower concentration to a region of higher concentration.

41. In polarography, a plot of current as a function of applied potential is called a voltammograms.

42. In anodic stripping methods, the working electrode behaves as a cathode during the deposition step.

43. One important application of amperometry is in the construction of electrochemical biosensors.

44. Peak current for a reversible couple is given by the Ilkovic equation.

45. In polarography, the electroactive species will undergo always reduction.

46. Hg forms soluble amalgam with many metals hence lowers their oxidation potentials.

47. Auxiliary electrode does not enter in the redox reaction while it is so important in keeping a constant reference electrode potential.

48. Polarizable electrode such as Ag/AgCl can take up any potential applied to it.

49. Carbon paste electrodes have slower electron transfer rates than metal electrodes.

50. In normal pulse polarography diffusion layer is thinner than that of DC polarography due to short pulse duration.

Section (B): Midterm Exam + Oral Exam (30 Marks)

Choose the Correct Answer:

51. The main features of the ..... are the cathodic and anodic peak potentials, the cathodic and anodic peak currents

(a) Differential pulse voltammetry (b) Normal pulse (c) Cyclic voltammetry

52. Current is sampled twice in .....

(a) Normal pulse (b) Cyclic voltammetry (c) Differential pulse polarography

53. The diffusion current in polarography is expressed by .....

(a) Randles-Sevcik equation (b) Ilkovic equation (c) Boltazmann equation

54. Auxiliary electrode is used in polarography to reduce .....

(a)The residual current

(b) The current passing through reference electrode

(c)The migration current

55. Convection current in polarography is eliminated by ----------

(a) Addition of KCl (b) Unstirred solution (c) Addition of acetate buffer

56. The current is due to concentration gradient of electroactive species in polarography is --------

(a) Diffusion current (b) Migration current (c) Convection current

57. Differential pulse polarography is more sensitive than ----------

(a) Normal pulse (b) Cyclic voltammetry (c) Square wave voltammetry

58. ---------- defined as the height of the potential pulse.

(a) Pulse amplitude (b) Pulse width (c) Sampling period

59. In ---------- small pulses of constant amplitude are superimposed on a staircase wave applied to the working electrode

(a) Differential pulse voltammetry (b) Normal pulse (c) Cyclic voltammetry

60. One of the advantages to measuring the difference current in square wave voltammetry is -----

(a) Increase of the discrimination of the charging current

(b) Decrease of the discrimination of the charging current

(c) The output of the current response is a sigmoidal curve

61. The main instrumental parameter in the ---------- is the scan rate

(a) Differential pulse voltammetry (b) Cyclic voltammetry (c) Normal pulse

62. The potential of the working electrode versus a reference electrode is varied linearly with ------

(a) Time (b) Current (c) Scan rate

63. The principle function of a potentiostat is to control ----------

(a) Potential and measure current

(b) Potential and measure time

(c) Current and measure potential

64. ---------- which is the duration of the potential pulse

(a) Pulse amplitude (b) Pulse width (c) Sampling period

65. Ilkovic equation forms the basis of ---------- analysis.

(a) Quantitative (b) Qualitative (c) Spectroscopic

66. One of the advantages to measuring the difference current in square wave voltammetry is -----

(a) Increase of the discrimination of the faradic current

(b) The output of the current response is a sigmoidal curve

(c) The output of the current response is a symmetric peak

67. From the given sentences select the incorrect one for solid electrodes based on carbon

(a) Broad potential window

(b) Low background current

(c) Faster electron transfer rates than metal electrodes

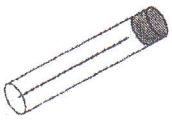
68. The output of a voltammetric analysis of an electroactive analyte is ----------

(a) Current-time curve

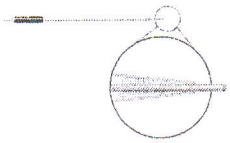
(b) Charge-time curve

(c) Current-potential curve

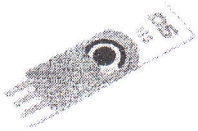
69. Which of the following represents screen-printed carbon electrode



(a)



(b)

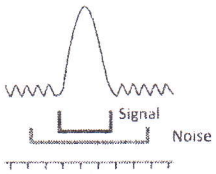


(c)

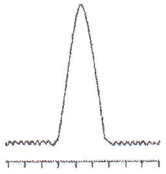
70. The current arises due to charging of mercury drop that grows is known as ---------

(a) Capacitive current (b) diffusion current (c) Faradic current

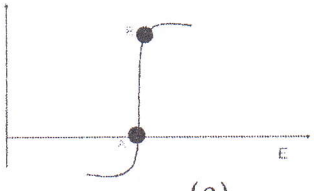
71. Which of the following illustrates high signal-to-noise ratio characteristic



(a)



(b)



(c)

72. ---------- is a potential at which polarographic wave current is equal to one half of diffusion current

(a) Half-wave potential ($E_{½}$) (b) Decomposition potential (c) Peak potential

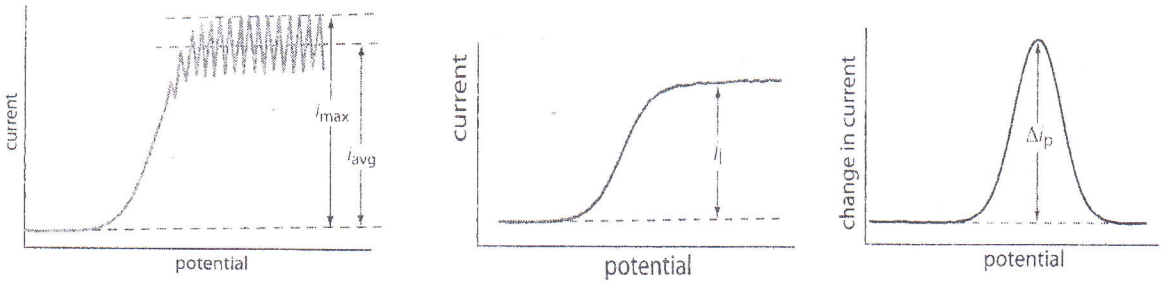
73. In polarography ---------- is used as non-polarizable electrode

(a) Glass electrode (b) Hydrogen electrode (c) Standard calomel electrode

74. The dissolved oxygen is reduced at the dropping mercury electrode to produce ..... polarographic waves

(a) One (b) Two (c) Three

75. Which of the following illustrates sampled current polarography



(a) (b) (c)

76. Various functional groups, such as ..... are reduced in the polarography.

(a) C=O and $-NO_2$ (b) C=O and –OH (c) -N=N- and –OH

77. Which of the following represents Randles-Sevcik equation (at 25 °C)

(a) $I_P = (2.69\times10^{-5}) A C n^{3/2} D^{½} v^{½}$

(b) $I_P = (2.69\times10^{-5}) n^{½} A C D^{½} v^{½}$

(c) $I_P = (2.69\times10^{-5}) A C (n D v)^{½}$

78. Which electrochemical technique measures current at fixed potential?

(a) Amperometry (b) Anodic stripping voltammetry (c) cyclic voltammetry

79. Which of the following techniques has the highest sensitivity?

(a) Differential pulsed polarography

(b) Anodic stripping voltammetry

(c) Normal pulse polarography

80. The reversible oxidation of paracetamol (PC) is a $2e^-$ process. A cyclic voltammetric anodic peak current (I_{pa}) of 2.2 µA is observed for 0.4 mM solution of PC in acetate buffer at carbon paste electrode of 2.6 mm^2 with a scan rate of 25 mV/s. What will I_{pa} be for v =100 mV/s and 1.2 mM PC?

(a) I_{pa} = 13.2 µA (b) I_{pa} = 1.1 µA (c) I_{pa} = 26.4 µA

♣♣ GOOD LUCK ♣♣

Examiner: Dr. Hossieny Ibrahim paracetamol

Assiut University 2020/2021

Faculty of Science Time Allowed: 3 hours

Chemistry Department

Final Exam of advanced synthetic Organic Chemistry - (3rd chemistry students (314 C)

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Part I: Final Exam (50 marks)

Q1: Shade the correct answer; A, B or C (2 Mark each)

1) Preferential selective of one side over another is defined as

A) stereioselectivity B) regioselectivity C) chemoselectivity)

2) Birch reduction of N,N-dimethylbenzene gave

A) 2,5-dihydro B) 1,4-dihydro C) 1,3-dihydro

3) Kinetic and thermodynamic control is defined as a type of

A) stereioselectivity B) regioselectivity C) chemoselectivity)

4) In the reduction of alkynes to trans alkene the catalyst used is.

A) Wilkinson B) Lindlar C) Li/NH_3

5) Oxidation of sec. alcohol over primary one could be obtained by using

A) Cr(VI) B) $AgCO_3$/Celite C) DMP)

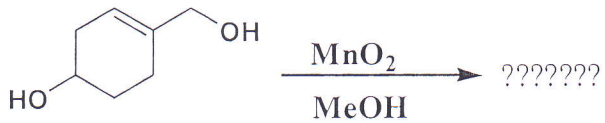
6) The reaction of Cinnamic acid (PhCH=CH-COOH) with hydrazine in H_2O_2, gave.

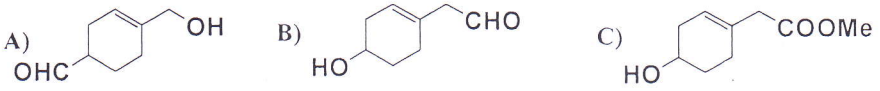
A) $PhCH_2CH_2COOH$ B) $PhCH{=}CHCH_2OH$ C) $PhCH_2CH_2CH_2OH$)

7) The product for the reaction of cyclohexanone with pyrrolidine is defined as

A) enamines B) imines C) Schiff bases

8) The main product of this reaction





9) The suitable reagent for this reaction

A) Et_3N/ROH/60C B) LDA/THF (-78 C-Ether) C) NaOEt/EtOH)

10) Thermodynamic enolates can be accelerated by using

A) Low temp. B) protic solvent C) strong base)

11) In Moffatt oxidation the DMSO was activated by

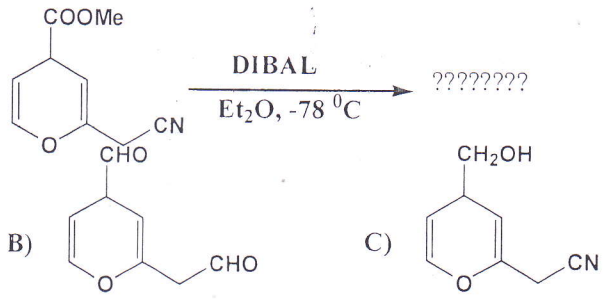
A) Oxalyl chloride B) DCC C) IBX

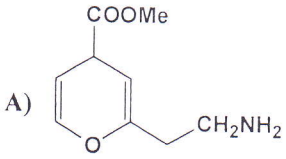
12) Reaction of $CH_3COOC_2H_5$ with LDA/ THF gave major

A) Cis Enolate B) Trans Enolate C) None of them

13) Hydration of Alkynes to produce carbonyl compounds is a type of

14) The main product of this reaction is

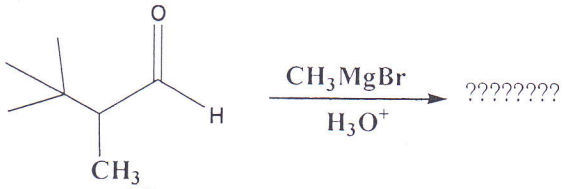


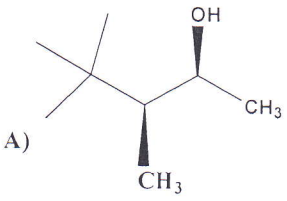
A) 

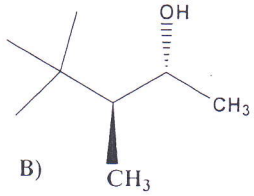
B)

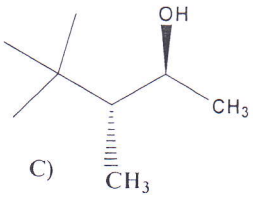
C)

15) The main product of this reaction is

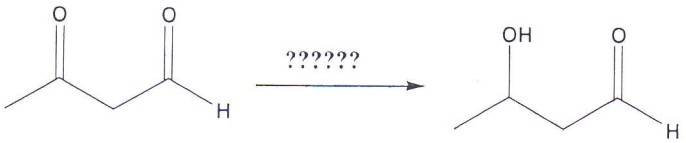


A) 

B) 

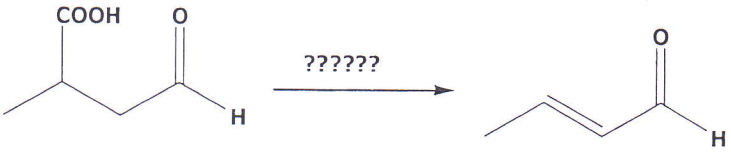
C) 

16) The suitable reagent for this reaction



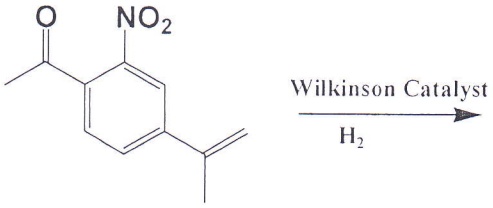
A) NH=NH B) $NaBH_4$/ $CeCl_3$ C) $LiAlH_4$

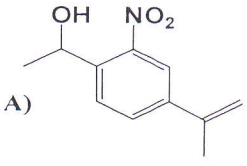
17) The suitable reagent for this reaction



A) DMS B) LTA C) PCC

18) The main product of this reaction is



A) 

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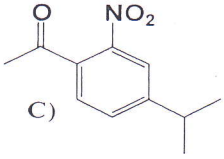
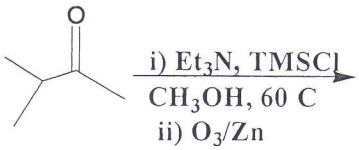
C) 

19) The main product of this reaction is

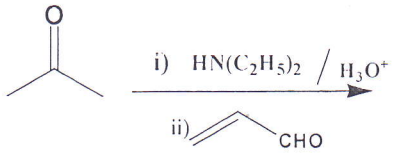


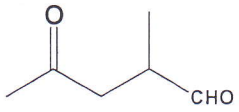
A) Acetone + Acetic Acid B) Isobutyric acid + Formaldehde C) Acetaldehyde + Acetic Acid

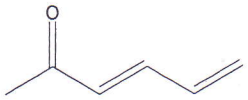
20) Trans Li Enolate was obtained when the carbonyl is attached to

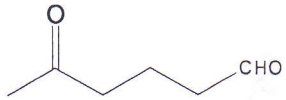
A) OCH_3 B) $N(CH_3)_2$ C) ' Butyl

21) The main product of this reaction is



A) 

B) 

C) 

22) The Suitable reagent for the reduction of C=O to CH_2 is

A) NH_2NHTs B) $H_2/Pd/c$ C) NH=NH

23) Birch reduction of 1-Naphthalin carboxylic acid gave

A) 1,4-Dihydro-naphthalene B) 5,8-Dihydro-naphthalene C) Decahydro-naphthalene

24) A Baeyer-Villiger oxidation is a type of reaction to convert

A) Ketones to Sec.Alcohol B) Aldehydes to Carboxylic acids C) Ketones to esters

25) Reaction of PhCHO with CH_3MgBr is a type of

A) Regioselectivity b) enantioselectivity C) chemoselectivity

****

Part II: Medterm, Activity, Oral (50 Marks)

Q2: Shade the correct answer; A, B or C (2 Mark each)

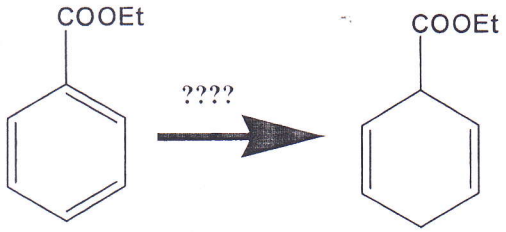
26) The reaction of alcohols with DMP is a type of

A) Rearrangement B) Oxidation C) Reduction

27) The reaction of 2-methylcyclohexanone with LDA/ THF, -78 C and then with Ethyl bromide gave

A) 2-methyl-2-ethyl-cyclohexanone B) 2-ethyl-6-methylcyclohexanone C) 6-ethyl-2-methylcyclohexanone

28) The Suitable reagent for this reaction is



A) $H_2/pd/c$ B) Li/NH_3 C) NH=NH

29) The Suitable reagent for this reaction is

A) Jones reagent B) LTA C) PDC

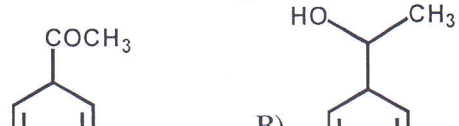
30) Reduction of Alkynes to Cis Alkenes was done by using

A) Na/NH_3 B) H_2/Ni C) $H_2/Pd/BaSO_4$, qnioline

31) Chair-Like Transtion state explain the

A) Degree of selectivity B) Trans and Cis enolate C) Majority of selectivity

32) Complete Birch Reduction of $PhCOCH_3$ gave



33) MnO_2 is a selective to oxidize

A) Sec. alcohols B) Ketones C) Allylic Alcohols

34) DIBAL is a good selective reducing agent for

A) Ketones B) Alkynes C) Esters

35) The reagent which used in Swern reaction is

A) DMSO/ $(COCl)_2$ B) PCC/DCM C) CrO_3/ H_2SO_4

36) Addition of HCl to 1-propene is a type of

A) Regioselectivity B) enantioselectivity C) chemoselectivity

37) The reduction of 1,3-pentadiene to give 2-pentene was obtained by using

A) $(Ph_3P)_3RhCl$ B) NH=NH C) DIBAL

38) In Baeyer Villigar reaction the using of CF_3COOOH could

A) Enhance the reaction B) Inhibit the reaction C) did not effect

39) Resmound Reaction is to obtain An Aldehyde from

A) Alcohols B) Nitriles C) Acid Chlorides

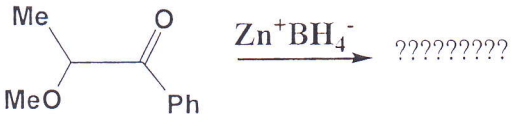
40) Reaction of 1-propanol with PDC/ DMF gave

A) Propionic Acid B) Propanaldehyde C) propane

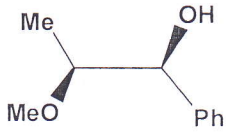
41) The suiatable reagent to obtain formaldehyde from ethylene gylycole is

A) PCC B) LTA C) DMP

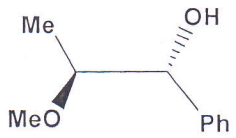
42) The main product of this reaction is



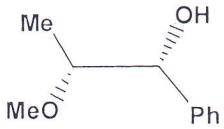
A)



B)



C)



43) The major product of the reaction of Isopropyl ethyl ketone with LDA/THF, -78 C is

A) Cis Enolate B) Thermodynamic enolate C) Trans Enolate

44) LDA is the Strong base to forming enolate due to its

A) High nucleophile B) Great PK_a value C) Smaller structure

45) The reduction of β-Keto ester to give β-hydroxy ester could be obtained via

A) $LiALH_4$ B) $NaBH_4$ C) NH=NH

****

Q3: Shade (T) for the true statements or (F) for false statements: (1 Mark each)

46) In the nucleophilic addition to Ketones the greater nucleophile give rise to greater distereoselectivity.

47) Heterogenous catalyst are not easier to remove from the reaction mixture.

48) CH_3COCl is reduced to CH_3CHO by using Lindlar Catalyst

49) Reaction of Diethylketone with Dihexyl Boron chloride in Et_3N gave trans boron enolate as major

50) Saturated alcohols with δ hydrogen atom reacts with LTA to give Furan ring

51) Wilkinson Catalyst reduce only the less hindered alkenes

52) Aldehydes are more active than ketones in the reduction using $NaBH_4$/ $CeCl_3$

53) Boron enolates is much more selective than Li enolates.

54) In Felkin-anh model the electronegative group is considered as a larger group.

Assiut University
Faculty of Science
Chemistry Department

Time: 3 and half hrs
Date: 19-06-2021

Final Examination of Natural Products and Biochemistry for 312C Students

Section A: Natural Products Chemistry:

Q1: Choose the correct answer A, B, C or D (One Mark each) (Final): (25 Marks)

1. Ozonolysis of α-farnecene gives the following compounds:
   A. Formic acid and pyruvic acid
   B. Formaldehyde, acetone and malonic acid
   C. Formaldehyde, acetone, pyruvic acid and laevulic acid
   D. All the pervious.

2. Oxidation of Citral with $KMnO_4$ followed by CrO_3 gaves one of the following compounds:
   A. Glycoxal, laevulaldehyde and acetone.
   B. Laevulic acid, acetone and acetone
   C. Laevulaldehyde, oxalic acid and acetone
   D. All the pervious.

.3. Reaction of Citral with K_2CO_3 gave one of the following compounds:
   A. laevulic acid, acetone and acetic acid
   B. Acetaldehyde and methyl-2-heptenone.
   C. Acetaldehyde, acetone and laevulaldehyde
   D. All the pervious.

4. Reaction of linalool with acetic anhydride gave one of the following compounds:
   A. Geranyl acetate and acetic acid.
   B. Geranyl acetate only.
   C. 4 mole laevulic acid, succinic acid and 1 mole acetone.
   D. All the pervious.

5. Conversion Limonene into α-terpinol through one of the following reagents:
   A. $KHSO_4$.
   B. Conc. H_2SO_4
   C. Dilute H_2SO_4.
   D. All the pervious.

6. Prove that the second double bond in Carvone at position 1(7) one the following compounds:
   A. Forming formaldehyde and pyruvic acid
   B. Forming formic acid and not pyruvic acid
   C. Forming formic acid only.
   D. All the pervious.

7. Which triterpenes?
   A. Farnesene
   B. Squalene
   C. Vit.A2
   D. Ambrene

8. Terpene (A) is an optically active liquid formula $C_{10}H_{18}O$. Its hydrogenation (H_2 +Pt) of (A) gives optically inactive a $C_{10}H_{20}O$ product (B). Heating of (B) with conc. H_2SO_4 gave (C), $C_{10}H_{14}$.Ozonolysis of (A) followed by dilute $KMnO_4$ treatment yields (D) acid ($C_7H_{10}O_4$) as the only identified product.

A. Camphor
B. α-Terpineol
C. Linalool
D. Limonene

9. The natural terpenes and sequiterpenes can be isolated using:
A. Steam distillation
B. Extraction by solvents.
C. Expressions
D. All the previous.

10. Bicyclic monoterpenoids classified into:
A. Tujane and carane group.
B. Pinane group
C. Bornane and norbornane
D. All the previous

11. Limonene occurs in various essential oils like:
A. Spearmint & Caraway oils
B. French lavender
C. peppermint oil
D. All the previous

12. The bile acids occur stored in the body in:
A. Spleen
B. Kidney
C. Gall-bladder
D. Intestine

13. Reaction of cholestanone with Grinard's reagent followed by selenium indicated one of the following:
A. Location of OH group as secondary alcohol on cholesterol molecule
B. The OH group must be located at sex membered ring
C. Location of the secondary OH group at C-3 of the steroid nucleus
D. All the pervious.

14. Reaction of cholestanone with Zn/Hg indicated one of following:
A. Cholesterol is tetracyclic ring.
B. Diel's hydrocarbon is carbon skeleton.
C. It has formula C_nH_{2n-4}
D. All the pervious.

15. Barbier-Wieland degradation method proves one of the following:
A. Formation of 3',7- dimethyl-1,2-cyclopentenophen- anthrene.
B. Ring © is five membered ring
C. Formation 1,2-dimehylphenanthrene
D. B and C

16. UV irradiation of ergosterol gave one of the following compounds:
    A. Vitamine D1.
    B. Vitamine B12.
    C. Ergocaleiferol
    D. All the pervious.

17. Acetylation of cholesterol followed by oxidation indicated one of the following:
    A. The OH group at C-3.
    B. The connection of side chain at C-17.
    C. The connection of side chain at C-17 and the volume of the side chain.
    D. All the pervious.

.18. Prove that oestrone contains OH-phenolic through one of the following:
    A. Formation diazonium salt with $NaNO_2$.
    B. The diazonium salt couple with oeterone in alkaline medium
    C. Formation azo dye with oestrone molecule.
    D. All the pervious.

19. Heating of oestriol with KHSO4 forming one of the following:
    A. Oestrone is produced with H_2O_2
    B. Oestrone is produced with H_2O
    C. Formation of oestrdiol
    D. All the pervious.

20. Conversion of oestrone into oestriol by Leed et al. pass through one of the following:
    A. Acetylation, $PhCO_3H$ followed $LiAlH_4$.
    B. Acetylation, $PhCO_3H$ followed Zn/CH_3COOH
    C. Acetylation, $PhCO_3H$ followed Na/ethanol.
    D. All the previous

21. Elucidation of the chemical structure of camphor through one of the following:
    A. Preparation of camphor from camphoric acid
    B. The relation between camphor, camphoric acid,
    C. Camphoronic acid and camphononic acid
    D. Preparation of camphoronic acid

22. Distillation of camphor with P_2O_5 gave
    A. Thymol
    B. Carvacrol
    C. p-cymene
    D. p-Menthane

23. 3, 7-Dimethyl-$\Delta^{1,6}$-octa-3-ol is the scientific name one of the following:
    A. Citral
    B. Linalool
    C. Myrcene
    D. Limonene

24. Dipentene is limonene in one of the following:
    A. isomer (+)
    B. Isomer (-)

C. racemic mixture (±)
D. All the previous.

25. The characteristic reaction to the presence of vitamin A1 is the appearance of the blue color when reaction with:
    A. $KMnO_4$
    B. K_2CrO_7
    C. HCl
    D. $Sbcl_3$

Section B: Biochemistry:

Choose (T) for True sentence or (F) for False sentence: (One Mark each) (Final): (25 Marks)

26. Modelling is a sufficient technique to solve 3D protein structure.
27. Side chains of hydrophobic amino acids tend to held together at the interior of the protein molecule.
28. All amino acids containing one amino group and one carboxylic group.
29. Glutamic acid interacts with lysine through hydrophobic interaction.
30. X-ray crystallization can be used to produce high resolution protein structure.
31. NMR spectroscopy can be used to solve the structure of the proteins without size limitation.
32. Radiation damage limits high resolution images of electron microscopy.
33. Electron microscopy is used to study the large biological systems like viruses' structures.
34. Proteins are generally hard to crystallize.
35. Proteins in the crystal are held together by strong forces.
36. Crystals only diffract X-rays when they are dry.
37. Disulphide bond is one of the essential forces that hold the tertiary structure of protein.
38. Acidity of ascorbic acid is due to the stabilization of the ascorbate ion.
39. Diastereomers are differ in more than one chiral center and they are mirror images.
40. Arabinose can be converted to glucose by the oxidation with Br2 water.
41. Tyrosine is the most susceptible amino acid for Phosphorylation.
42. The unfolded protein should have activity.
43. Hydrogen bonds in helix are formed between residue x and residue x+3.
44. Acidic amino acids show lower pKa value than basic amino acids.
45. Disulfide bond formation is one of the post-translational modifications processes in the protein.
46. Different sequences of the proteins must have different structures.
47. Inter-strand hydrogen bonds can form between C=O groups of one strand and N-H groups on an adjacent ß-strand and vice versa.
48. Tertiary structure is assembled from secondary structural elements like α-helix and ß-strand from one polypeptide chain.
49. Glycoprotein on cell surface is important for communication between cells.
50. Insufficient vitamin C will lead to inadequate Lys / Pro hydroxylation and weaker cross-linking of collagens.

Q2: Choose the correct answer A, B, C or D: (One Mark each) (Mid Term + Oral) (30 Marks):

51. Ozonolysis of farnesol gives one of the following compounds:
   A. Formic acid, laevulic acid, acetone.
   B. 2 Laevulic acid, acetone and glucolic acid.
   C. 2 Laevulaldehyde, formaldehyde, acetone and gulcolic aldehyde.
   D. All the pervious.

52. Graded oxidation of α-terpinol with $KMnO_4$ gave one of the following compounds:
   A. Terpenylic acid and terebic acid.
   B. Terebic acid, trihydroxy compounds and keto-lactone.
   C. Trihydroxy compounds, keto-lactone and terpenylic acid
   D. All the pervious.

53. Production of tetracarboxylic acid from oxidation of cholesterol with H_2O_2 and CrO_3 indicated one of the following:
   A. The position of C=C group.
   B. The two C=O group in the1,4-position.
   C. Rings (A) and (B) in the cholesterol are six membered ring
   D. All the pervious.

54. Ozonolysis of ergosterol gave one of the following:
   A. Methylisopropyl acetic acid.
   B. Methylisopropyl acetic acid, acetaldehyde and acid.
   C. Methylisopropyl acetic acid and acid
   D. All the pervious.

55. The relation between the bile acid and the sterols found in one of the following:
   A. Conversion of ergosterol into cholesterol
   B. Conversion of cholesterol into cholinic acid
   C. Conversion of ergosterol into allocholonic acid
   D. All the pervious.

56. p-Mentha-1-ene-8-ol is the scientific name one of the following:
   A. Limonene
   B. Myrcene
   C. α-Terpineol
   D. Ocimene

57. Heating of citral with KHSO4 via Simmeler reaction formed:
   A. p-Cymene
   B. p-Menthane
   C. Geraniol
   D. Geranic acid

58. Synthesis of squalene from franesyl bromide via reaction of
   A. Hoffmann
   B. Diel's-Alder
   C. Emad
   D. Wurtz

59. Steroids are compounds of:
A. Monocyclic
B. Bicyclic
C. Polynuclear
D. All the pervious.

60. Steroids contain four rings A-D. How are these rings connected?
A. A&B: fused; B &C: fused; C&D: bridged
B. A&B: fused; B &C: fused; C&D: spiro
C. A&B: fused; B &C: bridged; C&D: fused
D. A&B: fused; B &C: fused; C&D: fused

61. Ozonolysis of myrcene gave one of the following compounds:
A. Acetone, formic acid, laevulaldehyde
B. 2 Formaldehyde, ketoaldehyde and succinic acid
C. 2 Formaldehyde, acetone and ketoaldehyde.
D. All the pervious.

62. Oxidation of linalool with $KMnO_4$ gave one of the following compounds:
A. Laevulaldehyde, acetone and glycolic acid
B. Laevulic acid, acetone and glycolaldehyde
C. Laevulic acid, glycolic acid and acetone.
D. All the pervious.

63. Reaction myrcene with conc. H_2SO_4 gave one of the following compounds:
A. Geronic acid and citral
B. Gerinol only
C. Gerinol and citral.
D. All the pervious.

64. The general methods used for determination of the structure of natural terpenes
A. Elemental analysis, UV, IR, NMR and mass spectra.
B. Elemental analysis, UV, IR, NMR, mass spectra and synthesis.
C. Elemental analysis, UV, IR, NMR, mass spectra and degradation.
D. All the previous.

65. Confirmation of the relationship between limonene and dipentene via addition of 2 mole of one of the following:
A. H_2SO_4
B. HCl
C. H_3PO_4
D. K_2CO_3

66. Sugars that differ only in their stereochemistry at a single carbon are termed:
A. Epimers
B. Anomers
C. Monomers
D. Diastereomers

67. Oxidation of glucose with nitric acid gives:
A. Saccharic acid
B. Gluconic acid

C. Glucuronic acid
D. Glycolic acid

68. Lactose is a reducing sugar and consists of:
A. Glucose + fructose, linked 1-2'
B. Two glucose units linked 1-4'
C. Galactose + glucose linked 1-4'
D. Two glucose units linked 1-5'

69. Maltose is a reducing sugar and consists of:
A. Glucose + fructose, linked 1-2'
B. Two glucose units linked 1-4'
C. Galactose + glucose linked 1-4'
D. Two glucose units linked 1-5'

70. Cellulose is a polysaccharide composed of several thousand of D-glucose units jointed by:
A. β-(1, 4') glycosidic linkage
B. β-(1, 2') glycosidic linkage
C. β-(1, 5') glycosidic linkage
D. β-(2, 5') glycosidic linkage

71. Reaction of glucose with excess phenyl hydrazine followed by hydrolysis with conc. HCl gives:
A. Glucosone
B. Phenylglucoazone
C. Fructose
D. D-Arabinose

72. Which one of the following acids converts glucose to 5-hydroxymethyl furfural aldehyde?
A. Conc. H_2SO_4
B. Conc. HCl
C. Conc. HNO_3
D. Conc. HF

73. Which one of the following acids converts fructose to elemental carbon?
A. Conc. H_2SO_4
B. Conc. HNO_3
C. Conc. HCl
D. Conc. HF

74. Which one of the following is not reducing sugar?
A. Maltose
B. Lactose
C. Sucrose
D. Glucose

75. Osazones are not formed with:
A. Glucose
B. Maltose
C. Lactose
D. Sucrose

76. D and L forms are determined by the orientation of the hydroxyl group (–OH) around:

A. The pre-last carbon atom
B. Last carbon atom
C. First carbon
D. Second carbon

77. The gradually change of rotation of α and β anomers of glucose to equilibrium value is called:

A. Epimerization
B. Mutarotation
C. Condensation
D. Cyclization

78. Which pair of the following sugars gives the same osazone:

A. Glucose & mannose
B. Glucose & galactose
C. Mannose & galactose
D. Glucose & Lactose

79. Which one of these amino acids is not optically active?

A. Cysteine
B. Lysine
C. Arginine
D. Glycine

80. Proteins are made up of α-amino acids units, linked together by:

A. Peptide linkage
B. Glycosidic linkage
C. Phosphodiester linkage
D. Ester linkage.

Best wishes

أ.د. عبدالعال جابر
د. أحمد محمود

Assiut University
Faculty of Science
Chemistry Department

Chem 334 (Corrosion chemistry) Final exam second semester 2020-21 Time: 3 hours

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Part I State right (R) or false (F) for the following: (50 Q x one mark)

1- Corrosion process depends on pH of the corrosive medium. ( )
2- For corrosion resistant materials selection, it has high passive current (i_p) in the anodic polarization curve. ( )
3- Dry chlorine gas attacks the silver metal surface and form porous non-protective layer of AgCl. ( )
4- Cathodic inhibitor increases the corrosion current of the cathodic polarization branch. ( )
5- Wet corrosion is a heterogeneous process. ( )
6- Physical erosion of materials is look as corrosion. ( )
7- Contamination of the product is an indirect loss resulting from corrosion. ( )
8- Dry corrosion is an electrochemical process. ( )
9- Atmospheric corrosion refers to the corrosive action that occurs on the surface of a metal in an atmospheric environment. ( )
10- Dust particles absorb atmospheric gases like N_2 and SO_2. These corrosive gases combine with moisture and form inhibitors. ( )
11- Crevice corrosion is corrosive attack proceeding evenly over the entire surface area of the metal. ( )
12- The scratched or abraded area is anodic part and the rest of metal is cathode. ( )
13- When two dissimilar metals are in contact: the more active metal works as cathode and the other as anode. ( )
14- Usually the grain boundaries are more active to the grain. ( )
15- The area of the metal in contact with the more dilute solution is nobler to the more concentration ones. ( )
16- The electrolyte velocity affects the corrosion behavior of materials. ( )
17- Pitting occurs under stirred condition of the corrosive media. ( )
18- Pits of the the pitting corrosion are formed regularly on the metal surface. ( )
19- Tapped joints, gasket interfaces, bolts, rivets, etc., may form crevice corrosion. ( )
20- Impurities along grain boundaries cause Intergranular corrosion. ( )
21- Stress corrosion is attack of the metal under specific corrosive environment and presence of stresses on the metal. ( )
22- For corrosion resistant materials selection, it has high current peak at the passivation potential (i_c) in the anodic polarization curve. ( )
23- Oxygen diffuses into the metal matrix in atomic form inducing embrittlement. ( )
24- Erosion-corrosion is fast corrosion caused by relative motion between the metal surface and the corrosive fluid. ( )
25- Corrosion could be induced by Micro-organisms. ( )
26- Thermodynamic provides information on the kinetics of corrosion processes. ( )
27- If two metals are galvanically connected in an aqueous solution, the more electronegative metal will have a tendency to corrode. ( )
28- $M + 2\,n\,OH^- = (MO_n)^{n-} + n\,H_2O + n\,e^-$
, this reaction is dependent on potential and pH. ( )
29- The corrosion process is an exothermic process. ( )
30- Effect of temperature has been considered in the electrochemical potential series. ( )
31- The effect of temperature is not considered in the Pourbaix diagram. ( )
32- The weight loss method can be used to determine the corrosion rate. ( )
33- One metal will displace another above it in the electrochemical series from its salts in aqueous solution. ( )
34- Immunity domain in Pourbaix diagram represents the state in which corrosion is

thermodynamically possible in a particular environment. ( )

35- Nernst equation can be used to calculate corrosion tendency of metals in a given condition. ( )

36- Pourbaix (E/pH) Diagram indicates the effect of pH on potential of a metal. ( )

37- Passive domain in Pourbaix diagram represents the state in which the metal is thermodynamically unstable in a particular environment but corrosion is prevented by formation of surface oxide film. ( )

38- Pourbaix diagrams are used to predict of the environmental changes which will prevent or reduce corrosion attack. ( )

39- Anodic protection for a metal could be performed by lowering the potential down into the immunity domain. ( )

40- Mixed inhibitor shifts both cathodic and anodic branches of the Tafel's lines to lower current. ( )

41- Anodic protection is displaced the metal potential in positive direction by anodic polarization. ( )

42- The entire surface of the passivated metal surface is covered with continuous oxide layer. ( )

43- By weight loss method, the negative result indicates passivation of the tested metal. ( )

44- For corrosion resistant materials selection, it has extended passive range in the anodic polarization curve. ( )

45- The corrosion rate could be estimated from the Pourbaix diagram. ( )

46- At the primary passive potential (E_{pp}), the rate of protective film formation exceeds the rate of the chemical dissolution. ( )

47- The chemical dissolution of the protective passive film is potential dependent. ( )

48- The effect of alloying element or the presence of impurities in the metal has been considered in the Pourbaix diagram. ( )

49- Anodic polarization curves of passive metals can be used for indicate susceptibility of metal to either pitting or intergranular corrosion. ( )

50- The E/pH diagram is used for predicting stability and composition of corrosion product. ( )

Part II Choose the correct answer: (50 Q x one mark)

1-Corrosion occurs at special condition of thermodynamic.

(A) ΔG = +ve (B) ΔG = -ve (C) ΔG = zero (D) none of these

2-Corrosion occurs in .....

(A) non-aqueous media (B) aqueous media

(C) alcoholic media (D) all of these

3- Immunity of the metal occurs at .....

(B) Less positive potential value (B) more positive potential value

(C) Any potential value (D) none of these

4- Corrosion means .....of metal surface

(A)oxidation (B) dissolution (C) destruction (D) any of these

5- Passivity is a metal protection due to formation of surface.....

(A)oxides (B) hydroxides

(C) mixed of oxides and hydroxides (D) any of these

6- A potential-pH diagram could be applied for .....

(A) different metals (B) different alloys

(C) one metal or alloy (D) any of these

7- Best method used for studying metals exhibiting passivity.

(A) galvanostatic (B) potentiostatic

(C) weight loss (D) other

8- Metals more easly passivated has passivation potential (E_{cp}) .....

(A) more positive value (B) less positive value

(C) zero potential (D) other

9- According to polarization break method, the corrosion current (i_{corr}) can be calculated from

(A) $\frac{i_\alpha + i_b}{i_\alpha}$ (B) $\frac{i_\alpha + i_b}{i_\alpha i_b}$ (C) $\frac{i_\alpha i_b}{i_\alpha + i_b}$ (D) $\frac{i_\alpha}{i_\alpha + i_b}$

10- Which current can be used in calculation of the corrosion rate?

(A) I_{crit} (B) I_{corr} (C) i_p (D) other

11- High hydrogen overvoltage is attributed to
(A) an increasing of anodic polarization (B) an increasing of cathodic polarization
(C) an increasing of anodic or cathodic polarization (D) decreasing of anodic or cathodic polarization
12-The rusting of steel structure is the result of formation
(A) hydrated ferrous compound (B) hydrated ferric oxides
(C) hydrated ferric carbonates (D) non-hydrated oxides
13-A direct cost of corrosion is .....
(A)contamination of the product (B) stop of production
(C) inability to use the materials (D) lost of appearance
14-The metal susceptible to pitting corrosion like .....
(A) Zn (B) Cu (C) Pb (D) Cr
15- A direct cost of corrosion is .....
(A) cost of protection (B) occurrence of disaster
(C)stop of production (D) lost of appearance
16- A direct cost of corrosion is .....
(A) loss of voluble product (B) increase the cost of materials
(C) replace corroded materials (D) none of these
17-The metal that forms a stable surface oxide and prevents further corrosion is .....
(A) Zn (B) Mg (C) Fe (D) Al
18-The metal that forms an unstable surface oxide and undergoes back to metal is .....
(A)Fe (B) Mn (C) Pt (D) Cr
19- The cathodic reaction during the zinc corrosion in neutral aqueous solution is .....
(A) $Zn^{2+} + 2\,e^- \rightarrow Zn$ (B) $O_2 + 4\,H^+ + 4\,e^- \rightarrow 2\,H_2O$
(C) $O_2 + 2\,H_2O + 4\,e^- \rightarrow 2\,H_2O$ (D) $2\,H_2O \rightarrow O_2 + 2\,H_2O + 4\,e^-$
20- One is necessary for the corrosion, ...
(A) there must be corroded metal (B) there must be hydrogen ions in the electrolyte.
(C) there must be oxygen in the electrolyte (D) there must be stress on a metal.
21- Caustic embrittlement of boilers is due to hydrolysis of .....
(A) $CaSO_4$ (B) $Mg(NO_3)_2$ (C) $Ca(OH)_2$ (D) Na_2CO_3
22-Dry corrosion is like .....
(A) reaction of steel in hot acid solution (B) reaction of steel in hot gases
(C) reaction of steel in hot moisture (D) reaction of steel in hot liquid
23- A direct reaction of oxygen with the metal in absence of moisture is considered as .....
(A) oxidation corrosion (B) wet corrosion (C) pitting corrosion (D) general corrosion
24- The tin metal forms on the surface .....
(A) unstable oxide (B) non adherent oxide (C) stable oxide (D) stable carbonate
25-Pitting corrosion occurs under ..... electrolyte condition.
(A)stirring (B) hot (C) de-aerated (D) stagnant
26- For protection of a steel tank which metal is used as a sacrificial anode
(A)Al (B) Cu (C) Ni (D) Mg
27-Dust particles absorb moisture from the air due to their ..... nature
(A)microscopic (B) hygroscopic (C) heterogeneous (D) catalytic
28-..... ...corrosion occurs when dissimilar metals are physically joined in the presence of an electrolyte.
(A) pitting (B) uniform (C) galvanic (D) crevice
29- ..... corrosion is a localized form of corrosive attack.
(A) uniform (B) crevice (C) galvanic (D) atmospheric
30-Some inorganic compounds work as cathodic inhibitors like .....
(A)K_2SO_4 (B) KOH (C) Na_2CO_3 (D) $ZnSO_4$
31- Crevice corrosion is usually attributed to .....
(A)mechanical stress (B) high temperature (C) lack of conductivity (D) lack of oxygen
32- Intergranular corrosion is a form of corrosion occurs along .....
(A)cracks (B) grain boundaries (C) surface dislocations (D) crevice
33- Dezincification is an example of..... corrosion.

(A) stress (B) galvanic (C) de-alloying (D) intergranular

34-Some sulfate reducing bacteria produce ....., on the metal surface.

(A)H_2S (B) H_2SO4 (C) SO_2 (D) S

35-The relative motion between the metal and the corrosive fluid causes .....

(A)stress (B) intergranular (C) crevice (D) erosion-corrosion

36-The metallic structure to be protected (base metal) is connected by a wire to a more anodic metal so that all corrosion is concentrated at this more anodic metal which is.....

(A)cathodic protection by impressed current (B) cathodic protection sacrificial anode

(C)anodic protection (D) another method

37- Compounds are electron rich materials that can be adsorbed on the metal surface and decrease the corrosion rate.

(A)passivators (B) inhibitors (C) oxygen scavengers (D) promoters

38-There are compounds which react with dissolved oxygen and remove it from the neutral or alkaline corrosive environment, these compounds known as .....

(A)passivators (B) inhibitors (C) oxygen scavengers (D) promoters

39- Some compounds react to form oxide films on the anodic sites of corroded metal, these compounds known as .....

(A)passivators (B) inhibitors (C) oxygen scavengers (D) promoters

40- For material selection of nitric acid storage tank is .....

(A)tin (B) polymer (C) stainless steel (D) Cu alloy

41- For material selection of distilled water storage tank is .....

(A)tin (B) Al (C) stainless steel (D) steel

42- The corrosion rate can be decreased by

(A)decreasing anodic polarization only (B) increasing anodic or cathodic polarization

(C) decreasing cathodic polarization only (D) decreasing anodic or cathodic polarization

43- Some compounds are used as oxygen scavengers like.....

(A)Na_2SO_3 (B) Na_2SO_4 (C) $CaCO_3$ (D) K_2SO_4

44- Some compounds are used as passivators , such as .....

(A)Cr_2O_3 (B) NaOH (C) NH_3 (D) $NaNO_2$

45- In E/pH diagram, the domain in which the metal corrosion is thermodynamically impossible.

(A)passive (B) corrosion (C) immunity (D) other

46- The metal has higher susceptibility for passivation with .....

(A)higher i_{crit} (B) higher i_p (C) lower i_{crit} (D) lower i_p

47- Substances when added in very small quantities to the electrolyte solution decrease effectively the corrosion rate are known as .....

(A)passivators (B) inhibitors (C) oxygen scavengers (D) promoters

48- The principal cause of corrosion problems encountered in the field use of equipment .

(A) high temperature (B) low quality of materials (C) water intrusion (D) bad coating

49- Dust particles enhance atmospheric corrosion rate because.....

(A) they absorb moisture from air (B) they can form galvanic couple with the metal

(C) they absorb atmospheric gases (D) all of these

50- The advantage of the cathodic protection mehod using sacrificial anode is

(A)low cost method (B) simple method (C) does not required energy (D) all of these

مع اطيب الامنيات بالتوفيق

ا د ابوالحجاج عبدالعزيز هرماس

د مصطفى حسن وهدان

Assiut University
Faculty of Science
Chemistry Department

June 2021
Time allowed: 3 hours
Second Semester

Physical Chemistry III Examination (C-332) for Third Level Students

Note: The Examination is in Five pages. Shade the correct answer in the bubble sheet as shown ● and do not shade more than one circle for each statement:

Section I: Final Examination: *(50 Marks, 25 points, 2 Marks for each point)*

Q1: Choose and shade the correct answer among (A), (B) or (C) for each statement of the following statements: (20 Marks, 10 points, 2 Marks for each point)

I- Quantum Chemistry Section

1- From black body radiation phenomenon, according to Stefan-Boltzmann law, the emittance (M) is directly proportional to

(A) T^2 (B) T^4 (C) T^3

2- From heat capacity phenomenon, according to Debye's law, the heat capacity directly proportional to

(A) T^2 (B) T^4 (C) T^3

3- From Bohr's model of hydrogen atom, the Bohr radius for hydrogen atom is

(A) 0.53 Å (B) 5.3 Å (C) 53 Å

4- The Laplacian (Laplace operator) is

(A) $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}+\frac{\partial^2}{\partial z^2}\right)$ (B) $\left(\frac{\partial}{\partial x}+\frac{\partial}{\partial y}+\frac{\partial}{\partial z}\right)$ (C) $\left(\frac{\partial}{\partial x^2}+\frac{\partial}{\partial y^2}+\frac{\partial}{\partial z^2}\right)$

II- Molecular Spectroscopy Section:

5- Find the frequency at which a proton NMR spectrometer should be operating under a magnetic field 1.8 T (g_N = 5.449, μ_N = 5.0504 x 10^{-27} JT^{-1}, h = 6.626 x 10^{-34} Js).

(A) 74.8 MHz (B) 44.7 MHz (C) 67.7 MHz

6- What will be the frequency of radiation for resonance condition for a free electron placed in a magnetic field of strength 0.3 T,

(g=2.0023, Bohr magneton β = 9.273 x 10^{-24} JT^{-1})?

(A) 0.34 MHz (B) 8.4 x 10^9 Hz (C) 4.9 x 10^9 Hz

7- Assuming that the force constant for C≡C, C=C and C–C are in the ratio 3:2:1 and that normal range of C=C stretch absorption is 1630–1690 cm^{-1}, what range would you expect for C≡C stretch vibration?

(A) 2005-2080 cm^{-1} (B) 2005-2095 cm^{-1} (C) 2005-3095 cm^{-1}

III- Kinetic Theory of Gases Section:

8- Calculate the probability density for υ_x of O_2 molecules at 300 K at 300 ms^{-1}.

(A) 8.022×10^{-4} sm^{-1} (B) 1.429×10^{-3} sm^{-1} (C) 1.419×10^{-4} sm^{-1}

9- The vapor pressure of solid beryllium was measured by using a Knudsen cell. The effusion hole was 0.318 cm in diameter, and they found a mass loss of 9.54 mg in 60.1 min at a temperature of 1457 K. What is the vapor pressure?

(A) 0.669 Pa (B) 0.68 Pa (C) 0.968 Pa

10- For molecular oxygen at 25 °C, calculate the collision density Z_{11} at a pressure of 1 bar. The collision diameter of oxygen is 0.361 nm.

(A) 0.26×10^{-8} mol $L^{-1} s^{-1}$ (B) 1.26×10^{8} mol $L^{-1} s^{-1}$ (C) 1.16×10^{7} mol $L^{-1} s^{-1}$

Q2: Choose and shade True (T) for the correct statements or False (F) for the wrong ones for each statement of the following statements: (30 Marks, 2 Marks for each point)

I- Quantum Chemistry Section

11- From black body radiation phenomenon, according to Wien's displacement law, λ_{max} (the wavelength at which maximum emittance takes place) is directly proportional to absolute temperature. (T) (F)

12- According to Max Planck's hypothesis, the electromagnetic oscillators excited by discrete amounts and not continuous. (T) (F)

13- According to classical mechanics, the ejection of electrons depends on the intensity of the incident light, while in quantum mechanics it depends on the frequency of each photon in the incident light. (T) (F)

14- In photoelectric effect, the higher the energy of the photon in the incident light, the lower the kinetic energy of the ejected electron. (T) (F)

15- The quantization of energy is as a result of application of boundary conditions. (T) (F)

II- Molecular Spectroscopy Section:

16- The relative energy levels of the three transition processes are in the order electronic > vibrational > rotational. (T) (F)

17- In asymmetric top molecule, two moments of inertia are equal and the third is not equal to both or zero. (T) (F)

18- CCl_4 shows rotational spectra. (T) (F)

19- Shifting the absorption maximum to longer wavelength means hypsochromic shift. (T) (F)

20- Symmetric stretching in CO_2 is Raman active. (T) (F)

III- Kinetic Theory of Gases Section:

21- The magnitude of most probable speed C_{mp} decreases with an increase in temperature. (T) (F)

22- At constant temperature, a gas with higher molecular mass shows a narrow distribution of speeds compared to that shown by a low-molecular weight gas. (T) (F)

23- At a given temperature, the three molecular speeds C_{rms}, C_{mp}, and $\overline{C}$ can be arranged in the order $C_{rms} > C_{mp} > \overline{C}$. (T) (F)

24- The distribution of energy among molecules depends on temperature. (T) (F)

25- Gases transfer heat by direct collisions between molecules, and their thermal conductivity is low compared to most solids. (T) (F)

Section II: Mid-Term, Oral and Activity Examination

(50 Marks, 25 points, 2 Marks for each point)

Q3: Choose and shade the correct answer among (A), (B) or (C) for each staement of the following statements: (20 Mraks, 2 Marks for each point)

I- Quantum Chemistry Section:

26- The normalization factor of a wavefunctions $\psi_n = A\ sin\frac{n\pi x}{a}$ is

(A) $\frac{a}{2}$ (B) $\frac{2}{a}$ (C) $\sqrt{\frac{2}{a}}$

27- In rotational motion, the relation between kinetic energy operator ($\hat{T}$) and angular momentum operator ($\hat{L}$) is

(A) $\hat{T} = \frac{\hat{L}^2}{2I}$ (B) $\hat{T} = \frac{\hat{L}^2}{2}$ (C) $\hat{T} = \hat{L}^2$

28- The energy of degenerate states for a particle moves in a square with length L with one of the two quantum numbers (n_x and n_y) equals one and the second equals two is

(A) $E = \frac{2h^2}{8mL^2}$ (B) $E = \frac{5h^2}{8mL^2}$ (C) $E = \frac{14h^2}{8mL^2}$

29- The normalization factor of a wavefunctions $\psi_+ = C\ e^{im\phi}$ is

(A) $\frac{1}{2\pi}$ (B) $\frac{1}{4\pi^2}$ (C) $\frac{1}{\sqrt{2\pi}}$

30- The number of degenerate states for a particle moves in a cube with length L with one of the three quantum numbers (n_x, n_y and n_z) equals one, the second equals two and the third equals three is

(A) Four states (B) six states (C) two states

31- Schrödinger equation as a function of the spherical polar coordinates is

(A) $\frac{1}{r}\frac{\partial}{\partial r}r^2\frac{\partial\psi}{\partial r}+\frac{1}{r^2 sin\theta}\frac{\partial}{\partial\theta}sin\theta\frac{\partial\psi}{\partial\theta}+\frac{1}{r^2 sin^2\theta}\frac{\partial^2\psi}{\partial\phi^2}+\frac{8\pi^2m^2}{h^2}(E-u)\psi=0$

(B) $\frac{1}{r^2}\frac{\partial}{\partial r}r^2\frac{\partial\psi}{\partial r}+\frac{1}{r^2 sin\theta}\frac{\partial}{\partial\theta}sin\theta\frac{\partial\psi}{\partial\theta}+\frac{1}{r^2 sin^2\theta}\frac{\partial^2\psi}{\partial\phi^2}+\frac{8\pi^2m}{h^2}(E-u)\psi=0$

(C) $\frac{1}{r^2}\frac{\partial}{\partial r}r^2\frac{\partial\psi}{\partial r}+\frac{1}{r^2 sin\varphi}\frac{\partial}{\partial\theta}sin\theta\frac{\partial\psi}{\partial\theta}+\frac{1}{r^2 sin^2\theta}\frac{\partial^2\psi}{\partial\phi^2}+\frac{8\pi^2m}{h^2}(E-u)\psi=0$

II- Molecular Spectroscopy Section:

32- The absorption of 5.4 x 10^{-4} M solution of Fe^{3+} at 530 nm was 0.54, when measured in a cell with 1 cm path length. Calculate molar absorption coefficient.

(A) 10^4 M^{-1} m^{-1} (B) 10^5 M^{-1} m^{-1} (C) 10^3 M^{-1} m^{-1}

33- An irradiated sample of MgO has a strong ESR line at 0.163 T, when the spectrometer is operating at 9.4 GHz. What is the g-value of the line,

(Bohr magneton $\beta = 9.273 \times 10^{-24}$ JT^{-1})?

(A) 4.13 (B) 2.002 (C) 2.005

III- Kinetic Theory of Gases Section:

34- Calculate the root-mean-square speed $(v^2)^{1/2}$ for hydrogen molecules at 0 °C.

(A) 1.5 x 10^3 ms^{-1} (B) 1.84 x 10^3 ms^{-1} (C) 1.69 x 10^3 ms^{-1}

35- What is the mean relative speed of hydrogen molecules with respect to oxygen molecules at 298 K?

(A) 1824 ms^{-1} (B) 2824 ms^{-1} (C) 8.26 ms^{-1}

Q4: Choose and shade True (T) for the correct statements or False (F) for the wrong ones For each statement of the following statements: (30 Mraks, 2 Marks for each point)

I- Quantum Chemistry Section:

36- According to de Broglie's relation, the velocity of the a particle is directly proportional with the wavelength of its accompanied wave. (T) (F)

37- According to Bohr's model of hydrogen atom, the energy is inversely proportional with the principle quantum number (n) of that orbit. (T) (F)

II- Molecular Spectroscopy Section:

38- Would you expect the C = C stretch absorption in the $(CH_3)_2C=C(CH_3)_2$ to be active.

(T) (F)

39- Absorption of microwave rays by any molecule induces vibration process. (T) (F)

40- HBr shows vibrational spectra. (T) (F)

41- O_2 shows Raman spectra. (T) (F)

42- CH_3Cl shows rotational and vibrational spectra. (T) (F)

43- H_2O shows rotational spectra. (T) (F)

44- Cl_2 shows vibrational spectra. (T) (F)

III- Kinetic Theory of Gases Section:

45- The collision frequency of a gas is inversely proportional with the mean speed. (T) (F)

46- The mean relative speed of two different molecules increases with increasing the square root of temperature. (T) (F)

47- In general, the speed distribution curve is wider (broader) at higher temperature than that at lower temperature. (T) (F)

48- Polyatomic molecules besides having transitional motion, they also have rotational and vibrational motions. (T) (F)

49- The distribution of energy among molecules depends on temperature. (T) (F)

50- The speed distribution depends on the molar mass. (T) (F)

(R = 0.082 L atm K^{-1} mol^{-1}, 8.314 J K^{-1} mol^{-1}, 1.987 cal K^{-1} mol^{-1}, Avogadro's number = 6.022×10^{23}, h = 6.626×10^{-34} JT^{-1}, K = 1.381×10^{-23} JK^{-1}).

With Our Best Wishes

Examiners:- 1- Prof. Dr. AbdelRahman A. Dahy 2- Dr. Mostafa Farrag

Assiut University

Faculty of Science
Chemistry Department
Final Examination for 2nd (Industrial Program) Industrial Polymer Chemistry (304 Chem)

Date: Monday, 28/06/2021 **Time: 2 hours**

Answer Eight Only from the following Questions: **(80 points)**

1) How does urea-methanal differ from nylon, Kevlar and Dacron, even though all of them are condensation polymers?
2) Why is the structure of DNA called a double helix? Name its component structure?
3) Why would a hole appear when a dilute alkali is spilt on a fabric made of Kevlar, discuss by mechanism equations ?
4) What are the three main types of degradable plastics? Why are they degradable?
5) What are the two types of polyethene? What is the structural difference between them?
6) Explain the term "vulcanization of rubber". What are the differences between natural rubber and vulcanized rubber?
7) What is a peptide linkage? Illustrate your answer with 2-amino-ethanoic acid ?
8) Write short note about the Bakelite, its properties, and uses?
9) Complete the following table:

Polymer	Abbreviation	Structural formula of monomer	Structural formula of polymer	Uses
Polymethylmetha-acrylate	(i)	(ii)	(iii)	(iv)
Polyvinyl chloride	(v)	(vi)	(vii)	(viii)
Polypropylene	(ix)	(x)	(xi)	(xii)

Good Luck

Examiner:

Prof. Dr. Kamal I Aly

Faculty of Engineering
Assiut University
2nd Semester – Final Exam
2020/2021– June, 2019
Time: 2 Hours
Marks: 100

Industrial chemistry Program
Course: Industrial Pollution Control and Industrial safety
code: Chem 400
3 rd level, – **bylaw:**

Important remarks

This exam measures
- **A.7, b4, c1,, d3, d12**

No. of pages: 5 - No. of questions: 100

الإجابة فى ورقة الأسئلة

Answer the following questions:

A) Write (Yes) or(NO) **(50 marks)**

	الجملةStatement	(Yes) or (NO)
1	Visual pollution is not environmental parameter	
2	The existence of substances into the normal air in quantities less than the permissible value is called air pollution	
3	Mists are considered as particulate pollution	
4	Smoke is considered as gases	
5	parts per million (ppm) are used to measure the concentration of particulate pollutants in the air	
6	Particles smaller than 10 μm are called total dust	
7	Dust concentration is measured by mg/m^2	
8	Exposure time is not affect the health risk of dust breathing	
9	CO can affect the human health	
10	High volume dust sampler is used when dust concentration is high	
11	Cascade impactor is used to measure dust concentration only	
12	The unit to measure dustfall is g/m^2*30 days	
13	Stacks are called movable –source of air pollution	
14	The efficiency of a cyclone dust control depends upon the cyclone diameter	
15	smaller cyclone diameter, lower is the efficiency,	
16	Cyclone dust collectors connected in series are more efficiency than those connected in parallel	
17	Electrostatic precipitators use gravity force to remove the particles from air stream	
18	Higher particle dust resistivity leads to a decrease in removal efficiency.	
19	Scrubbers are used to control gases and particulate pollutants	
20	Fumes are considered as gaseous pollutants	
21	Particles as small as one-tenth of a micrometer can be removed by cyclones	

22	Gravitational settling chamber needs A source of high voltage	
23	Single stage or two stage is considered as a type of bagfilter	
24	Plate type precipitators are horizontal or vertical, depending on the direction of the gas flow	
25	The Electrostatic precipitator is made of a rectangular or cylindrical casing	
26	Continues dust measurements cannot be done for stacks	
27	Low pressure drop is one of the disadvantages of gravitational settling chamber	
28	Settling chambers are mostly used as pre-cleaners for dust control devices.	
29	The usual velocity (V_h) through the settling chamber is high	
30	Cyclones use gravitational forces for removing the fine particles	
31	The efficiency of a cyclone can be decreased by the use of cyclones in parallel	
32	A battery of smaller cyclones can treat a large gas flow	
33	Parallel cyclones capturing smaller particles	
34	Low pressure drop one of the disadvantages of cyclone dust collector	
35	low collection efficiency for particles below 5 μ in diameter,	
36	A decrease in cyclone efficiency at low particulate concentration	
37	Erosion is not considered one of the operating problems of cyclone	
38	ESP is the device uses inertial impaction to remove particles from the air	
39	The cyclone collection efficiency is not affected by with particle size variation	
40	d_{50} is the particle size for which the collection efficiency is 50 % in the cyclone	
41	The safety grounding system is extremely important when using scrubber dust collector	
42	Plate type precipitators are horizontal or vertical	
43	Dry precipitator is used when particulate matter is removed from the collecting electrodes, by rapping only	
44	It is found that the cyclone dust collector is more efficiency than ESP	
45	Particulates can remain suspended in air for a long time based on their size and density.	
46	Smog is considered gaseous pollutant	
47	Part per millions are used to measure the concentration of particle pollutants in the air.	
48	Inertial separators are referred to bag filters	
49	Solid particles of large size and high speed can cause damage to the material by abrasion.	
50	Collection efficiency of ESP is decreased by decreeing the area of plate	

B) Choose the correct answer (Write the letter of correct answer) (50 marks) اكتب الحرف المقابل للإجابة الصحيحة		
		الحرف
51	Which one of the followings is considered to be one of the factors affecting the human health a. Particle color b. Particle diameter c. Not In the above	
52	TLV-TWA is the maximum exposure limit to pollution for a period up to a. 8-Hrs b. 2 Hrs c. 4 Hrs. d. Not In the above	
53	Particle concentration are measured in a. mg/m^2 b. $\mu g/m^4$ c. $count/cm^3$ d. All the above	
54	Respirable particles are those: a. Smaller than 5 µm b. Greater than 10 µm c. All the previous	
55	Particle re-entrainment is a problem facing the a. Cyclones b. Bag filters c. Wet scrubbing systems d. Not in the previous	
56	In Anisokinetic sampling from stacks: a. $U=U_o$ b. $U\#U_o$ c. $U\geq 25V_s$ d. The velocity is not considered	
57	The 10-mm cyclone in personal sampler is used to collect a. Respirable dust b. Coarse dust c. Total dust d. All the previous	
58	Exposure limit of pollutants for 15 minutes is considered as: a. TLV-TWA b. TLV-STEL c. TLV-C	
59	The device that used to measure the dust concentration with the size distribution is a. Laser dust monitor b. Dusttrak c. Personal sampler d. Not in the above	
60	The factor that is not affecting the development of lung diseases is a. composition, b. size c. concentration d. Color	
61	Sampling instruments can be classified according to the a. measured Parameter and design. b. size and shape c. All the previous	
62	The unit of measurement in Laser dust monitor is the : a. Count Per Minute b. $\mu g/m^3$ c. Both the previous	
63	$\mu g/m^2$ is a unit to measure pollution concentration in a .air b. gases c. sound d. Not in the previous	
64	Particles are collected by a combination of several mechanisms such as a. absorption , b. Condensation c. centrifugal impaction, d. Not in the previous	
65	The efficiency of a cyclone dust collector depends upon the: a. Cyclone size . b. Particle size c. Particle density d. All the previous	
66	Dust particles can be considered in: a. Explosive b. color c. Count d. All the previous	

67	Particle shape is more dangerous to human health if it is ; a. irregular b. Spherical c. Both the previous	
68	Classifications of Sampling instruments can be done according : a.The measured parameter b. Their design. c. Both the previous	
69	The unit of measuring the gravimetric dust concentration is : a. PPm b. count c. Percentage d. Not in the previous	
70	DUSTTRAK is device to measure Dust concentration by : a. ppm b. CPM b. Weight / m^3 b. Not in the previous	
71	Deposit gauge is a device used to measure a. Dust size b. Dust fall c. Dust shape d. All the previous	
72	A representative sample from the moving air stream is called : a.Isokinetic sample b.Anisokinetic sample c. Continuous sample	
73	one's surroundings is defined as: a. environmental science b. environmental pollution c. environmental engineering d. Not in the previous	
74	Solids and liquid particles in submicron size are called : i. Smog ii. Smoke iii. dust iv. All the previous	
75	Polluted air can be treated as ideal with respect to :\ a.Temperature and pressure. b. Temperature iii. Pressure	
76	Inertial impaction of particles on the surface of liquid droplets is the dominant control mechanism in : a. Cyclone b. wet scrubbers c. Bagfilter d. All the previous	
77	Jet venture is a device used : a. Dust measurement b. Only dust Control c, Gas and dust control	
78	a. Cyclone b. ESP c. Bagfilter d. Not in the previous .....can handle flammable and explosive dusts	
79	Corrosion problems can be found in a. Cyclone b. wet scrubbers c. d. All the previous	
80	i. Singeing: ii. Napping: iii. iii. All the previous .....is done by passing the filter material over an open flame	
81	Operating Problems in bag filter because : a. humidity b. Temperature c. Rupture d. All the previous	
82	Mechanisms that are used for cleaning the filters in a bag: a. rapping b. Reverse air flow c. vibration, d. All the previous	
83	The design of fabric filters is based on: a. filtering rates b. air-to-cloth ratio b. all the previous	
84	If the particulate matter is sticky or wet, the device to be used for control is a. wet scrubber b. cyclone c. all the previous	

85	Gas control by passing the gas mixture through a solvent is done by: a.Adsorption b Absorption c. Both the previous	
86	Bleeding is a problem facing : a. Cyclone b. ESP c. Bagfilter d. Not in the previous	
87	low filter ratios in case of fabric filter are recommended for: a.high concentration of particulate. b. low concentration of particulate	
88	Among the factors affecting the selection of the filter medium for bag filters: i.Gas flow rate ii. Particle shape iii. Carrier gas composition iv. All the previous	
89	Particles less than 1 micron in diameter ca be collected by : a. Cyclone b. ESP c. scrubbers d. Not in the previous	
90	When using Laser dust monitor, the value of the conversion factor K is calculated as : a. K=C/R b. K=C/R	
91	Nylon cyclone in the personal sampler is used to separate .....to its bottom: a. respirable dust particles. b. non-respirable dust particles	
92	The instrument of dust measurements with particle size is: a.Personal sampler b. Dusttrak c.Cascade impactor iv. All the previous	
93	Error associated with sampling in still air, is due to: a. Particles settling velocity b. Particle inertia. c. All the previous	
94	Anisokinetic sampling is not due to : a. The probe is aligned with gas flow streamlines. b. The velocity in the probe is different from the stream velocity c. The velocity in the probe is same as the stream velocity	
95	Threshold Limit Value-Time weighted Average is for time exposure of : a.40-hour workweek b. 15 minutes c. 12-hour workday	
96	Particle size is a factor affecting the: a. Human health risk b. Selection of dust control devices c. All the previous	
97	Among these parameters is not environmental pollution a.Gaseous pollution b. Particulate pollution c. Soil pollution d. Not in the previous	
98	..... is known as inertial separators a. Cyclone b. ESP c. bagfilter d. Not in the previous	
99	Humidity is a problem facing : a. Bagfilter b. Cyclone c. All the previous	
100	Pulse jet is a type of a.Bagfilter c. Cyclone d. scrubber	

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