Assiut university
Faculty of science
Chemistry department

Date: 7 / 7 / 2021
Time : 3 hours

Final Exam in Selected Topics of Organic Chemistry 414C
For Fourth Year Science Students

Question (No. 1): (50 marks)

Choose (T) for true sentence and (F) for false sentence.

1- The pH of the stomach is among the defenses of the body against bacterial invasion. (T/F)
2- No bacteria can penetrate the intestinal wall to enter the body proper. (T/F)
3- Phenol is used for the disinfection of the intact skin. (T/F)
4- The White Cells have a different function than that to macrophages. (T/F)
5- The chemotherapeutic agent must be parasitotropic and not organotropic. (T/F)
6- Chemotherapeutic index = MTD / (MCD). (T/F)
7- Protozoa are animalbacteria. (T/F)
8- Streptococcus pyogenes, or β-hemolytic streptococcus causes pneumonia. (T/F)
9- Neisseria gonorrhoeae or gonococcus can be treated by penicillin. (T/F)
10- The *p*-aminobenzoic acid (PABA) inhibits the growth of bacteria. (T/F)
11- Sodium salt of sulfanilamide is used for the treatment of bacterial infections of delicate tissues like eyes. (T/F)
12- Dichlororiboflavin is a potent antagonist of vitamin B_1. (T/F)
13- Pyridine-3-sulfonamide antagonizes *p*-Aminobenzoic acid (PABA). (T/F)
14- Penicillin is activated by some metal ions. (T/F)
15- Disinfectants are bacteriostatic. (T/F)
16- Sleeping sickness is caused by viral infection. (T/F)
17- Prontosil is active against bacteria *in vitro* as well as *in vivo*. (T/F)
18- For the initiation of protein synthesis a mRNA attaches to a ribosome. (T/F)
19- Frame shift mutation-An extra base adds to or is deleted from the normal DNA sequence. (T/F)
20- The HIV-1 virus is a retrovirus that infects T4 lymphocyte cells. (T/F)
21- A tRNA attaches to its specific amino acid during the activation step. (T/F)
22- Protease inhibitor isa substance that prevents the synthesis of viral proteins. (T/F)
23- A tRNA binds to the AUG codon of the mRNA on the ribosome during the initiation step. (T/F)
24- When cytidine (C) enters the DNA sequence, it causes substitution mutation. (T/F)
25- A completed peptide chain is released duringthe termination step. (T/F)
26- A Reverse transcription is process in which using viral RNA to synthesize viral DNA. (T/F)
27- The genetic code is a sequence of amino acids in a tRNA that determine the amino acid order for the protein. (T/F)
28- When one adenosine is removed from the DNA sequence, this is called substitution mutation. (T/F)
29- A retrovirus is a substance that prevents the synthesis of viral proteins. (T/F)
30- When a base sequence of TGA in DNA changes to TAA it causes frame shift mutation. (T/F)
31- A carcinogenis a substance that induces unregulated growth processes in cells or tissues of multicellular animals. (T/F)
32- A protease inhibitor is a virus containing RNA. (T/F)
33- During transcription, RNA*polymerase*moves along the mRNA template to synthesize the corresponding DNA. (T/F)
34- During the protein synthesis, each mRNA bonds to a specific amino acid at the acceptor stem. (T/F)
35- The transfer RNA makes up 2/3 of ribosomes where protein synthesis takes place. (T/F)
36- The sugar-phosphate backbone of a nucleic acid is directional. (T/F)
37- The sequence of basesof RNA and DNA isn't always written in 5'-->3'.
38- DNA and RNA have a sugar-phosphate bond, made by phosphodiester linkages, and

a sequence of any four nitrogenous bases that extend from it. (T/F)

39- Purine-pyrmidine pairs allow hydrogen bonds to form between some purines and pyrimidines. (T/F)

40- DNA carries the information required for an organism's growth and reproduction. (T/F)

41- The DNA molecule is double stranded and the RNA molecule is single stranded. (T/F)

42- The process of translation occurs at the ribosome. (T/F)

43- The job of mRNA is to pick up amino acids and transport them to the ribosomes. (T/F)

44- Transcription must occur before translation may occur.

45- The role of tRNA during translation is to carry ribosomes to the site of protein synthesis.30. A codon is a protein that begins transcription by breaking apart H bonds31.The phosphate group in nucleic acid structure has positive charge. (T/F)

46- A mutagena substance or agent that induces heritable change in cells or organisms.

47- A protease inhibitor is a substance that prevents the synthesis of viral proteins. (T/F)

48- A completed peptide chain is released during the termination step.37.The HIV-1 virus is a retrovirus that infects T4 lymphocyte cells. (T/F)

49- In the translocation process, ribosome move along mRNA adding amino acids to growing peptide chain. (T/F)

50- In the termination process of protein synthesis, the completed peptide chain is released. (T/F)

Question (No. 2): (Midterm, Oral and Activity: (50 marks)

Choose (T) for true sentence and (F) for false sentence.

51- The introduction of chlorine or bromine into phenol or β-naphthol decreases their antiseptic potency considerably. (T/F)

52- Soap is an anionic detergent of long chain alkyl sulfates. (T/F)

53- In aqueous solutions, maximum stability of Penicillin prevails at pH = 3-9. (T/F)

54- Pyrithiamine is a metabolite antagonist of sulfathiazole. (T/F)

55- The ethanol 70% has disinfectant activity higher than phenol. (T/F)

56- The insoluble sulfa drugs can't be estimated in urine. (T/F)

57- Nuclear substitution of sulfa drugs abolishes the activity. (T/F)

58- The sodium salt of sulfathiazole is neutral. (T/F)

59- Syphilis is a sexually transmitted disease caused by a virus. (T/F)

60- Penicillin is stable at pH 2 and deteriorates at pH 6. (T/F)

61- Secondary alcohols are less active disinfectant than primary alcohols. (T/F)

62- Ethanol makes the cell membrane of bacteria permeable to simple molecules. (T/F)

63- Soap is an example of cationic detergent. (T/F)

64- The intensity of detergents action increases with increasing of the pH of the medium. (T/F)

65- Sulfadiazine inhibits the enzyme carbonic anhydrase and thus diminishes the carbon dioxide combining power of the blood. (T/F)

66- Sulfaguanidine is absorbed quickly in the intestine and secreted slowly. (T/F)

67- Acylation of the N^4 amino group of sulfa drugs does not abolish their *in vivo* activity. (T/F)

68- Nucleosides is carbohydrate linked to base. (T/F)

69- Cytosine, uracil, and thymine are the pyrimidines type. (T/F)

70- RNA secondary structures can form spontaneously. (T/F)

71- DNA molecule contains Uracil base. (T/F)

72- Nucleotides = nucleoside + phosphate. (T/F)

73- The phosphate is attached to carbon5'. (T/F)

74- DNA and RNA only have a primary structure.

75- DNA molecule contains Uracil base . (T/F)

76- Nucleotides = nucleoside + phosphate. (T/F)

77- RNA molecule contains Thymine base. (T/F)

78- Adenosine is type of nucleotides. (T/F)

79- Adenine is linked with thymine. (T/F)

80- Retrovirus is a virus containing RNA. (T/F)

81- Both DNA and RNA can form double helices. (T/F)
82- The sugar found in RNAis called deoxyribose. (T/F)
83- A virus is small particles requiring host cells to replicate. (T/F)
84- Uridine 5'-monphosphate is type of nucleosides. (T/F)
85- UMP refers to uridine 5'-monophosphate. (T/F)
86- Retrovirus is a virus containing RNA. (T/F)
87- Nucleosides =carbohydrate + base. (T/F)
88- The actual site of protein synthesis is the nucleus. (T/F)
89- The genetic code consist of TWO bases. (T/F)
90- Amino acids are held together by peptide bonds. (T/F)
91- The number of codons are needed to specify three amino acids is three. (T/F)
92- The genetic codeis a sequence of nucleic acids in a mRNA that determine the amino acid order for the protein. (T/F)
93- Adenosine is type of Nucleotides. (T/F)
94- A tRNA attaches to its specific amino acid, the process is called activation process. (T/F)
95- Ribosomes move along mRNA adding amino acids to a growing peptide chain, this process is called activation process. (T/F)
96- The sugar component is made up of hydroxyl functional group. (T/F)
97- The phosphate group is attached to 5' carbon. (T/F)
98- The (-OH) in nucleic acid is bonded to 3' carbon. (T/F)
99- Adenine and guanine are the purines type. (T/F)
100- Translation process is not part of protein synthesis. (T/F)

With Our Best Wishes

The examiners: Prof. Hussein El-Kashef and Dr. Ahmed Abdou Omar

Assiut University Faculty of Science Chemistry Department	June 2021 Time allowed: 3 hours
Second Semester Final Examination Subject: Selected Topics in Analytical Chemistry (C-444)	

Answer the following questions: (ملحوظة: الامتحان في ثلاث صفحات)

Question 1: Shade (T) for the correct statement or (F) for the wrong statement [Final (50 Marks)]

1. Like dissolve like.
2. Solvent extraction involve the distribution of a solute between two miscible liquid phases.
3. The extraction of partially ionized species is affected by the pH-change.
4. Benzoic acid can be extracted from aqueous solution into ether, the extraction efficiency in alkaline media is maximum.
5. 8-hydroxy quinoline (oxine) is a tetra dentate ligand.
6. The extraction efficiency is independent of the original concentration of the solute.
7. The fraction of solute extracted equals to the number of m.moles of solute extracted divided by the total number of m.moles of solute.
8. Permanganate forms an ion pair with tetraphenylarsonium ion and then extracted into methylene chloride.
9. The most widely used method for extracting metal ions is the formation of a metal chelate.
10. The absorbing groups in a molecule are called chromophores.
11. Condensation reactions can be used for the formation of azo compounds.
12. 4-amino antipyrine is one of aliphatic amines.
13. Diazonium salts are obtained through the reaction of a primary amine with sodium nitrite in acid (HCl) medium.
14. The compound R-N=N-R' is an example of diazo compounds.
15. Azo compounds can be obtained from the reaction of a primary amine with nitrous acid.
16. Condensation reaction is valid for the determination of aromatic amines.
17. Ce^{3+} is used as an oxidizing agent for the preparation of Natulan compound.
18. Vitamin "C" can be oxidized using $HgCl_2$ to form dehydroascorbic acid.
19. Dehydroascorbic acid reacts with 4,5-dimethyl-o-phenylenediamine via condensation reaction.
20. Fluorescent compounds have one characteristic spectrum.
21. Emitted light has a longer wavelength than the absorbed light.
22. Fluorescence intensity is directly proportional to concentration.
23. Very high concentrations can have very high fluorescence.
24. As the number of ions decreases the conductance of the solution decreases.
25. In titration of strong acid with strong base, the initial conductivity of the acid will be low and increase upon addition of strong base.

Question 2: Shade the correct answer: [Med term + Oral (50 Marks)]

26. Solvent extraction is very useful for rapid and clean separation of ..... substances.
    A) inorganic B) organic C) A, B are true D) non is true
27. At equilibrium the ratio of concentration of solute in the two phases is called .....
    A) distribution coefficient
    B) distribution ratio
    C) A, B are true
    D) non is true
28. At equilibrium the ratio of concentrations of all species of a solute in the two phases is called .....
    A) distribution coefficient
    B) distribution ratio
    C) A, B are true
    D) non is true
29. The percent extracted %E = ...
    A) $100\ D \div (D + V_{aq} / V_o)$
    B) $100\ D \div (D + V_o / V_{aq})$
    C) $100\ D \div (D + V_{aq})$
    D) $100\ D \div (D + V_o)$
30. Uranyl ion (UO_2^{2+}) is extracted from aqueous nitrate solution into isobutanol by associating with ..... nitrate ions.
    A) two B) three C) four D) five
31. Blood Lead can be separated as it's dithiazone chelate and extracted into methylene chloride and then it is determined .....
    A) spectrophotometrically B) potentiometrically C) A, B are true D) non is true
32. The ppm concentration of a solution containing 0.05 g/L of the analyte is .....
    A) 30 ppm B) 40 ppm C) 50 ppm D) 60 ppm
33. The titer is the number of mg of analyte that reacts with ..... mL of titrant.
    A) 0.5 B) 1.0 C) 1.5 D) 2.0
34. Drugs can be determined spectrophotometrically through ..... reactions.
    A) redox B) condensation C) complex formation D) the all are true
35. Shiff bases are obtained through the reaction of a ketonic compound with .....
    A) ether B) ester C) a primary amine D) alcohol
36. Condensation reactions take place in ..... media.
    A) acid B) neutral C) alkaline D) the all are true
37. Condensation reactions can be used for the determination of .....
    A) aromatic amine
    B) acid hydrazides
    C) hydrazine derivatives
    D) the all are true
38. An example of acylation reactions is the reaction between 3,5-dinitrobenzoyl chloride and .....
    A) amine B) alcohol C) ether D) the all are true

39. Flumecinol can be detected in acidic medium via ..... reaction.
    A) acid catalyzed rearrangement
    B) ion pair formation
    C) condensation
    D) A, C are true
40. Fluorescent compounds have .....
    A) an excitation spectrum B) an emission spectrum
    C) all of them D) none of them
41. Advantages of Fluorescence are .....
    A) low Sensitivity B) Specificity C) high cost D) none of them
42. As temperature increases, fluorescence intensity will .....
    A) increase B) decrease C) increase then decrease D) not be affected
43. Collisional quenching resulting in .....
    A) an increase of emission energy B) an increase of excitation energy
    C) a loss of excitation energy D) none of them
44. Photochemical decay means that fluorescent molecules are destroyed by .....
    A) heating B) light C) increasing pH D) none of them
45. If the interfering substance absorbs light, the fluorescence intensity will .....
    A) decrease B) increase C) not be affected D) increase then decrease
46. Spectrofluorimetric determination of Levocetirizine dihydrochloride is based on .....
    A) oxidation by cerium (IV) B) charge-transfer reaction
    C) formation of fluorescent complex D) none of them
47. Spectrofluorimetric determination of Sulfasalazine drug is based on .....
    A) charge-transfer reaction B) redox reaction
    C) ligand exchange mechanism D) none of them
48. The addition of metal ion to calcein to form M – calcein complex resulting in .....
    A) increasing in fluorescence intensity B) quenching
    C) not be affected D) none of them
49. Conductometric titrations can be used for the determination of ..... electrolytic solutions.
    A) turbid B) highly coloured
    C) very dilute D) all of them
50. The conductance of the solution depends on .....
    A) temperature B) nature of ions C) concentration of ions D) all of them

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GOOD LUCK

The Examiners: *Prof. Dr. Hassan Sedaira*

Dr. Ahmed Kamal

Dr. Doaa Abdel-rahman Mohamed

Assiut University

Surface chemistry & Electrochemistry for 4th Level Students (Chem.432)
Chemistry Major
Time :3 h

Faculty of Science
Chemistry Department

Answer the Following Questions:

A-(Midterm, Activities & Oral examination)

Put (True) or (False) for the following sentences:

1- Surface activity is the weak adsorption of materials at surface or interfaces ( )

2- The alcohol with long series is weakly adsorbed on the surface (air – water) loading to decrease in the surface tension ( )

3- The average area occupied by each molecule adsorbed on the surface is given by A = $\frac{\Gamma}{N_A}$ ( )

4- Adsorbent is the substance on whose surface adsorption occurs. ( )

5- Adsorbate is the substance adsorbed from bulk phase ( )

6- Multilayer adsorption means that the thickness of adsorbed layer is two molecules or more ( )

7- Chemisorption is rapid and reversible ( )

8- Physisorption is possible over wide range of temperature ( )

9- Physical adsorpion is accompanied with electron transfer ( )

10- The adsorption of gas on solid can be increased with special treatment ( )

11- The adsorption should influence by the increase or decrease of temperature and pressure ( )

12- The adsorption of gas on solid is usually accompanied with increase of its heat content ( )

13- According Langmuir assumption, each site on solid surface is held with more than one adsorbate molecule ( )

14- The Langmuir isotherm is given by $\theta_A = \frac{aP_A}{1+aP_A}$ ( )

15- Freundilich equation was applied successfully at relatively high concentration ( )

16- The linear equation of Freundilich is given by $\frac{x}{m} = \ln k + \frac{1}{n}P$ ( )

17- The heat of chemisorption is a measure of strength of the bonds formed between adsorbent and adsorbate ( )

18- Isomorphism is two compounds chemically different but with the two different crystal forms ( )

19- The repeated motion many times in the crystals is responsible for the plasticity of crystals ( )

20- The freedom of the valence electrons to move through a metal give rise to high electrical conductivity ( )

21- Paramagnetic results from the presence of a permanent dipde moment ( )

22- The doping of NIO with Li^+ increases the number of holes ( )

23- The number of charge carries that can result from ordinary donor or acceptor ionization is [D] + [A] ( )

24- The position in energy of the absorption peaks associated with F-Center provides a direct measure of the ionization energy of an electron attracted to the center ( )

25- Interstitial atom occupies normal position in crystal lattice ( )

26- The anion vacancy with trapped electron is F- Center ( )

27- Chemical imperfection results from addition of foreign cations ( )

28- The doping of ZnO with Fe^{3+} increased of its electrical conductivity ( )

29- The turnover number is the number of molecule that adsorbed per unit site per unit time ( )

30- The maximum rate of reaction is obtained when the bond between the adsorbed complex and the catalyst surface is too strong ( )

31- A catalyst support is unstable under reaction and regeneration conditions ( )

32- Structure promoter changes the chemical composition of the catalyst ( )

33- Selective catalyst should proceed the reaction to products ( )

34-This reaction occur spontaneously under standard condition: $2\ Fe^{2+}(aq) + 2\ I^-(aq) \rightarrow 2\ Fe\ (aq) + I_2(s)$ ( )

35-The polarization cell consists of two electrode, cathode and anode. ( )

36-Cell potentials, like free energy changes, depend on temperature and on the composition of reaction mixture. ( )

37-The most important practical application of galvanic cells is their use as batteries. ( )

38-The enthalpy of solution connected with the solution process is relatively small. ( )

39-For an electrical system, the enthalpy function is the amount of work we can extract electrically from a system. ( )

40-Hydration is the process in which a water molecule is surrounded by ionic molecules arranged in a specific manner. ( )

41-Activity is the effective concentration of ions depending on inter-ionic interactions in solution. ( )

42-The Debye-Hukel limiting law takes into consideration the solvation of ions. ( )

43-According to the Debye-Hukel limiting law, only electrostatic interactions between ions are considered. ( )

44-A crystal lattice in solid state is disrupted by introducing of an ion of different charge leads to ionic conductivity. ( )

45-The ions in the solid electrolytes follow the laws we have derived for liquid electrolytes. ( )

46-Holmholtz brought both Stern and Gouy-Chapmann models together by proposing a model in which the potential varies linearly up to the OHP, after which it decays according to Gouy-Chapmann. ( )

47-The exchange current is the current at zero potential. ( )

48-The Tafel's equation is applied to study the kinetic of electrode reaction. ( )

49- The electrode reaction consists of several steps; anyone of these steps could be the rate demining step. ( )

50-The interphase between metallic electrode and an aqueous solution of an electrolyte behave like an electric capacitor in that it is capable of storage electric charges. ( )

B-Final examination

Choose the correct answer of the following

51- Schottky defect is observed in crystal when

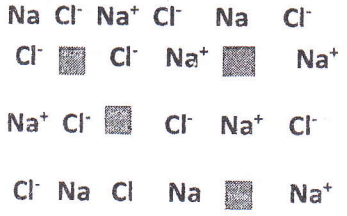
(a) Some cations move from their lattice site to interstitial sites

(b) Equal number of cations and anions are missing from the lattice

(c) Some lattice sites are occupied by electron

(d) Some impurity is present in the lattice

52- What type of crystal defect is indicated in the diagram below



(a) Frenkel defect (b) Frenkel and Schottky defects (c) Inter stitial defect (d) Schottky defect

53- n-type semiconductor is formed when trace amount of impurity is added to silicon . The number of valence electrons in the impurity atom must be

(a) 3 (b) 5 (c) 1 (d) 2

54- When n and P-type semiconductors are allowed to come into contact

(a) Some electrons will flow from n to P

(b) Some electrons will flow P to n

(c) The impurity element will flow from n to P

(d) The impurity element will flow from P to n

55- Doping of silicon with P or Al increases the conductivity the difference in the two cases in

(a) P is non – metal where as Al is a metal

(b) P is a poor conductor while Al is a conductor

(c) P gives rise to extra electrons while Al gives rise to holes

(d) P gives rise to holes while Al gives rise to extra electron

56- Which arrangement of electrons describes ferromagntism

(a)↑↑↑↑↑ (b) ↑↓↑↓ (c) ↑↑↑↓ (d) ↓↓ ↑↑

57- The n- type semiconductor is

(a) [D] = [A] (b) [A] > [D] (c) [D] > [A] (d) none

58- The thermal conductivity is corresponded to

a) Lattic vibration b) Contribution from electrons c) Small contribution from imperfection d) All of them

59- Doping of ZnO with Al_2O_3leads to

(a) Increases of its n-typness (b) decreases of its n-typness (c) Increases its P-typness

(d) Decreases of its P-typness

60- With increase in temperature, the electrical conductivity of semiconductors,

a) Decreases b) Remains some c) Increases d) none of these

61- A solid having regular shape is

a) Amorphous b) crystalline c) Anisotropic d) Semicrystalline

62- If the reflation of all lattice positions through a point brings a coincidence of point there is a

(a) Center of symmetry (b) Plane of symmetry (c) Center and plane of symmetry (d) None of the m

63- Which of the following statements is True?

(a) Paramagnetic substances are attracted by the magnetic field
(b) Paramagnetic substances are strongly repelled by the magnetic field
(c) Paramagnetic substances are nether attracted nor repelled by the magnetic field
(d) Paramagnetic substances are either attracted or repelled by the magnetic field

64- A basic concept of catalyzed reactions explained by

(a) The geometrical theories (b) Electronic theories (c) Chemical approach (d) All of them)

65- What is not true for catalytic reaction

(a) Catalyst increases equally both the rate of forward and reverse reactions
(b) Catalyst doesn't effect to equilibrium
(c) Catalyst decreases activation energy
(d) Catalyst increases activation energy of chemical equation

66- According to the adsorption theory of catalysis the speed of the reaction increases because

(a) Concentration of reactant molecules at the active centers of the catalyst becomes high due to adso rption
(b) In the process of adsorption the activation energy of molecules becomes large
(c) Adsorption produces heat increases the speed of the reaction
(d) Adsorption lowers the activation energy of the reaction

67- Selective catalyst should .....

(a) Increase the reaction rate (b) Change the reaction products
(c) Increase the number of molecules adsorbed on the catalyst surface
(d) Proceed the reaction to desired product

68- The catalyst should be characterized by

(a) High surface area (b) Mechanical properties (c) Stability (d) All of them

69- The addition of a catalyst to a reaction provides an alternate mechanism with

(a) Lower activation energy and lower reaction rate
(b) Lower activation energy and higher reaction rate
(c) Higher activation energy and lower reaction rate
(d) Higher activation energy and higher reaction rate

70- What is not true of the characteristics of catalytic reaction ?

(a) The catalyst remains unchanged chemical composition at the end of the reaction
(b) A small quantity of the catalyst
(c) The action of a catalyst is specific to a large extent
(d) A catalyst alter the final state of equilibrium

71- According the chemical approach the desirable energy for decomposition the intermediate complex is:

(a) High energy (b) Low energy (c) Intermediate energy (d) None

72- A Catalyst may lose its activity or its selectivity by

(a) Poisoning (b) Block of some pores (c) creation of active site (d) All of them

73-The possible mechanism of structural promoter is

(a) It has a dual-function action

(b) The promoter may unchanged the electronic structure of a catalyst

(c) The promoter has no effect on the structure of a catalyst

(d) the promoter has no effect on the effective activation energy

74- The factor affecting the precipitation method of a catalyst

(a) Precipitating agent (b) pH (c) Temperature (d) All of them

75- In Langmuir's model of adsorption of a gas on solid surface which of the correct statement,

a) The adsorption at a single site on the surface may involve multiple molecule at the same time

b) The mass of gas striking a given area of surface is proportional to the pressure of gas.

c) The mass of gas striking a given area of surface is independent of pressure of gas.

d) The rate of dissociation of adsorbed molecules from the surface does not depend on the surface covered.

76-At which temperature chemical adsorption occurs

(a) At high temperature (b) At very low temperature (c) At low temperature
(d) Temperature does not affect

77- Extent of physisorption of a gas increases with

(a) Increase in temperature (b) Decrease in temperature (c) Decrease in surface area

(d) Decrease in strength of Vander Waals forces

78- What will be the intercept in graph Freundlich isotherm

(a) K (b) log K (c) $\frac{1}{a}$ (d) $\frac{1}{n}$

79- On which factor adsorption of gas on solid adsorption depend

(a) On temperature (b) On pressure of gas (c) On nature of adsorbent (d) All the given

80-Due to adsorption

(a) surface energy increases (b) surface energy becomes zero (c) surface energy decreases (d) no change occurs in surface energy

81- Frundlich adsorption isotherm is given by the expression $\frac{x}{m} = kp^{1/n}$ which of the following conclusions can be drown from this expression

(a) When $\frac{1}{n} = 0$ the adsorption is independent of pressure

(b) When $\frac{1}{n} = 0$ the adsorption is directly proportional to pressure

(c) When n = 0 , $\frac{x}{m} vs$ p graph is a line parallel to x-axis

(d) When n= 0, plot of $\frac{x}{m} vs$ p is a curve

82- If x is amount of adsorbate and m is amount of adsorbent, which of the following relations is not related to adsorption process ?

(a) x/m = f(p) at constant T (b) x/m = f (T) at constant P (c) P = f (T) at constant (x/m)

(d) $\frac{x}{m} = p \times T$

83- Which of the following statement is not true ?

(a) The value of adsorption enthalpy of physical adsorption is less than chemical adsorption

(b) Physical adsorption occurs due to Van der Waals' forces

(c) Chemical adsorption decreases at high temperature and low pressure

(d) Physical adsorption is reversible

84- F = 96500 C, R=8.314 JK^{-1} mol^{-1}, 0.082 L atm $K^{-1}mol^{-1}$, A= 0.509 / $(mol\ kg^{-1})^{1/2}$, (standard reduction potential:Fe^{2+}/Fe=-0.44V, I_2/I^-=0.54V, Fe^{3+}/Fe^{+2}=0.77V, Cu^{2+}/Cu=0.34V)

The standard cell potential at 25°C is 0.92 V for the reaction Al(s) + $Cr^{3+}(aq) \rightarrow Al^{3+}(aq)$ + Cr(s)

What is the standard free energy at 25°C?

(a)- 266 kJ (b) - 210 kJ (c) -266 J (d) other

85- What is the galvanic cell potential at 25°C that uses the reaction: Cu(s) + 2 $Fe^{3+}(aq) \rightarrow Cu^{2+}(aq)$ + 2 $Fe^{2+}(aq)$ With concentrations; $[Fe^{3+}]= 1x10^{-4}M$, $[Cu^{2+}]$=0.25 M, $[Fe^{2+}]$=0.20 M.

(a)- 0.43V (b) 0.19 V (c) 0.25 V (d) other

86- What is the value of E° for a redox reaction involving the transfer of 2 mol of electrons if its equilibrium constant is $1.8x10^{-5}$.

(a)-0.33V (b) 0.14 V (c) - 0.14 V (d) other

87- Anode is where.....

(a)reduction occurred (b) electrons are produced (c) electrons are consumed (d) none of these

88- Water is a .....

(a) strong electrolyte (b) weak electrolyte (c) non-electrolyte (d) normal electrolyte

89- The most ideal electrolyte solution of these salts.

(a) $CaCl_2$ (b) $ZnSO_4$ c) $AlCl_3$ (d) KCl

90- The potential of zero charge is called

(a)Galvani potential (b) Volta potential (c) zeta potential (d) surface charge potential

91-The salt activity mathematical form of $LaCl_3$ is

(a) $4\ C^4\gamma_{\pm}^4$ (b) $27C^4\gamma_{\pm}^4$ (c) $27\ C^5\gamma_{\pm}^5$ (d) $9\ C^5\gamma_{\pm}^5$

92- What is the ionic strength of a solution containing 1.0 M $MgCl_2$ and 1.0 M $La_2(SO4)_3$?

(a) 12 (b) 36 (c) 6 (d) 18

93- According to the Debye-Hukel limiting law, the value of $\gamma_{\pm}$ for $2x10^{-2}$ M solution of K_2SO_4 is

(a) 0.75 (b) 0.32 (c) 0.56 (d) other

94- The activity coefficient of potassium ion (γ_{K+}) in above solution is

(a) 0.75 (b) 0.32 (c) 0.56 (d) other

95- The activity coefficient of sulfate ion (γ_{SO4--}) in above solution is

(a) 0.75 (b) 0.42 (c) 0.86 (d) other

96- The exchange current density for the evolution of hydrogen at platinum is 3.0 A m^{-2}, what is the current density at 25°C for an over potential 8 mV.

(a) 0.58 A m^{-2} (b) 632 mA m^{-2} (c) 779 mA m^{-2} (d) other

97- The salt effect on the ionic reaction: $[Co(NH_3)_5Br]^{++} + OH^- \rightarrow [Co(NH_3)_5OH]^{++} + Br^-$

(a) zero (b) positive (c) negative (d) none of these

98- The current produced from the electrochemical reaction at the working electrode is balanced by a current flowing in the opposite direction at the ..... electrode.

(a) reference (b) working (c) counter (d) other

99- "The electric double layer consist of non rigidly held counter ions, but tend to diffuse into the liquid phase", this theory is called:

(a) Helmholtz (b) Stern (c) Gouy and Chapman (d) other

100 - If over potential (η) of an electrode is positive, the electrode reaction is

(a) reduction reaction (b) oxidation reaction (b) redox reaction (c) other

Good Luck

Examiners: Prof. Abd El-Aziz A. Said and Prof. Abu El-Hagag A. Herms

Assiut University

Faculty of Science
Chemistry Department

Final Examination in Petroleum & Petrochemicals (451C) for the 4th Level Geology Students

Date: Friday, 25/06/2021 **Time: 2 hours.**

Answer Eight Only from the following questions:

1) Explain the Doctor's sweetening process equations.
2) Discuss the effect of sulfur compounds upon the Gasoline Product?
3) Show by chemical structures the composition of Heteroatom in the crude Petroleum.
4) Explain the Carbide Theory for origin of the Petroleum and its defects.
5) Discuss the following terms:

   Aniline Point Additives Freezing Point of Aviation Fuels
6) Discuss briefly the types of Distillation.
7) Discuss the Solvent Extraction methods for sulphur reaction.
8) Write short notes on the Hydrocarbons in crude Petroleum.
9) Starting from the following building blocks , discuss what are the petrochemicals can be produced from it :
   a) Ethylene
   b) Propylene.
   c) Butadiene

Good Luck
Examiner:
Prof. Dr. Kamal Ibrahim Aly

Faculty of Science
Chemistry Department

June 19, 2021
Time : 2 hrs

Petrochemicals(409C)

Final Exam. for the 4th level Students (Industrial Chemistry)

Answer on the following two Sections (A & B):

Section A: Put right (√) or Wrong (X) on Only 25 of the following statements, and Justify your answer : (25 x2 =50 Marks)

1 - Nuclear fusion energy is an alternative for syngas in chemical industries. ( )
2- Natural gas and coal gasification products are feed stocks in petroleum industries. ( )
3-Methane and Acetylene are used as feed stocks in petrochemical Industries. ( )
4- Coal is used as raw material for benzene and naphthalene production. ( )
5-Black coal contains higher amount of water and carbon. ( )
6--Natural gas and heavy oil fractions are suited for synthesis gas. ( )
7-The production of synthesis gas from natural gas and steam involves only Exothermic process. ( )
8- Autothemal and Allothermal processes are involved in synthesis gas production from oil and steam. ( )
9- $C + H_2O \rightleftharpoons CO + H_2$ [Exothermic Process]. ( )
10- Hydrocarbons can be produced by Fischer -Tropsch synthesis. ( )
11- Synthesis gas is a source for O_2, CO and methanol. ( )
12- CO can be applied with H_2 for production of methanol and hydrocarbons. ( )
13-Phosgene gas ($COCl_2$) can be formed from CO and bromine. ( )
14- Synthesis gas can be formed from heavier petroleum fractions by autothermal partial oxidation. ( )
15- Gasoline -nethanol mixture has disadvantage due to presence of H_2O in methanol. ( )
16- Most of methanol is consumed in chemical industries and ~ 30 % is used in energy production. . ( )
17- Methanol is used to improve knocking, it has medium Octane Number. ( )
18- Yeast and Bacteria can synthesize protein from methanol and ethanol ( ).
19- Ag catalysts are not preferred for oxidative dehydrogenation of CH_3OH to HCHO ( )
20- $HCOOCH_3 + CH_2{=}CH_2 + \text{catalyst} \longrightarrow CH_3CH_2COCH_2CH_3$ ( )
21- Cyanogen chloride can be obtained via the reaction:

$$HCN + HCl \longrightarrow ClCN + HBr$$ ( )

22- Cyanuric chloride is a Dimer of cyanogen chloride. ( )
23-Acrylonitrile can be prepared from Acetylene by reaction with HF. ( )
24- Alkylation of benzene with propylene tetramer gives Toluene . ( )
25-Styrene, the monomer of polystyrene polymer can be obtained from the reaction of benzene and ethyl alcohol in one step. ( )
26-Natural rubber is the polymer of cis 3-methyl-1,3-pentadiene monomer. ( )
27- Surfactants are used in cleaning of closes and have only a hydrophilic end. ( )

الأسئلة ورقتان.

Section B: For Class activities. Mid- term & Oral Exams:

Answer on the following Questions : **(15 X2 =30 Marks)**

1- Fischer- Tropsch method gives synthesis gas from coal gasification ( )
2- Benzene and Gasoline have the same molecular composition. ( )
3- Natural gas was formed in one step via solar energy storage ( )
4 CO_2 can be applied with nucleophiles (H_2O & CH_3OH) to form carboxylic acids ( )
5- Bitumen contains higher amount of sulfur and carbon ( )
6- The production of synthesis gas from oil and steam involves only Endothermic process,. ( )

7- $CH \equiv CH + CH_3COOH \rightarrow CH_3 COOCH=CH_2$ ( )

8- Melamine can be synthesized by reaction of NH_3 with cyanuric chloride. ( )

9- Production of H_2 gas during aromatization and desulfurization processes is possible ( )

10- Formaldehyde is available in only one commercial forms. ( )

11- Polyamides are formed from polymerization of dicarboxylic acids with olefins. ( )
12--Synthetic fibers have low melting points, poor insulation, burn more rapidly and , skin friendly. ( )
13- Cellulose, silk, Dacron and Terylene are polyesters. ( )
14- Plastic recycling and production of biodegradable plastics are needed for solving environmental pollution problems. ( )

15- Colorants, plasticizers, stabilizers and fillers are normal ingredients in polymers industry. ( )

Good Luck

Prof. Dr. Aboel Magd A. Abdel Wahab

Assiut University

Faculty of Science
Chemistry Department

Final Examination for 4th (Industrial Program) Textile Chemistry
(404 Chem)

Tue 22

Date: iday, /06/2021 **Time: 2 hours**

Answer Nine only from the following Questions: **(90 points)**

1) Mention the : Advantages, Disadvantages, Uses and Care for:
   i) Cotton ii) Wool iii) Silk iv) Linen
2) What is the significance of fiber evidence? How can using the fibers to reconstruct crime scenes ?
3) Explain what are the main tests for the identification of Fibers?
4) " Carbon Fibers..... the wonder polymer..... stronger than the steel". Show by equations the steps of production of this polymer.
5) Mention the : Advantages, Disadvantages, Uses and Care for:
   i) Polyesters ii) Rayon iii) Acetate iv) Acrylic
6) What you mean by : i) Fabric Production ii) Weave Terminology.
7) Explain what you mean by Basic Comparison of Fiber Samples ?
8) Discuss the Cotton fibers, its composition and its properties ?
9) Explain the Essential properties of Textile Fibers ?
10) Discuss the properties of Metallic Fibers ?

Good Luck

Examiner:

Prof. Dr. Kamal Ibrahim Aly

Assiut University
Faculty of Science
Chemistry Department

July 2021
Time: 2 hours
(80 Marks)

Second Semester Examination for Biological Students
Subject: Analytical Chemistry (C- 460)

Final Exam (50 marks)

Q1: Choose the correct answer: (1.5 mark for each point)

1. An acid base titration involves a
   A) composition reaction B) neutralization reaction C) single replacement reaction
2. The electrode potentials are calculated by:
   A) Ilkovic equation B) Nernst equation C) Ohm law
3. If acidic solution are used in Mohr method
   A) chromates ions are decreased B) chromates ion are increased C) A and B
4. The pH scale measures .....
   A) acidity and basic B) the temperature C) none of these
5. Oxidation is defined as:
   A) The loss of electrons and an increase oxidation number
   B) The gain of electrons and a decrease in oxidation number
   C) The gain of electrons and an increase in oxidation number
6. What is the purpose of the salt bridge in a voltaic cell?
   A) It allows ion migration. B) It allows electron flow. C) It prevents ion migration.
7. Which Titration is known as the Argintometric titration?
   A) Acid base Titration B) Diazotization Titration C) Precipitation titration
8. Find the oxidation state of Mn in MnO_4^-
   A) +7 B) -2 C) +5
9. In which of the following acid / base titrations, can we NOT determine the equivalence point in an accurate manner?
   A) strong acid / strong base B) strong acid / weak base C) weak acid / weak base
10. ` Ions having positive charge are
    A) Cation B) Neutral C) Anion
11. Substances that change color when added to acids or bases are called?
    A) indicators B) insulators. C) electrolytes
12. if an acid has a pH of 6.5 will it be
    A) strong B) weak C) neutral
13. What is the expression for K_a for the following reaction?

$$CH_3COOH_{(aq)} \rightarrow CH_3CO_2^-{}_{(aq)} + H^+{}_{(aq)}$$

A) $K_a = [CH_3CO_2^-{}_{(aq)}][H^+{}_{(aq)}] / [CH_3COOH_{(aq)}]$
B) $K_a = 2[H^+{}_{(aq)}] / [CH_3COOH_{(aq)}]$ C) $K_a = [H^+{}_{(aq)}]_2 / [CH_3COOH_{(aq)}]$

Please turn over for the rest of questions

14. Nernst equation for an electrode is based on the variation of electrode potential of an electrode with
A) temperature only B) concentration of electrolyte only C) both A and B

15. Electrochemical cells convert which of these into electrical energy?
A) mechanical energy B) potential energy C) chemical energy

16. The pH scale measure :
A) acidity and basic B) the temperature C) none of these

17. The ideal indicator for the titration of strong acid and weak base should have pH range between
A) 5-8 B) 4-6 C) 8-10

18. Which of the following is a buffer solution?
A) $CH_3COOH + CH_3COONH_4$ B) NaCl + NaOH C) $CH_3COONa + CH_3COOH$

19. $Sn^{4+} \rightarrow Sn^{2+}$ represents.
A) oxidation B) reduction C) hydrolysis

20. What is the $[OH^-]$ of a solution with a pH of 9.0?
A) 1×10^{-5} M B) 1×10^{-9} M C) 1×10^{-4} M

21. In any oxidation-reduction reaction, the total number of electrons gained is
A) equal to the total number of electrons lost
B) less than the total number of electrons lost
C) greater than the total number of electrons lost

22. What is the purpose of the salt bridge in a voltaic cell?
A) It allows ion migration. B) It allows electron flow. C) It prevents ion migration.

23. What are the products of the neutralization reaction between HCl and LiOH
A) H_2O B) $H_3O^+ + OH^-$ C) $H_2O + LiCl$

24. Phenolphthalein is all of the following EXCEPT
A) neutral B) chemical indicator C) pink in bases

25. In an electrolytic cell, metal passes into ions at
A) cathode B) anode C) salt bridge

26. Neutralization reaction is a
A) reaction between a strong acid and a weak acid.
B) reaction between a strong base and a weak base.
C) reaction between an acid and a base.

27. Oxidation state of H^+ is
A) -1 B) +1 C) +4

28. 10mL of the 0 .1M HCl is required to reach the equivalency point of 10 mL of NaOH. What is the concentration of the NaOH?
A) 0.05M B) 0.1M C) 0 .15M

Please turn over for the rest of questions

Q2: Answer the follow statements with sign (√) or (X): (1 mark for each point)

1. Mixed indicators are used in the titration of week acid with week base. ( )
2. Potassium chromate used as indicator in Volhard method. ( )
3. The ideal indicator for the titration of strong acid and weak base should have pH range between 4-6. ( )
4. The acid used in Volhard method is sulphuric acid. ( )
5. Limitation of argentemetric titration is SO_2 must be removed. ( )
6. NH_4OH + NH_4Cl is a buffer solution. ( )
7. End point colour in Mohr method is yellow colour. ( )
8. Mohr method is applicable in basic solution. ( )

Mid Term and Oral Exam: (30 mark)

Q1: Choose the correct answer: (1.5 mark for each point)

1. When titrating a strong acid with a strong base, the equivalence point
   A) will be below a pH of 7.0 B) will be above a pH of 7.0 C) will be at a pH of 7.0
2. A solution with a pH of 7 is
   A) acid B) neutral C) base
3. An electrochemical cell is also called
   A) battery cell B) galvanic cell C) cell
4. Ions having positive charge are
   A) cations B) neutral C) anions
5. The sum of oxidation number of all atoms in a neutral molecule is
   A) 0 B) +5 C) -1
6. The oxidation state of Cr in $Cr_2O_7^{-2}$ is
   A) +7 B) +5 C) +6
7. What is the expression for K_b for the following reaction?
   $NH_4OH \rightarrow NH_4^+ + OH^-$
   A) $K_b = [OH^-] / [NH_4^+] [NH_4OH]$ B) $K_b = [OH^-] [NH_4^+] / [NH_4OH]$
   C) $K_b = [NH_4] / [NH_4OH] [OH^-]$
8. If a solution has a pOH = 1 , it is also considered :
   A) acidic B) basic C) neutral
9. The indicator in Fajan method is
   A) fluorescein B) methyl blue C) potassium dichromate
10. When titrating a strong acid with a strong base the equivalence point :
    A) will be below a pH of 7 B) will be above a pH of 7
    C) will be at a pH of 7

Please turn over for the rest of questions

11. The reduction is:
    A) The loss of electrons and an increase oxidation number
    B) The gain of electrons and a decrease in oxidation number
    C) The gain of electrons and an increase in oxidation number

12. The equivalent weight of phosphoric acid is ..... its molecular weight.
    A)1/2 B) 1/3 C) 2/3

Q2: Answer the following statements with sign (√) or (X): (1 mark for each point)

1- In the titration of strong acid with strong base the indicators used are phenolphthalein and methyl orange. ( )
2- Reducing agents are substance gains electrons and is reduced to a lower valence state. ( )
3- $[OH^-]$ of a solution with a pH of 9.0 is $1X10^{-5}$. ( )
4- In the titration of weak base with strong acid the indicator is methyl orange. ( )
5- The end point colour in Volhard method is reddish brown. ( )
6- The basic buffer solution is sodium hydroxide and ammonium chloride. ( )
7- The oxidation number of Fluorine in NaF is zero. ( )
8. A standard solution is a solution with accurately known concentration. ( )
9. 10 cm^3 of 1 mol dm^{-3} $CH_3COOH_{(aq)}$ and 10 cm^3 of 1 mol dm^{-3} $H_2SO_{4\,(aq)}$ require the same number of moles of NaOH for complete neutralization. ( )
10. $KMnO_4$ acts as a self-indicator. ( )
11. Indicator is a chemical substance which changes colour at the end point. ( )
12. Haber's method is used for the analysis of precipitate. ( )

----------G00D LUCK----------

Prof. Dr.Azza M.M.Ali

Assiut University

Faculty of Science
Chemistry Department

Final Examination for B.Sc. (Chemistry major)
Applied Organic Chemistry (412 C): (Polymers &Material science & Textiles Fibers)

Date: Saturday, 019/06/2021 **Time: 2 hours**

Choose the correct answer from the following points:
The answer in the (Bubble Sheet):

1) **Polystyrene can be prepared from the polymerization of:**
A) Methyl-benzene Monomer B)Styrene Monomer C) Ethyl-benzene Monomer D) Hexyl-benzene Monomer

2) **Nylon 6,6 can be prepared from the polymerization of Hexamethylenediamines with:**
A) Sebacoyl chloride B) Oxaloyl chloride C) Adipoyl chloride D) Terephthaloyl chloride.

3) **The copolymers came from the copolymerizaion of :**
A) Monomers A and B B) Monomers B and C C) Monomers C and D D) All the previous.

4) **Rubber polymer is an as example for:**
A) Branched polymer B) Cross-linked polymer C) Linear polymer D) Star polymer

5) **An example for Initiator used anionic polymerization:**
A) Butyl chloride B) Butyl lithium C) Butyl fluoride D) Butyl sulphide

6) **One only from these things make the polymers are different from other compounds :**
A)Intermolecular forces B) Intramolecular forces C) Supermolecular forces D) Ultramolecular forces

7) **The pendant group present in the :**
A) Star polymer B) Linear polymer C) Cross-linked polymer D) Branched polymer

8) **Dendrimers polymers is a type of polymer like :**
A) Tree B) Rote C) Arm D) Leg

9) **PET came from the polycondensation of terephthalic acid with:**
A) Propylene glycol B) Butylene glycol C) Ethylene glycol D Not all

10) **A Nice Jacket can make from Recycled:**
A) Polyethylene B) Polyurethane D)Polyamides D) Polyesters.

11) **The exception in the polyurethane synthesis :**
A) Combine between addition and condensation B) Addition polymerization only C) Condensation polymerization only D) Not all

12) **Free radical polymerization consist from:**
A) Initiation step B) Propagation steps C) Termination step D) All the previous steps.

13) **Condensation polymerization occurred in the following two monomers:**
A) Not containing any functional groups B) Containing one only functional group C) Containing three functional groups D) Containing two functional groups.

14) **One only from these polymers came from Addition Polymerization:**
A) Polyamides B) Nylon6,6 C) Polyesters D) Polymethylmethaacrylate

15) **Bubble Gum is a Copolymer came from :**
A) Styrene and butane B) Styrene and butene C) Styrene and butadiene D) Styrene and butalyne.

16) **One only from these polymers came from Condensation Polymerization:**
A) Polypropylene B) Polystyrene C) Protein D) Polyvinyl chloride.

17) **HIPS is a Copolymer came from :**
A) Styrene and Butane B) Styrene and Butene C) Styrene and Butadiene D) Styrene and Butalyne.

18) **Sometimes polymers are called :**
A) Micro-molecules B) Macro-molecules C) Minor-molecules D) Not any one.

19) **Most of the Polymers are:**
A) Lighter B) Long-lasting C) Recyclable D) All the previous steps.

20) **Starch and Cellulose came from:**
A) α –glucose and α –maltose B) α –glucose and β –sucrose
C) α -glucose and β –glucose D) α –glucose and β – fructose.

21) **Polypropylene as an example for:**
A) Branched polymer B) Star polymer C) Linear polymer D) Dendrimers

22) **Living polymerization have no one from these steps:**
A) Initiation step B) Propagation steps C) Termination step D) Not all.

23) **The branching can occurs only inside one only from these poymers:**
A) Polyesters B) Polyamides C) Poycarbonates D) Polyethylene

24) **An example for Initiator to anionic polymerization:**
A)Butyl chloride B)Butyl lithium C)Butyl fluoride D)Butyl sulphide

25) **The possibility to prepare polyethylene from :**
A) Cyclohexane B) Ethylene gas C) n-propane D) Cyclhexanone

26) **Condensation polymerization go through :**
A)Double bond B)Triple Bond C) Difunctional groups D) Not any one

27) **The bulky groups in BHT molecule cause the :**
A) Initiation B) Re-initiation C) Inhibition D) Propagation.

28) **Fenton Reagent is an example for:**
A) Thermo- initiator B) Photo- initiator iii) Redox- initiator iv) Self- initiator.

29) **Dimer + Dimer in the polycondensation reactions:**
A) Trimer B) Tetramer C) Pentamer D) Hexamer .

30) **The free radical polymerization of Un-substituted ethylene :**
A) Usually work B) Works fine C) Seldom work D) Never work.

31) **The main difference between step-growth and chain growth polymerization is:**
A)The unsaturated center B)Difunctional groups C)Byproduct D) all of them

32) **Which one of these monomers needed the smallest time in polymerization:**
A)Vinyl Chloride, B)Styrene , C) MMA. D) Ethylene

33) **Which of these polymers is cross linked:**
A)Polyethylene B) Rubber C) Polypropylene D) Polyester.

34) **Coordination polymerization using Zigler-Natta catalyst use:**
A)Titanium monochloride B)Titanium dichloride C)Titanium tetrachloride D) Titanium oxychloride

35) **The only exception in the polymerization of Tetrasubstituted ethylene is:**
A)Tetra-chloro-ethylene B)Tetra-Iodo-ethylen C)Tetra-Flouro-ethylene
D)Tetra bromo-ethylene.

36) **Naylon 6 came from Monomer called:**
A) Caprolactone B)Caprolactame C) Caprolactine D) Caprolactyne

37) **The Paradoxical Role of Oxygen means :**
A) Inhibition B) Initiation C) Both of A and B D) Neither A or B

38) **In the thermal imitators , which compounds are used:**
A) Hydrazo-compounds B) Azo-compounds C) Azomethin compounds D) Hydrazino compounds.

39) **An example for Initiator to cationic vinyl polymerization:**
A) Sodium hybochlorite B) Aluminum chloride C) Sodium chloride D) Potassium chloride

40) **The carbon fiber named by this name, because:**
A) It contain Hydrogen only B) It contain Carbon only C) It contain both H and C
D) All the previous .

41) **The main difference between Nylon 6 and Nylon 6,6 is :**
A) Number of hydrogen atoms B) Number of carbon atoms C) Number of oxygen atoms.
D) All the previous.

42) **Time scale of motion is one from 3 things in polymers go to :**
A) Fast motion B) Slow motion C) Average motion D) Not all.

43) **The coupling process is a step from :**
A) Initiation step B) Propagation Step C) Termination step D) Chain transfer

44) **In the polymerization of Butyl acrylate, the termination step go through:**
A) Chain transfer only B) Coupling only C) Disproportionation only D) Both B and C

45) **In Urea-Methanal polymer, it came from** :
A) Urea and methanol B) Urea and ethanol C) Urea and formaldehyde. D) Urea and ethane.

46) **The best advantage of polymeric materials are:**
A) Long Lasting B) Recyclable C) Cheep D) All the previous.

47) **The name of Naylon polymer came from Two cities:**
A) New York and Kansas B) New York and London C) New York and Roma.
D) New York and Los Anglos

48) **One only from these imitators is thermal imitator :**
A) Benzoin B)AIBN C) Fenton reagent D) Benzil

49) **Drinking Bottles and CD for the computer came from :**
A) Polyamide and Polyethers B) Polyamide and Polyethylene
C) Polyamide and Polyurethanes D) Polyester and polycarbonate

50) **The monomer disappear early in :**
A) Condensation polymerization B) Addition polymerization
C)Chain growth polymerization D) All of them

51) **Teflon came from the polymerization of :**
A) Tetraflouroethylene B) Tetraflouroethane C) Tetraflouroethyne D) Tetraflouroethanene .

52) **Backbitting is a phenomena occurs in :**
A) Polystyrene B) Polyethylene C) Polyvinyl chloride D) Polysulpide.

53) **Dianion means the Reactive groups at :**
A) Middle end B) One end only C) Two ends . D) Neither any one

54) **Self initiator phenomena occurs in :**
A) Polypropylene B) Polyethylene C)Polyvinyl chloride D) Polystyrene

55) **Photo imitators mean the initiation occurs by :**
A) Heat B) Ultra Violet C) Thermal D) Oxidation

56) **In the living polymerization, we put an ending for the living chain (Carbanion) by :**
A) Carboxylation B) Alcohol and Ethylene Oxide C) Coupling Agent D) All the previous

57) **The chain transfer agent in polymerization of polystyrene is :**
A) Butyl Diol B) Butyl Thiol D) Butyl triol D) Butyl mono ol

58) **From the Silk advantages are :**
A) Smooth B) Lustrous C) Dry quickly D) All the previous.

59) **From the Wool advantages are :**
A)Worm B) Fire Retardant C) Durable D) All the previous.

60) **The monomer in Cotton fibers is:**
A) α-Glucose B) β-Glucose C) α- Galactose D) β- Galactose

61) **The monomer in Wool fiber is:**
A) α-Glucose B) Amino acids C) α- Galactose D) Sucrose

62) **The monomer in polyesters fibers is:**
A) Diacids and diols B) Diacids and diene C) Diacids and dihalides D) Diacids and dialkyl.

63) **Carbon Fibers...the wonder polymer... stronger than the steel". It prepared from:**
A) Polyacrylamide B) Polyacrylonitrile C) Polyacryloimide D) Polyacrylohalide.

64) **The significance of fiber evidence to reconstruct crime scenes depend on:**
A) Type of fiber B) Color and number of fibers C) Location of fiber D)All the previous

65) **The very common Fibers and Basically meaning in forensic investigations:**
A) Wool B) Silk C) Rayon D) Cotton

66) **The main tests for the identification of Fibers:**
A) Microscopic B) Burning C) Thermal D) All the previous

67) **Silk and Wool Fibers came from :**
A) Vegetable sources B) Mineral sources C) Animal sources D) Human sources.

68) **Fibers are made of:**
A) Triplet Filaments B) Singlet filaments C) Twisted filaments D) Quirted filaments

69) **During the preparation of carbon fibers some gases were kick off :**
A) Hydrogen and Oxygen B) Hydrogen and Carbon D) Hydrogen and Nitrogen D) Hydrogen and vapor.

70) **Jute fibers has a good resistance to :**
A) Microorganisms and Insects B) Burning C) Chemicals D) Heat .

Good Luck
Examiner:
Prof. Dr. Kamal Ibrahim Aly

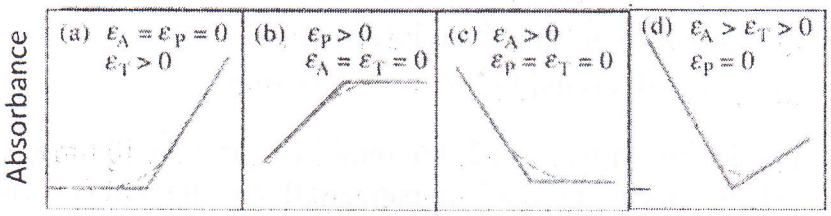
Assiut University Faculty of Science Chemistry Department	Second Semester Final Examination Instrumental Analysis (C-445) Credit Hours System	2021 Time: 2 hour

Answer the Following Questions:

Please: In the answer sheet, shade the answer for each question

Part (I): Question 1: Choose the Correct Answer: (50 Marks)

1. Formation of compound of low volatility in AAS can be eliminated by using of,
   a) EDTA or other complexing agents
   b) Addition of KCl to the matrix
   c) Addition of oxyanions such as sulfate or phosphate
   d) None of the above.
2. Ionization of analyte atoms in flame AAS can be eliminated by:
   a) EDTA or other complexing agents
   b) Increasing the temperature of flame.
   c) Addition of KCl to the matrix
   d) Addition of oxyanions such as sulfate or phosphate.
3. Fe^{+3} (non-absorbing) reacts with thiocyanate ion (SCN^-) (non-absorbing) to form the red complex, $Fe(SCN)^{2+}$. Photometric titration of Fe^{+3} with SCN^- solution to make $Fe(SCN)^{2+}$ would give what titration curve? ε_A for Analyte Fe^{3+}, ε_T for titrant SCN^- and ε_P for product $Fe(SCN)^{2+}$.



4. According to Beer's law for a colored solution, which one of the following statements is **correct**?
   a) The cell path length is directly proportional to the concentration.
   b) The absorbance is directly proportional to the concentration.
   c) The absorbance does not change when the cell path length (cell thickness) increases.
   d) None of the above.
5. Deuterium and tungsten lamps are used as a light source in one of the following techniques.
   a) Nuclear magnetic resonance spectrophotometers
   b) X-rays diffractometers.
   c) Gas chromatograph
   d) UV/Visible spectrophotometers.
6. A device that measures the difference between the transmitted light through the sample (I) vs. the incident light (I_0) and sends this information to the recorder.
   a) Wavelength Selector
   b) Signal Processor.
   c) Light Source
   d) Photoelectric Transducer
7. An important advantage of a double-beam UV-Vis spectrophotometer over a single-beam UV-Vis spectrophotometer is that
   a) it requires same light source for UV-Vis radiation.
   b) a greater range of wavelengths can be used.
   c) it splits the light source, after passing through the monochromator, into two separate beams-one for the sample and the other for the reference.

8. The wavelength of a transition is 656.3 nm. What is the corresponding frequency? ($c = 3.00 \times 10^8$ m/s)

a) 5.60×10^{17} s^{-1} b) 4.57×10^{14} s^{-1} c) 5.60×10^{16} s^{-1} d) 1.80×10^{12} s^{-1}

9. Which statement is incorrect?

a) Wavelength is inversely proportional to energy.
b) Wavenumber is inversely proportional to wavelength.
c) Wavelength is inversely proportional to frequency.
d) Wavenumber is inversely proportional to energy.

10. A shift to lower wavelength for an absorption in a spectrum corresponds to:

a) a shift to lower wavenumber b) a shift to higher energy.
c) a shift to lower frequency d) None of the above.

11. The molar absorptivity is .....

a) characteristic for each substance at a particular wavelength b) a universal constant.
c) equal to one d) None of the above.

12. The dichromate ion absorbs light of wavelength close to 500 nm. Based on this information, what can you conclude?

a) Solutions of the dichromate ion are colorless.
b) The dichromate ion absorbs within the visible region.
c) The dichromate ion absorbs in the ultraviolet region.
d) The dichromate ion absorbs outside the visible region.

13. A compound with a molar absorptivity of 32667 mol^{-1} L^{-1} cm^{-1} (at 740 nm) exhibits an absorbance of 0.81 when placed within a 1cm pathlength cuvette in a UV visible spectrophotometer. Calculate the concentration of the compound.

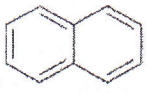
a) $1.24\text{x}10^{-4}$ mol L^{-1}
b) $4.88\text{x}10^{-5}$ mol L^{-1}
c) $2.48\text{x}10^{-5}$ mol L^{-1}
d) $3.24\text{x}10^{-3}$ mol L^{-1}

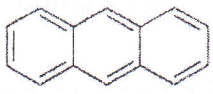
14. A sample has a percent transmittance of 50%. What is its absorbance?

a) 0.500 b) 50.00 c) 0.301 d) 30.10

15. Rank each of the following molecules from highest to lowest λ_{max} for the $\pi \rightarrow \pi^*$ transition.


Benzene


Naphthalene


Anthracene

a) Naphthalene > Benzene > Anthracene b) Anthracene > Naphthalene > Benzene
c) Benzene > Anthracene > Naphthalene d) Naphthalene > Anthracene > Benzene

16. Which of the following statement is **incorrect** about hollow cathode lamp?

a) Anode is made up of Tungsten.
b) The tube is under reduced pressure and filled with an inert gas, usually neon or argon.
c) It emits the specific resonance lines of the atoms in question.
d) None of the above

17. Atomization is carried out in ..... furnace technique.

18. Ionization interference in AAS occurs when ----------
    a) Flame temperature is too low
    b) Flame temperature is remaining constant.
    c) Flame temperature is too high
    d) None of the above.
19. A device for converting solution into fine spray or droplets in AAS is _____.
    a) Atomizer b) Computerize c) Nebulizer d) None of the above
20. At what pressure should the gases in the sealed tube be maintained in the hollow cathode lamp?
    a) 15 to 20 torr b) 1 to 5 torr c) 5 to 10 torr d)10 to 15 torr
21. Cold vapor technique is an atomization method used only to the determination of _____.
    a) Cadmium b) Lead c) Mercury d) Aluminum
22. Which of the following is (are) disadvantages of graphite furnace technique?
    a) Background absorption effects.
    b) Analyte sample may be lost at the ashing stage and not completely atomized.
    c) The precision was poor than the flame method and the analytical range is relatively narrow.
    d) All the above.
23. Which of the following is the atomization method used for highly toxic elements such as arsenic (As), antimony (Sb) and lead (Pb)?
    a) Hydride generation method
    b) Flame method
    c) Electrothermal method
    d) Cold-Vapor method.
24. Which of the following methods is used for the determination of analytes in a complex matrix where interferences in the UV/Vis for the analyte will occur: i.e. blood, sediment, human serum, etc.
    a) Calibration curve method
    b) Standard addition method.
    c) Gravimetric method
    d) All the above.
25. The concentration of Cu^{2+} in a sample is determined by reacting it with the ligand cuprizone and measuring its absorbance at 606 nm in a 1.00- cm cell. When a 5.00-mL sample is treated with cuprizone and diluted to 10.00 mL, the resulting solution has an absorbance of 0.118. A second 5.00-mL sample is mixed with 1.00 mL of a 20.00 mg/L standard of Cu^{2+}, treated with cuprizone and diluted to 10.00 mL, giving an absorbance of 0.162. Calculate the mg Cu^{2+}/L in the sample.
    a) 10.73 mg Cu^{2+}/L
    b) 5.360 mg Cu^{2+}/L
    c) 20.00 mg Cu^{2+}/L
    d) 15.23 mg Cu^{2+}/L
26. The problem with data detection in ---------- is that current varies over lifetime of drop, giving variation on current over curve
    (a) Tast polarography
    (b) DC polarography
    (c) Normal pulse polarography
    (d) Cyclic voltammetry
27. The pulse waveforms are designed to enhance the ---------- relative to the ----------, leading to significantly improved detection limits
    (a) Diffusion current , Faradaic current
    (b) Faradaic current , charging current
    (c) Capacitive current , Faradaic current
    (d) Non-Faradaic current , limiting current

28. Ilkovic equation forms the basis of ..... analysis.
(a) Quantitative (b) Qualitative (c) Spectroscopic (d) Thermal

29. The dissolved oxygen present in experimental solution in acidic medium gets easily reduced at DME to form ..... , in the first step
(a) Hydrogen peroxide (b) Triton X-100 (c) Gelatin (d) Water

30. The output of a voltammetric analysis of an electroactive analyte is .....
(a) Current-time curve (b) Charge-time curve
(c) Current-potential curve (d) Charge-temperature curve

31. From the given sentences select the incorrect one for solid electrodes based on carbon
(a) Broad potential window (b) Low cost
(c) Low background current (d) Faster electron transfer rates than metal electrodes

32. Non-Polarizable electrode is one which .....
(a) Can take up any applied potential (b) Has its own potential
(c) Does not have own potential (d) Having variable potential

33. In polarography dropping mercury electrode is used as .....
(a) Polarizable (b) Reference electrode
(c) Non-polarizable (d) Counter electrode

34. Diffusion current is directly proportional to .....
(a) Molecular weight (b) Concentration of electroactive material
(c) Volume of sample solution (d) Volume of supporting electrolyte solution

35. The dissolved oxygen is reduced at the dropping mercury electrode to produce ..... polarographic waves
(a) One (b) Two (c) Three (d) Four

36. In polarography dissolved oxygen is not removed by passing ..... gas because its also electrolytically active
(a) Nitrogen (N_2) (b) Nitrous oxide (N_2O) (c) Helium (He) (d) Argon (Ar)

37. A ..... is the electrode whose potential is known and remains constant
(a) Reference electrode (b) Working electrode
(c) Carbon paste electrode (d) Graphite electrode

38. Half wave potential is dependent of .....
(a) Concentration of electro active species (b) Nature of supporting electrolyte
(c) Dissolved oxygen (d) Nature of electroactive species

39. Voltammetry is based on the measurement of ..... as function of applied potential
(a) Conductance (b) pH (c) Current (d) Concentration

40. Equation of the polarographic wave derived by applying .....
(a) Beer-Lambert's law (b) Nernst equation
(c) Ilkovic equation (d) Planck's equation

41. The diffusion current is measured in late life period of mercury drop in .....
(a) Pulsed polarography (b) Differential pulsed polarography
(c) Tast polarography (d) Square wave voltammetry

42. Widely used supporting electrolytes in polarography are .....
(a) Quaternary ammonium salts (b) Potassium salts

43. The current arises due to charging of mercury drop that grows is known as .....
(a) Capacitive current (b) Charging current
(c) Non-faradic current (d) All of the above

44. A sample contains two different ionic species at different concentrations. The two ions can be distinguished in polarography by .....
(a) Half wave potentials (b) Diffusion currents
(c) Limiting current (d) Faradic current

45. ..... 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 (d) None of them

46. Most voltammetric measurements make use of a device called ..... which is capable of applying a potential to a working electrode and measuring the current.
(a) A potentiostat (b) Polargram (c) Voltammogram (d) Ammeter

47. In polarography half wave potential and diffusion current is fundamental basis of ..... and ..... analysis respectively
(a) Quantitative , qualitative (b) Qualitative , quantitative
(c) Current , voltage (d) Functional group , element

48. Ilkovic expressed the relation of the average diffusion current (I_d) to the various parameters by the equation .....
(a) $I_d = 607\ n\ D^{1/3}\ C\ m^{1/2}\ t^{1/6}$ (b) $I_d = 607\ n\ D^{1/2}\ C\ m^{2/3}\ t^{1/6}$
(c) $I_d = 607\ n\ D^{1/2}\ C\ m^{1/6}\ t^{2/3}$ (d) $I_d = 607\ n\ D^{1/2}\ C\ m^{1/2}\ t^{1/6}$

49. In pulse methods a sequence of potential steps (pulses), each with a duration of about 50 ms, is applied to the .....
(a) Non-polarisable electrode (b) Reference electrode
(c) Working electrode (d) Counter electrode

50. In polarographic wave, the small current flows in the beginning and is carried by the supporting electrolyte and impurities present in the sample is called .....
(a) Faradic current (b) Residual current
(c) Diffusion current (d) Limiting current

Part (II): Question 2: (Midterm Exam + Oral Exam) (30 Marks)

Mark True (*T*) for right statement and False (*F*) for wrong statement

51. Chemical deviations of Beer's Law occur due to association, dissociation and interaction of the analyte with the solvent to produce a product with different absorption characteristics

52. Spectroscopy is defined as the study of interaction between radiation (or other forms of energy) and matter

53. Substituents that increase the intensity and often wavelength of an absorption are called auxochromes

54. Electromagnetic radiation is a form of energy that has both wave and particle properties

55. A shift in the λ_{max} from a shorter to a longer wavelength is known as a bathochromic shift

56. Hypochromic effect is defined as an increase in the intensity, whereas hyperchromic effect is a

57. A tunable laser source is used as a light source for UV-Vis spectrophotometry, owing the improvements in detection limits

58. Graphite furnace atomic absorption instruments will generally yield lower detection limits for a given element than corresponding flame instruments

59. A deuterium lamp is an excellent source of radiation in the AAS

60. Wavenumber is the distance between two identical adjacent points in a wave (usually maxima or minima), whereas wavelength is the number of waves per cm in units of cm^{-1}

61. Chromophore is defined as a group of atoms in a compound responsible for the absorption of electromagnetic radiation

62. Real limitations to Beer's law are always appear at higher concentration of the absorbing substance (usually >10 mM)

63. Most of the elements that can be determined by atomic absorption spectroscopy are metals

64. The disadvantages of AAS are expensive and need to use different lamp for each element tested

65. The spectral interference in AAS can be avoided by variation in analytical variables, such as flame temperature and fuel-to–oxidant ratio

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

67. In differential pulse voltammetry, the output of the current response is a sigmoidal curve

68. The main instrumental parameter in the cyclic voltammetry is the pulse amplitude

69. Analyte concentration should be in large excess of supporting electrolyte

70. Various functional groups, such as C=O and OH is oxidized in the polarography

71. Phosphate buffer is a nonreactive electrolyte used in electrochemical cells

72. The diffusion current in polarography is expressed by the Randles-Sevcik equation

73. Heyrovsky-Ilkovic equation determines the number of electrons from the slope

74. Reference electrodes should possess a high signal-to-noise ratio characteristic

75. For reversible systems E_{pa} and E_{pc} are dependent on the scan rate

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

77. Potential is sampled twice in differential pulse voltammetry

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

79. For a fast one electron transfer, the peak separation (ΔE_P) = 59 mV

80. Randles-Sevcik equation can be used to determine electrode surface area

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♣♣♣ GOOD LUCK ♣♣♣

Examiners: Prof. Dr. Mohamed Sayed Ibrahim & Dr. Hossieny Ibrahim

Assiut university **Faculty of science** **Chemistry department**	**Final exam** **Time: 2 hours** **Unit process in fertilizer industry**	**Industrial chemistry** **Fourth level** **(400 Eng)**

First question **(25 degrees)**

A burning furnace in fertilizer factory consumes 20 ton per day sulfur. Its dimensions are 12 m length and outer diameter 3 m. lining thickness is 25 cm with thermal conductivity 0.02 watt/K.m. Temperature of exhausted gases is 1000°C.

- Calculate the quantity of heat transferred through the furnace wall.

Second question **(25 degrees)**

- **True or false:**
  1- The chemical reaction possible goes, when ΔG is +ve. ( )
  2- The main factor, which control thermodynamically the chemical reaction, is temperature. ( )
  3- The main factor, which control the chemical reaction kinetically, is pressure. ( )
  4- The equilibrium constant changes with changing concentration. ( )
  5- The pressure of production SO_2 is one atmosphere. ( )

6- Oxidation of S to SO_2 to SO_3 is an exothermic reaction, but oxidation of SO_2 to SO_3 is an endothermic reaction. ( )

7- Controlling the temperature for production SO_2 done by excess air. ( )

8- Energy, which generated by exothermic reaction decreases the moisture of the products. ( )

9- Heat exchangers are saving the operation cost of producing SO_2. ( )

10- Air is better than water in heat transfer. ( )

Third question **(30 degrees)**

A heat exchanger used for cooling gas mixture (SO_2 15%, N_2 75%, O_2 15%) with rate 10 m^3/hour from 1000 to 600°C. The water charges at room temperature and outlet at 99°C.

- Calculate the amount of water.

If, $C_{p_{H_2O_l}} = 45$ Cal/mole. K, $C_{p_{SO_{2g}}} = 6.5$ Cal/mole. K,

$C_{p_{N_2}} = 7$ Cal/mole. K, $C_{p_{O_2}} = 7.12$ Cal/mole. K

Forth question **(10 degrees)**

Choice the correct answer

1- The chemical reaction goes spontaneously, when ΔG^o is (+ve, -ve, 0)

2- The equilibrium constant changes with changing
(concentration, temperature, pressure)

3- Excess air which needed for production SO_2 (<1, >1, =1)

4- Turbulence ..... efficiency of heat transfer. (decreases, increases)

5- Enthalpy of elements equal (0, 1, <0, >0)

Fifth question **(10 degrees)**

Complete the following

1- Temperature of chemical reaction determined by ..... and/or .....

2- Reynold's number limit in heat transfer equal ..... in flat and ..... in cylindrical transfer.

3- Decreasing of moisture done by ..... or .....

4- Recycling of wastes is useful for ..... and .....

5- In industrial chemistry must control ..... and .....

Good Luck

Dr. Eng.\ Ahmed Dawood