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CALICUT UNIVERSITY CENTRALIZED ENTRANCE TEST (CU-CET)
APRIL 2025

M.Sc. CHEMISTRY / M.Sc. CHEMISTRY (NANO SCIENCE)

Time : Two Hours Maximum : 400 Marks

Each question carries 4 marks.
1 Mark will be deducted for each wrong answer.

1. Mercury sulfide is commonly known as ————————.
   (A) Marsh gas. (B) Fools gold.
   (C) Silent killer. (D) Vermillion.
2. What is Tyndall effect ?
   (A) Scattering of a beam of light by the particles of a suspension.
   (B) Refraction of a beam of light by the particles of a solution.
   (C) Scattering of a beam of light by the particles of a colloid.
   (D) Reflection of a beam of light by the particles of a suspension.
3. Anemia is caused due to the deficiency of ————————.
   (A) Cobalt. (B) Iron.
   (C) Copper. (D) Magnesium.
4. Stainless steel contains Iron, Carbon and ————————.
   (A) Chromium. (B) Nickel.
   (C) Tin. (D) Lead.
5. Zeolites are ————————.
   (A) Dehydrated Calcium Sulphates.
   (B) Hydrated Calcium Sulphates.
   (C) Hydrated Aluminosilicates.
   (D) Dehydrated Aluminosilicates.

6. The anode of dry cell is ————————.

(A) Zinc. (B) Graphite.

(C) Copper. (D) Iron.

7. ———————— is the suitable indicator when solution of sodium carbonate is titrated with sulfuric acid.

(A) Methyl red. (B) Phenolphthalein.

(C) Methylene blue. (D) Methyl orange.

8. During the electrolysis of dilute sulfuric acid ———————— liberated at the anode and ———————— at the cathode respectively.

(A) Hydrogen, oxygen. (B) Oxygen, hydrogen.

(C) Hydrogen, sulfur dioxide. (D) Sulfur dioxide, oxygen.

9. Cu^{2+} and Cd^{2+} are distinguished through formation of complex $\left[Cu(CN)_4\right]^{3-}$ and $\left[Cd(CN)_2\right]^{2-}$, when H_2S gas is passed :

(A) There is yellow precipitate of CdS.

(B) There is black precipitate of CuS.

(C) There is red precipitate of CuO.

(D) There is no precipitate.

10. Pentaminechloroplatinum (IV) chloride ionizes to give :

(A) Two ions. (B) Three ions.

(C) Four ions. (D) Five ions.

11. Gold and silver are extracted by complex formation with ———————— ligand.

(A) NH_3. (B) CN^-.

(C) CO. (D) H_2O.

12. Excess use of aluminium causes the disease called ————————.

(A) Liver cirrhosis. (B) Diabetics.

(C) Cancer. (D) Alzheimer.

13. The separation of lanthanides in ion-exchange method is based on the :

(A) Basicity of the hydroxides. (B) Size of hydrated ions.

(C) Size of the unhydrated ions. (D) The solubility of their nitrates.

14. The process of obtaining sulfur by the Borehole method is called the ———— process.

(A) Lablanc. (B) Mannheium.

(C) Calcaroni. (D) Frasch.

15. Iron obtained from the blast furnace is :

(A) Wrought iron. (B) Cast iron.

(C) Pig iron. (D) Steel.

16. FeS_2 is also known as :

(A) Fool's gold. (B) Mackenna's Gold.

(C) White gold. (D) Black gold.

17. In Borax-bead test, there is formation of transparent beads of :

(A) $NaBO_2$ and $NaPO_3$. (B) $NaBO_2$ and $Na_2B_4O_7$.

(C) $NaBO_2$ and B_2O_3. (D) $NaPO_3$ and B_2O_3.

18. $AgNO_3$ gives white precipitate with hypo changing to black after sometime. The black precipitate is of ————.

(A) Ag_2S. (B) Ag_2SO_4.

(C) $Ag_2S_2O_3$. (D) $Ag_2S_4O_6$.

19. What weight of hydrogen at STP could be contained in a vessel that holds 3.36 L of O_2 gas at STP ?

(A) 0.21 g. (B) 0.30 g.

(C) 4.8 g. (D) 3.36 g.

20. When KCl dissolves in water ?

(A) $\Delta H = +ve, \Delta S = +ve, \Delta G = +ve.$ (A) $\Delta H = +ve, \Delta S = -ve, \Delta G = -ve.$

(C) $\Delta H = -ve, \Delta S = -ve, \Delta G = +ve$ (C) $\Delta H = +ve, \Delta S = +ve, \Delta G = -ve.$

21. Laughing gas is :

(A) Nitric oxide. (B) Nitrous oxide.

(C) Nitrogen dioxide. (D) Nitrogen pentoxide.

22. Boyle's Law states that :

(A) p1/p2 = v1/v2 at constant T. (B) V1/V2 = T1/T2 at constant P.

(C) p1/p2 = v2/v1 at constant T. (D) P1/P2 = T1/T2 at constant V.

23. Molarity is expressed as :

(A) moles/liter. (B) gram-equilent/liter.

(C) grams/liter. (D) moles/1000 g.

24. The fundamental particle responsible for keeping the nucleus together is _____.

(A) Muon. (B) Positron.

(C) Hyperon. (D) Meson.

25. The atomic spectra of hydrogen is explained by :

(A) Bohr's theory. (B) Heisenberg's uncertainty principle.

(C) Rutherford's atomic model. (D) Pauli's exclusion principle.

26. The number of electrons with the azimuthal quantum number of 2 is :

(A) 4. (B) 6.

(C) 8. (D) 10.

27. In polar co-ordinates $x = r\cos\theta$. This means the probability of finding an electron in a p_z orbital along the xy plane is _____.

(A) A maximum. (B) High.

(C) Zero. (D) Low.

28. The metal which exhibit the highest known valency is :

(A) Platinum. (B) Osmium.

(C) Ruthenium. (D) Zinc.

29. The 8 : 8 type package is present in ——————.

(A) CsCl. (B) NaCl.

(C) CaF_2. (D) KCl.

30. A polar covalent bond is formed between two atoms which have :

(A) Low ionization energies. (B) Similar electronegativity values

(C) High electron affinities. (D) Different electronegativity values

31. The electrical conductivity of metals ——————.

(A) Is independent of temperature.

(B) Decrease with increasing temperature

(C) It first decreases and then increases with increasing temperature.

(D) Increase with increasing temperature

32. Oxygen is not evolved when ozone reacts with :

(A) SO_2. (B) KI.

(C) H_2O_2. (D) I_2.

33. Kaolinite has the composition :

(A) $Al_2O_3.\ SiO_2.\ H_2O$. (B) $Al_2O_3.\ 2SiO_2.\ H_2O$.

(C) $Al_2O_3.\ SiO_2.\ 2H_2O$. (D) $Al_2O_3.\ 2SiO_2.\ 2H_2O$.

34. Mohr's salt is ——————.

(A) $(NH_4)_2FeSO_4.6H_2O$. (B) $(NH_4)_2FeSO_4.24H_2O$.

(C) $NH_4(FeSO_4)_2.6H_2O$. (D) $(NH_4)_2FeSO_4.7H_2O$.

35. Caro's acid is :

(A) Pyrosulfuric acid. (B) Sulfurous acid.

(C) Peroxymonosulfuric acid. (D) Concentrated sulfuric acid.

36. If $pK_a = -\log K_a = 4$, and $K_a = Cx^2$, then van't Hoff factor for weak monobasic acid when C = 0.01 M is ——————.

(A) 1.02. (B) 1.10.

(C) 1.01. (D) 1.20.

37. Reverse osmosis can be used for ————————.

(A) Desalination of sea water.

(B) Increasing BOD of sea water.

(C) The removing insoluble matter from sea water.

(D) For decreasing the turbidity of sea water.

38. An azeotropic solution of two liquids has a boiling point lower than either of them when it :

(A) Shows negative deviation from Raoult's law.

(B) Shows positive deviation from Raoult's law

(C) Shows ideal behaviour.

(D) Is saturated.

39. A rapid reaction is distinguished by ————————.

(A) Being unaffected by catalyst.

(B) Having large heat of reaction.

(C) Having small value of activation energy.

(D) Having small heat of reaction.

40. Temperature of one mole of helium gas is increased by 1°C, hence the increase in internal energy is ————————.

(A) 6.0 cal. (B) 2.0 cal.

(C) 5.0 cal. (D) 3.0 cal.

41. Water and alcohol have usually large entropies of vapourization. This is because of ————————.

(A) Higher densities (B) Lower free energies

(C) Extensive hydrogen bonding (D) Smaller molecular weights

42. Efficiency of a Carnot's engine is 100 % when ————————.

(A) Sink is placed at 0°C. (B) Source is placed at 100°C.

(C) Sink is placed at 0 K. (D) Source is placed at 100 K.

43. The weak acid, CH_3COOH behaves as a strong acid in ———————.

(A) NH_3. (B) HCl.

(C) HF. (D) HNO_3.

44. Electrical potential of a cell is an ——————— property.

(A) Isobaric. (B) External.

(C) Isothermal. (D) Internal.

45. Silver ornaments turn black in the atmosphere. It is due to the formation of ———————.

(A) Ag_2O, Ag_2S. (B) $AgNO_3$, Ag_2S.

(C) Ag (OH), Ag_2CO_3. (D) Ag.

46. How many coulombs are required for oxidation of 1.0 mole of H_2O to O_2 ?

(A) 3.86×10^5 C. (B) 9.65×10^5 C.

(C) 1.93×10^5 C. (D) 4.825×10^5 C.

47. ——————— defects involve a cation leaving its lattice site and occupying an interstitial position, creating a vacancy.

(A) Frenkel. (B) Schottky.

(C) Glide. (D) Quasi-crystal.

48. Equilibrium constant changes, if ———————.

(A) Catalyst is added. (B) Pressure is changed.

(C) Temperature is changed. (D) Concentration is changed.

49. In multimolecular colloidal sols, atoms or molecules are held together by ———————.

(A) Hydrogen bonding. (B) Van der Walls forces.

(C) Ionic bonding. (D) Polar covalent bondings.

50. Effect of temperature on viscosity is given by ———————.

(A) Hole theory. (B) Arrhenius theory.

(C) Collision theory. (D) Adsorption theory.

51. Ziegler-Natta catalyst is used for the polymerization of ———————.

(A) Amides. (B) Olefins.

(C) Esters. (D) Urethanes.

52. ———————— is a thermosetting polymer.

(A) Neoprene. (B) Polyester.

(C) Polystyrene. (D) Bakelite.

53. Which of the following two monomers are used in preparation of nylon-6, 6 ?

(A) Hexamethylene diamine and ethylene glycol.

(B) Dimethyl terphthalate and ethylene glycol.

(C) Adipic acid and hexamethylene diamine.

(D) Adipic acid and ethylene glycol.

54. The amino acid abundantly found in collagen is ————————.

(A) Glycine. (B) Alanine.

(C) Serine. (D) Tryptophan.

55. Which of the following is a green solvent used for bleaching clothes ?

(A) Water. (B) Supercooled CO_2.

(C) Ethanol. (D) Hydrogen peroxide.

56. Nucleation in nanoparticle synthesis gives ————————.

(A) Electro-sterically stable product. (B) Thermodynamically stable product.

(C) Electrically stable product. (D) Kinetically stable product.

57. As a material become nano-form, its melting point ————————.

(A) Increases. (B) Decreases.

(C) Remain the same. (D) Decrease first and then increase.

58. The p-type semiconductor is obtained when Si is doped with ————————.

(A) As. (B) Ge.

(C) Ga. (D) Al.

59. Catalyst increases the speed of a reaction by ————————.

(A) Increasing E_a. (B) Decreasing A.

(C) Decreasing E_a. (D) Increasing entropy.

60. In mass spectrometer, the ions are sorted out by ————————.

(A) Applying a high voltage.

(B) Accelerating them through electric field.

(C) Accelerating them through magnetic field.

(D) Accelerating them through electric and magnetic field.

61. Calomel electrode is :

(A) Hg covered by HgCl in contact with saturated KCl solution.

(B) HgCl covered by saturated HgCl solution.

(C) HgCl in contact with saturated KCl solution.

(D) HgCl in contact with saturated KCl solution.

62. In the titration of a weak acid and a strong base, ———————— is used as an indicator ?

(A) Methyl orange. (B) Bromothymol blue.

(C) Phenolphthalein. (D) Methyl red.

63. In conductometry, what type of ions conduct electrical current in solution ?

(A) Anions. (B) Cations.

(C) Electrons. (D) Radicals.

64. DTA can be used to determine the ———————— of a material.

(A) Melting point. (B) Boiling point.

(C) Glass transition temperature. (D) Decomposition temperature.

65. The gas used to purge in thermal equipment is ————————.

(A) Nitrogen. (B) Oxygen.

(C) Argon. (D) Chlorine.

66. When unsymmetrical molecule adds to unsymmetrical alkene, the negative part of the molecule goes to the carbon bearing the least number of hydrogen atoms. This is ————————.

(A) Thiel's theory. (B) Bayer's theory.

(C) Markownikoff's rule. (D) Anti- Markownikoff's rule.

67. The product obtained on heating 2-bromopentane with potassium ethoxide in ethanol is _____.

(A) 1-pentene. (B) 2-ethoxy pentane.

(C) 2-cis-pentene. (D) Trans-2-pentene.

68. _____ can be used to distinguish between $CH_2BrCH=CH_2$ from $CH_3CH=CHBr$.

(A) Br_2/CCl_4. (B) $AgNO_3/C_2H_5OH$.

(C) cold $KMnO_4$. (D) $Ag(NH_3)_2OH$.

69. An organic reaction used to convert an aryl diazonium salt into an aryl halide using a copper(I) halide catalyst is called :

(A) Finkelstein reaction. (B) Gattermann reaction.

(C) Sandmeyer reaction. (D) Balz-Schiemann reaction.

70. Formic acid and acetic acid can be distinguished by reaction with _____.

(A) Sodium ethoxide. (B) $HgCl_2$.

(C) Sodium. (D) Copper.

71. Iodo alkane is obtained by the reaction of bromoalkane or chloroalkane with solution of NaI prepared in dry acetone. This reaction is known as _____ reaction.

(A) Finkelstein. (B) Wurtz Fitting.

(C) Grignard. (D) Swartz.

72. Chlorination of toluene in presence of light and heat followed by treatment with aqueous NaOH gives _____.

(A) o-cresol. (B) p-cresol.

(C) Mixture of o-cresol and p-cresol. (D) Benzoic acid.

73. What is called CCl_2F_2 ?

(A) Freon 12. (B) Freon 21.

(C) Freon 122. (D) Freon 22.

74. Which amino acid does not contain chiral carbon ?

(A) Threonine. (B) Glycine.

(C) Alanine. (D) Histidine.

75. D.D.T. is produced from ————————.

(A) Chloroform and carbon tetrachloride.

(B) Chloroform and chlorobenzene.

(C) Chloral and chlorobenzene.

(D) Chloral and chloroform.

76. Phenylbenzoate can be prepared from phenol using ———————— reaction.

(A) Fries Rearrangement. (B) Hauben-Hoesch reaction.

(C) Claisen Rearrangement. (D) Schotten Baumann reaction.

77. What is the colour of the azo dye produced when azo coupling reaction takes place between benzene diazonium chloride and solution of N, N-dimethyl aniline in HCl ?

(A) Orange. (B) Red.

(C) Dark Yellow. (D) Green.

78. When Nitrobenzene reacts with HNO_3/H_2SO_4 at 80-100°C :

(A) 1, 3-Dinitrobenzene (B) 1, 2-Dinitrobenzene.

(C) 1,4-Dinitrobenzene (D) 1, 3, 5-Trinitrobenzene.

79. Artificial teeth are made from ————————.

(A) Metal composites. (B) Styrene copolymers.

(C) Zeolites. (D) Acrylic resin.

80. N-methyl aniline is a strong base than aniline because of the ————————.

(A) – I effect of phenyl group. (B) + I effect of CH_3.

(C) – I effect of CH_3. (D) + I effect of phenyl group.

81. A reaction that preferentially forms one constitutional isomer over others is called ———————— reaction.

(A) Stereo-specific. (B) Stereo-selective.

(C) Regio-specific. (D) Chemo-selective.

82. Phenol on reduction with H2 in presence of Ni catalyst will gives ————————.

(A) Benezene. (B) Toluene.

(C) Cyclohexanol. (D) Cyclohaxane.

83. The IUPAC name of glycerol is ——————.

(A) Propan-1, 2, 3-triol .
(B) Propan-1, 3-diol.
(C) Ethane-1, 2-diol.
(D) 2-methayl-propan-2-ol.

84. Lucas reagent is ——————.

(A) Sodium and alcohol.
(B) Zinc and concentrated hydrochloric acid.
(C) Anhydrous zinc chloride and concentrated hydrochloric acid.
(D) Anhydrous sodium acetate and acetic anhydride.

85. Copper (I) oxide is formed when an aldehyde is treated with ——————.

(A) Fehling's solution.
(B) Schiff's reagent.
(C) Borsche's reagent.
(D) Barford's reagent.

86. Thin layer chromatography is used to ——————.

(A) Separate compounds.
(B) Isolate compounds.
(C) Check product formation.
(D) Identify compounds.

87. Rancidity of butter is due to the formation of ——————.

(A) Butane-1.
(B) Lactic acid.
(C) Lactose.
(D) Butanoic acid.

88. Raman spectra is due to ——————.

(A) Absorption of energy by molecules.
(B) Absorption and re-emission.
(C) Emission of energy by molecules.
(D) Inelastic collisions.

89. A negative value of packing fraction indicates that the isotope is ——————.

(A) Radioactive.
(B) unstable.
(C) Stable.
(D) Artificial.

90. The order of reaction of a radioactive decay is ———————.

(A) Zero. (B) One.

(C) Two. (D) Three.

91. ——————— theory indicates that the interaction between the metal ion and ligands as purely electrostatic.

(A) Crystal field. (B) Valence bond.

(C) Molecular orbital. (D) Ligand field.

92. In Liebermann reaction test, phenols in concentrated ——————— acid reacted with nitrite.

(A) Phosphoric. (B) Hydrochloric.

(C) Nitric. (D) Sulphuric.

93. Which of the following are the main constituents of acid rain ?

(A) Carbon, nitrogen. (B) Sulphur, nitrogen.

(C) Sulphur, oxygen. (D) Nitrogen, hydrogen.

94. Aldehydes are identified by the following bands in IR spectra :

(A) ~ 1700 and ~ 2900 cm^{-1}. (B) ~ 1200 and 2200 cm^{-1}.

(C) ~ 1100 and -3500 cm^{-1}. (D) ~ 1400 and 3300 cm^{-1}.

95. The peak in UV absorption spectrum of benzene is due to ——————— transition.

(A) n to π^*. (B) π^* to π.

(C) π to π^*. (D) π^* to n.

96. The iodine value is the mass of iodine in ——————— that is consumed by ——————— grams.

(A) Milligrams, 100. (B) Grams, 1000.

(C) Milligrams, 1. (D) Grams, 100.

97. Alkali metals in liquid ammonia is used for ——————— reduction.

(A) Birch. (B) MPV.

(C) Clemmensen. (D) Bouveault-Blanc.

98. Salicylic acid is best obtained by _____ reaction.

(A) Gattermann.
(B) Gattermann-Koch.
(C) Reimer-Tiemann.
(D) Kolbe-Schmitt.

99. Condensation of _____ ith two equivalents of phenol under acidic conditions gives phenolphthalein.

(A) Phthalimide.
(B) phthalic acid.
(C) Phthalic anhydride.
(D) phthalic chloride.

100. Cinnamic acid is best obtained by _____.

(A) Oppenauer oxidation.
(B) Perkin reaction.
(C) Wittig reaction.
(D) Hoffmann reaction.