CHEMISTRY

1. For the reaction $aA + bB \rightleftharpoons cC + dD$, the products will be formed when

   (A) Qc > Kc   (B) Qc < Kc

   (C) Qc = Kc   (D) Qc = 1/Kc

2. The number of isomers possible for a disubstituted benzene is

   (A) 2   (B) 6

   (C) 4   (D) 3

3. The most abundant isotope of oxygen is

   (A) O^{16} (B) O^{17}

   (C) O^{18} (D) O^{32}

4. The oxidation state of Boron in Boric Acid is

   (A) +1   (B) +2

   (C) +3   (D) +4

5. $CH_2 = CHCN$ is a monomer of

   (A) Terylene   (B) Teflon

   (C) Orlon   (D) Glyptal

6. The boiling point of a solvent containing dissolved solid substance

   (A) is depressed   (B) is elevated

   (C) remains constant   (D) keeps changing

7. Which one of the following can be used in Friedel Crafts acylation reaction ?

   (A) CH_3COCH_3 (B) CH_3CH_2Cl

   (C) CH_3COOCH_3 (D) CH_3CH_2COCl

8. Which of the following is not a metallurgical operation ?

   (A) Purification   (B) Refilling

   (C) Benefaction   (D) Crushing

9. $CH_3CN + CH_3MgBr \xrightarrow{ether} X \xrightarrow{H_3O^+} Y.$

   The product Y in the above reaction is

   (A) Acetaldehyde   (B) Acetone

   (C) Acetic acid   (D) Methyl amine

10. Which of the following compounds is added to rectified spirit to make it unfit for drinking purposes ?

    (A) Ethanoic acid   (B) Chlorobenzene

    (C) Ethanol and pyridine   (D) Methanol and pyridine

11. The oxide that gives H_2O_2 on treatment with dil. H_2SO_4 is

    (A) Fe_2O_3 (B) PbO_2

    (C) K_2O (D) Na_2O_2

12. Which of the following is not an essential amino acid ?

    (A) Phenylalanine   (B) Methionine

    (C) Lysine   (D) Alanine

13. Reaction of acetone with zinc amalgam and conc. HCl forms

    (A) Ethanal   (B) Ethane

    (C) Propanal   (D) Propane

14. The structure given below represents
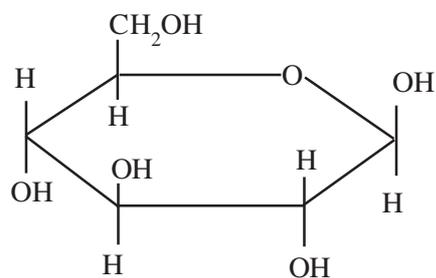
    (A) $\alpha - D -$ Glucose   (B) $\beta - D -$ Glucose

    (C) $\alpha - D -$ Fructose   (D) $\beta - D -$ Fructose

15. Which of the following ores will be most suitable for treatment with 'Roasting' process ?

    (A) Zinc blende (ZnS)
    (B) Haematite (Fe_2O_3)
    (C) Pyrolusite (MnO_2)
    (D) Bauxite ($Al_2O_3.2H_2O$)

16. The intermolecular forces in polyesters are

    (A) Van der Waal's forces
    (B) Dipole – dipole interactions
    (C) Hydrogen bonding
    (D) Ionic bonds

17. The chemical formula of Limestone is

    (A) $CaCO_3$
    (B) $Ca(OH)_2$
    (C) $(CaSO_4)_2.H_2O$
    (D) CaO

18. In the process of aluminium extraction, _____ is added to increase the electrical conductivity of the reaction mixture inside the Hall-cell.

    (A) fluorspar
    (B) alumina
    (C) coke
    (D) cryolite

19. The clean water should have a BOD value of

    (A) less than 17 ppm
    (B) more than 5 ppm
    (C) less than 5 ppm
    (D) more than 17 ppm

20. The standard reduction emf for the cell

    $Zn + Cu^{2+} \longrightarrow Zn^{2+} + Cu$ is 1.1 V at 25° C. The emf of the cell reaction when 0.01M Cu^{2+} and 0.01M Zn^{2+} solutions are used at 25° C is

    (A) 0.10 V
    (B) 1.10 V
    (C) – 1.10 V
    (D) – 0.110 V

21. Lucas reagent is

(A) Anhydrous $ZnCl_2$ + Conc. HCl

(B) $FeSO_4 + H_2O_2$

(C) $2[Ag(NH_3)_2]OH$

(D) $2Cu(OH)_2 + 2NaOH$

22. Atoms of the same element which have different atomic masses but same atomic numbers are called

(A) Isotone

(B) Isotopes

(C) Radicals

(D) Isobars

23. Which of the following compounds cannot be prepared by Rosenmund reduction?

(A) Benzaldehyde

(B) Formaldehyde

(C) Acetaldehyde

(D) Propanal

24. The species undergoing reduction in the following reaction is

$$Cr + 2H_2O + ClO^- \longrightarrow Cr^{3+} + 3Cl^- + 6OH^-$$

(A) Cl^-

(B) ClO^-

(C) H_2O

(D) Cr

25. ZnS has a tetrahedral structure with co-ordination number 4. The radius ratio must be between

(A) $0.225 - 0.414$

(B) $0.414 - 0.732$

(C) $0.732 - 1.0$

(D) $1.0 - 1.155$

26. Triglyceride undergoes hydrolysis to give

(A) one molecule of glycerol and three molecules of fatty acids

(B) three molecules of glycerol and one molecule of fatty acid

(C) three molecules of glycerol and three molecules of fatty acids

(D) one molecule of glycerol and one molecule of fatty acid

27. The normality of 0.1M solution of H_2SO_4 is

(A) 2.5 N   (B) 0.5 N

(C) 0.2 N   (D) 1.5 N

28. Bromoethane is formed by refluxing silver propionate with Br_2 in CCl_4. The name of this reaction is

(A) Borodine Hunsdiecker reaction   (B) Finkelstein reaction

(C) Hoffmann bromamide reaction   (D) Haloform reaction

29.
 $+ Cl_2 \xrightarrow{FeCl_3} X$. The compound X is
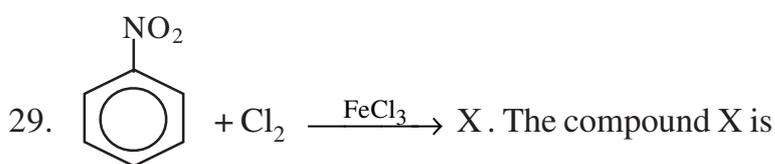
(A)
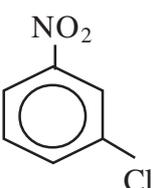
(B)
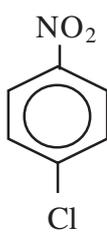
(C)
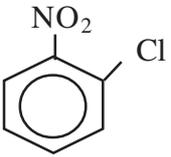
(D)
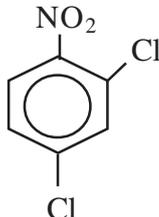
30. Hydrocarbon which is liquid at room temperature is

(A) Ethane   (B) Propane

(C) Butane   (D) Pentane

31. The reagent used in the formation of fluorobenzene from benzene diazonium chloride is

(A) H_3BO_3 (B) HF

(C) HBF_4 (D) BF_3

32. Phosgene is formed by the reaction of

(A) Chlorine and carbon dioxide
(B) Chlorine and carbon monoxide
(C) Chlorine and sulphur dioxide
(D) Chlorine and sulphur monoxide

33. Among the following haloalkanes, which one has the highest dipole moment ?

(A) CCl_4
(B) $CHCl_3$
(C) CH_2Cl_2
(D) CH_3Cl

34. The IUPAC name of
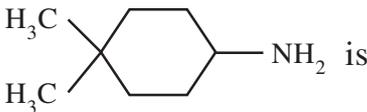
is

(A) 4,4 – Dimethylbenzenamine

(B) 1,1–Dimethylcyclohexanamine

(C) 4,4 – Dimethylcyclohexanamine

(D) 1,1 – Dimethylhexanamine

35. The number of moles in 8g of O_2 is the same as that in

(A) 11 g of CO_2
(B) 7g of CO
(C) 3g of N_2
(D) 13g of NO_2

36. The IUPAC name of succinic acid is

(A) Butane – 1,4 – dioic acid
(B) Ethane – 1,2 – dioic acid
(C) Butanoic acid
(D) Ethanoic acid

37. Which of the following statement about alkali metals is not true ?

(A) They have the largest atomic and ionic radii in their respective periods.

(B) They have the highest ionisation enthalpy in each period.

(C) They are soft and have low melting points.

(D) They are strongly electropostive in nature.

38. Arrange the following isoelectric ions in order of their increasing size

   (A) $N^{3-} < Na^{+} < O^{2-} < F^{-}$

   (B) $N^{3-} < O^{2-} < Na^{+} < F^{-}$

   (C) $N^{3-} < O^{2-} < F^{-} < Na^{+}$

   (D) $Na^{+} < F^{-} < O^{2-} < N^{3-}$

39. The S.I. unit of viscosity coefficient (η) is

   (A) Pascal

   (B) $Nm^{-2}s$

   (C) $Km^{-2}s$

   (D) Nm^{-2}

40. Which of the following statement about lyophobic colloid is true ?

   (A) They show Tyndall Effect.

   (B) They are very stable.

   (C) They are reversible in nature.

   (D) They can be formed by direct mixing.

41. In a galvanic cell or electrochemical cell

   (A) the anode is given a negative charge

   (B) oxidation takes place at the anode

   (C) the anode is always represented on the left hand side

   (D) All of the above

42. In the reaction, $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$

   (A) $K_p = K_c$

   (B) $K_c = K_p(RT)$

   (C) $K_p = K_c(RT)^2$

   (D) $K_c = K_p(RT)^3$

43. Which of the following is not a heterocyclic compound ?

   (A)
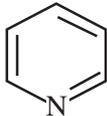
   (B)

   (C)
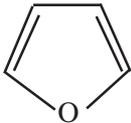
   (D)
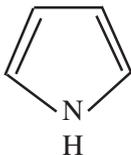
44. The hydronium ion is represented as

(A) ^-OH (B) H^+

(C) H_3O^+ (D) HSO_4^-

45. In the periodic table, Sodium belongs to

(A) d-block   (B) f-block

(C) p-block   (D) s-block

46. The reducing property of alkali metals follows the order

(A) $Li < Na < K < Rb < Cs$ (B) $Na < K < Rb < Cs < Li$

(C) $Rb < Cs < K < Na < Li$ (D) $Li < Cs < Na < K < Rb$

47. Non – stick utensils are made of

(A) Polytetrafluoroethylene   (B) Polystyrene

(C) Polyvinylchloride   (D) Polyethylene

48. The element showing inert pair effect is

(A) Al   (B) Si

(C) Ga   (D) Pb

49. Which of the following cannot be formed ?

(A) $[PbCl_6]^{2-}$ (B) $[GeF_6]^{2-}$

(C) $[SiF_6]^{2-}$ (D) $[CF_6]^{2-}$

50. The reaction $C_6H_6 + Cl_2 \xrightarrow{\text{Anhy AlCl}_3} C_6H_5Cl + HCl$ is

(A) Electrophilic substitution   (B) Nucleophilic substitution

(C) Elimination reaction   (D) Rearrangement reaction

51. The purest form of amorphous carbon is

(A) Lamp black (B) Wood charcoal

(C) Animal charcoal (D) Sugar charcoal

52. The compound showing sp^3d^2 hybridisation is

(A) XeF_2 (B) $XeOF_4$

(C) XeF_6 (D) $XeOF_2$

53. Among the following compounds, the strongest acid is

(A) CH_3COOH (B)

(C)

(D)
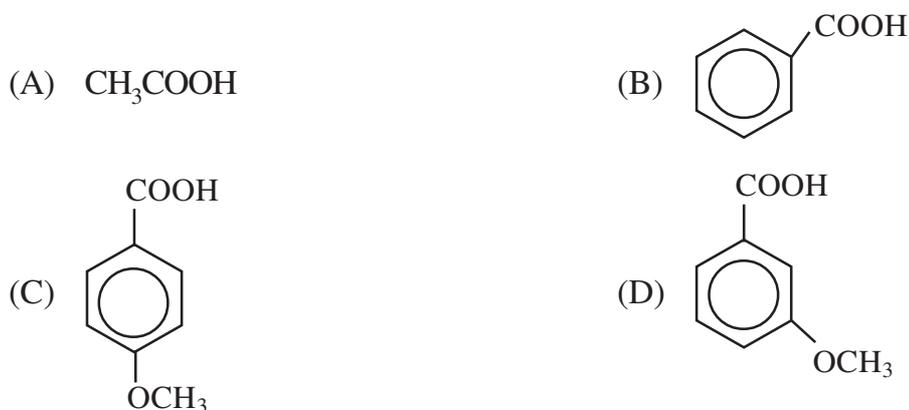
54. When there is spontaneous alignment of magnetic domains in the same direction, we get

(A) Anti-ferromagnetism (B) Ferrimagnetism

(C) Diamagnetism (D) Ferromagnetism

55. Which of the following statement about adsorption is not correct ?

(A) Adsorption is exothermic.

(B) Increase in temperature increases the extent of adsorption of a gas on solid.

(C) Increase in pressure increases the extent of adsorption of a gas on solid.

(D) Greater the surface area, larger will be the adsorbing capacity.

56. The change in internal energy when a system absorbs 490J of heat and 210J of work is done by the system will be

(A) 28 kJ (B) 280 J

(C) 700 J (D) 70 kJ

57. The graph used to distinguish physical and chemical adsorption is

   (A) Adsorption isotope
   (B) Adsorption isotherm
   (C) Adsorption isotone
   (D) Adsorption isobar

58. Which of the following molecules have net dipole moment (μ) greater than zero ?

   (A) CO_2
   (B) CH_4
   (C) BF_3
   (D) NH_3

59. In which mode of expression, the concentration of a solution remains independent of temperature ?

   (A) Molarity
   (B) Formality
   (C) Normality
   (D) Molality

60. The process of separation of components of an organic mixture between stationary phase and mobile phase is called

   (A) Fractional distillation
   (B) Chromatography
   (C) Differential extraction
   (D) Steam distillation

61. In S_N^2 reaction, order of reactivity for alkyl halides is

   (A) $RF > RCl > RBr > RI$
   (B) $RF > RBr > RCl > RI$
   (C) $RCl > RBr > RF > RI$
   (D) $RI > RBr > RCl > RF$

62. The doping of Si with traces of P gives rise to

   (A) n-type semiconductor
   (B) p-type semiconductor
   (C) a diode
   (D) an insulator

63. PCl_5 contains

   (A) two equatorial and three axial bonds

   (B) two axial and three equatorial bonds

   (C) one axial and four equatorial bonds

   (D) one equatorial and four axial bonds

64. Which of the following ion has the highest magnetic moment ?

(A) Sc^{3+} (B) Ti^{3+}

(C) Mn^{2+} (D) Fe^{2+}

65. In the following reaction how is the rate of appearance of the underlined product related to the rate of disappearance of the underlined reactant ?

$$BrO_3^- + \underline{5Br^- \text{ (aq)}} + 6H^+ \longrightarrow \underline{3Br_2(l)} + 3H_2O(l)$$

(A) $\dfrac{d[Br_2]}{dt} = -\dfrac{d[Br^-]}{dt}$

(B) $\dfrac{d[Br_2]}{dt} = \dfrac{5}{3}\dfrac{d[Br^-]}{dt}$

(C) $\dfrac{d[Br_2]}{dt} = -\dfrac{3}{5}\dfrac{d[Br^-]}{dt}$

(D) $\dfrac{d[Br_2]}{dt} = \dfrac{d[Br^-]^{5/3}}{dt}$

66. Which of the following is an artificial sweetener usually added to sugarfree gums ?

(A) chloramphenicol (B) fructose

(C) xylitol (D) ofloxacin

67. Mercury melts at

(A) 0°C (B) – 38°C

(C) – 27°C (D) 32°C

68. Which of the following gives carbylamine reaction ?

(A) Aniline (B) N – Ethylaniline

(C) N – Methylaniline (D) N,N – Dimethylaniline

69. The vapour pressure of a solution mixture AB will show negative deviations from Raoult's law when

(A) A–B interaction is stronger than A–A interaction

(B) A–B interaction is weaker than A–A interaction

(C) A–B interaction is equal to A–A interaction

(D) All of the above

70. Which one of the following is tribasic ?

(A) H_3PO_5 (B) H_3PO_3

(C) HPO_3 (D) H_3PO_2

71. Which of the following can be prepared by Wurtz reaction ?

(A) C_3H_8 (B) CH_4

(C) C_2H_6 (D) C_5H_{12}

72. Alcohols react with sodium metal to give H_2 gas. The nature of alcohols is

(A) Basic   (B) Acidic

(C) Amphoteric   (D) Neutral

73. The molar conductance of CH_3COONa, HCl and $NaCl$ at infinite dilutions are 91.5, 426 and 126 cm^2mol^{-1} respectively. The molar conductance of CH_3COOH at infinite dilution is

(A) 391.5 cm^2mol^{-1} (B) 612.5 cm^2mol^{-1}

(C) 261.5 cm^2mol^{-1} (D) 561.5 cm^2mol^{-1}

74. The substance that will reduce Ag^+ to Ag but will not reduce Ni^{2+} to Ni is

(A) Mg (B) Al

(C) Zn (D) Pb

75. The enthalpy of formation of ammonia for the reaction

$3H_2(g) + N_2(g) \longrightarrow 2NH_3(g)$ when $\Delta H = -92200$ J is

(A) $+46100$ kJ   (B) -4.6100 kJ

(C) $+46.100$ kJ   (D) -46.100 kJ

76. Calculate the half life of a first order reaction where the specific rate constant is 3 min^{-1}

(A) 0.346 min   (B) 0.163 min

(C) 0.231 min   (D) 0.363 min

77. What is the general electronic configuration of the coinage metals ?

(A) ns^2np^6

(B) $(n-1)d^5ns^1$

(C) $(n-1)d^{10}ns^1$

(D) $(n-1)d^4ns^2$

78. From the given equation $\log k = \log A - \dfrac{E_a}{2.303\,RT}$

(A) E_a and k are independent

(B) when E_a increases, k decreases

(C) when E_a increases, k first increases and then decreases

(D) when E_a increases, k also increases

79. The bond order in the species O_2, O_2^+ and O_2^{2-} follows

(A) $O_2 > O_2^+ > O_2^{2-}$

(B) $O_2^+ > O_2 > O_2^{2-}$

(C) $O_2^{2-} > O_2 > O_2^+$

(D) $O_2^+ > O_2^{2-} > O_2$

80. Which of the following compounds exhibit both geometrical and optical isomerism ?

(A) $[Pt(NH_3)Cl_3]$

(B) $[Pt(NH_3)_2Cl_2]$

(C) $[Pt(en)_2Cl_2]$

(D) $[Pt(en)_3]^{2+}$

81. The oxidation state of phosphorus in magnesium pyrophosphate $(Mg_2P_2O_7)$ is

(A) -3

(B) $+5$

(C) $+2$

(D) $+3$

82. According to Crystal Field Theory, strong ligands such as CN^-

(A) usually produce high spin complexes and small crystal field splittings

(B) usually produce low spin complexes and small crystal field splittings

(C) usually produce low spin complexes and high crystal field splittings

(D) usually produce high spin complexes and low crystal field splittings

83. The compound having highest melting point and lowest boiling point is

   (A) 2, 2 - Dimethylpropane   (B) 2 - Methylbutane

   (C) n - Hexane   (D) n - Pentane

84. Which of the following is most acidic ?

   (A) But-1-ene   (B) But-1-yne

   (C) Butane   (D) But-2-yne

85. The correct order of acidic strength among *p*-nitrophenol, *p*-methylphenol and *p*-methoxyphenol is

   (A) *p*-nitrophenol < *p*-methoxyphenol < *p*-methylphenol

   (B) *p*-methylphenol < *p*-nitrophenol < *p*-methoxyphenol

   (C) *p*-nitrophenol < *p*-methylphenol < *p*-methoxyphenol

   (D) *p*-methoxyphenol < *p*-methylphenol < *p*-nitrophenol

86. Which of these is added to soap to impart antiseptic properties ?

   (A) Boric acid   (B) Bithional

   (C) Thiol   (D) Beryllia

87. Lanthanoid contraction is due to increase in

   (A) effective nuclear charge   (B) shielding of 4f-electrons

   (C) size of 4f-orbital   (D) atomic number

88. Pick the odd one out

   (A) bithional   (B) iodine

   (C) aspartame   (D) iodoform

89. The total number of possible values of the magnetic quantum number (m_s) for $l = 2$ is

   (A) 3   (B) 4

   (C) 5   (D) 7

90. Cr^{3+} ion contains

    (A) 3 unpaired electrons
    (B) 2 unpaired electrons

    (C) 4 unpaired electrons
    (D) no unpaired electrons

91. Which of the following expressions gives the de Broglie relationship ?

    (A) $p = \dfrac{h}{mv}$
    (B) $\lambda = \dfrac{h}{mv}$

    (C) $\lambda = \dfrac{h}{m\rho}$
    (D) $\lambda m = \dfrac{v}{\rho}$

92. The correct order of basicity of the following Lewis bases is

    (A) $NH_3 > PH_3 > AsH_3 > SbH_3$
    (B) $SbH_3 > PH_3 > NH_3 > AsH_3$

    (C) $PH_3 > AsH_3 > SbH_3 > NH_3$
    (D) $NH_3 > PH_3 > SbH_3 > AsH_3$

93. A molecule obtained by sp^3d^2 hybridisation has a geometry of

    (A) trigonal bipyramidal
    (B) square plannar

    (C) octahedral
    (D) Pentagonal bipyramidal

94. The rate of the reaction remains unchanged when the concentration of the reactant is doubled. The order of the reaction is

    (A) 0
    (B) 1

    (C) 2
    (D) 4

95. Real gases shows ideal behaviour at

    (A) low presure and low temperature

    (B) high presure and low temperature

    (C) low presure and high temperature

    (D) high presure and high temperature

96. The reaction will not be spontaneous if

    (A) $T\Delta S > \Delta H$ and $\Delta H = -ve$, $T\Delta S = +ve$

    (B) $T\Delta S > \Delta H$ and $\Delta H = +ve$, $T\Delta S = +ve$

    (C) $T\Delta S < \Delta H$ and $\Delta H = +ve$, $T\Delta S = +ve$

    (D) $T\Delta S < \Delta H$ and $\Delta H = -ve$, $T\Delta S = -ve$

97. Select the correct IUPAC name for $[FeF_4(OH_2)_2]^-$

    (A) diaquatetrafluoroiron(II)ion

    (B) diaquatetrafluoroferrate(III)ion

    (C) diaquatetraflouroferrate(I)ion

    (D) diaquatetrafluoroiron(IV)ion

98. The reaction
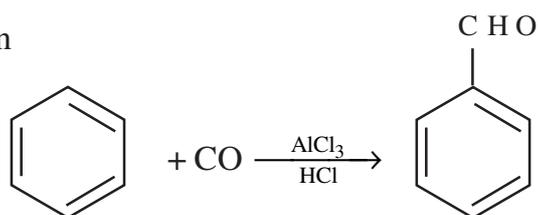
    is known as

    (A) Kolbe's reaction   (B) Riemer – Tiemann reaction

    (C) Gattermann Koch reaction   (D) Perkin's reaction

99. Green chemistry means such reactions which

    (A) reduce the use and production of hazardous chemicals

    (B) produce colour during reactions

    (C) are related to the depletion of ozone layer

    (D) study the reactions in plants

100. The number of neutrons in tritium is

    (A) 2   (B) 3

    (C) 1   (D) 0