CHEMISTRY

1. Which of the following behaves as both oxidising and reducing agent

   a. H_2SO_4 b. SO_2

   c. H_2S d. HNO_3

2. The work function of a metal is 4.2 ev, if the radiation of 2000 A^o falls on the metal then the kinetic energy of the fastest photo electron is

   a. 1.6×10^{-19} J b. 16×10^{10} J

   c. 3.2×10^{-19} J d. 6.4×10^{10} J

3. Consider the following reaction

   $C_6H_5NO_2 \xrightarrow{Sn/Hcl} x \xrightarrow{C_6H_5COcl} Y + Hcl$. What is Y?

   a. Acetanilide
   b. Benzanilide
   c. Azobenzene
   d. Hydrazobenzene

4. The correct order of magnetic moments (spin value in B.M.) among the following is

a. $[MnCl_4]^{-2} > [CoCl_4]^{-2} > [Fe(CN)_6]^{-4}$

b. $[Fe(CN)_6]^{-4} > [CoCl_4]^{-2} > [MnCl_4]^{-2}$

c. $[Fe(CN)_6]^{-4} > [MnCl_4]^{-2} > [CoCl_4]^{-2}$

d. $[MnCl_4]^{-2} > [Fe(CN)_6]^{-4} > [CoCl_4]^{-2}$

5. In Freundlich adsorption isotherm the value of $^1/_n$ is
   a. between 0 & 1 in all cases
   b. between 2 & 4 in all cases
   c. 1 in case of Physical adsorption
   d. 1 in case of chemical adsorption

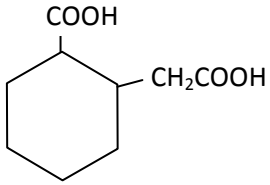
6. The correct order of stability of H_2, Li_2, B_2 is

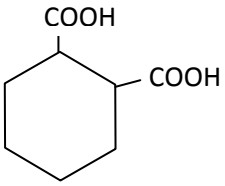
   a. $Li_2 > B_2 > H_2$ b. $H_2 > B_2 > Li_2$

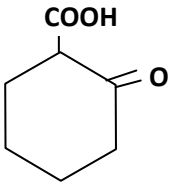
   c. $B_2 > Li_2 > H_2$ d. All have equal stability

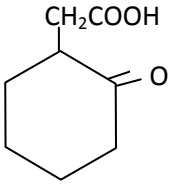
7. The ionisation potential for hydrogen atom is 13.6 ev. The ionisation potential for He^+ is
   a. 54.4 ev
   b. 6.8 ev
   c. 13.6 ev
   d. 24.5 ev

8. The compound that undergoes decarboxylation most reading under mild condition is

   a. 

   b. 

   c. 

   d. 

9. IUPAC name of the compound $K_3[Fe(CN)_5CO]$ is

a. Potassium carbonyl pentacyano ferrate (II)

b. Potassium pentacyano carbonyl ferrate (II)

c. Potassium carbonyl pentacyano ferrate (III)

d. Potassium pentacyano carbonyl ferrate (III)

10. In the reversible $2NO_2 \underset{K_2}{\overset{K_1}{\rightleftharpoons}} N_2O_4$ reaction, the rate of disappearance of NO_2 is equal to

   a. $\frac{2K_1}{K_2}[NO_2]^2$
   b. $2K_1[NO_2]^2 - 2K_2[N_2O_4]$
   c. $2K_1[NO_2]^2 - K_2[N_2O_4]$
   d. $(2K_1 - K_2)[NO_2]$

11. How many geometrical isomers are possible for the following compound
    $CH_2 = CH–CH = CH–CH = CH_2$
    a. 2
    b. 4
    c. 6
    d. 8

12. The system $Pcl_{s(g)} \rightleftharpoons Pcl_{3(g)} + Cl_{2(g)}$ attain equilibrium. If the equilibrium concentration of $Pcl_{3(g)}$ is doubled, the concentration of $Cl_{2(g)}$ would become

    a. ¼ of its initial value
    b. ½ of its initial value
    c. Twice of its initial value
    d. None of the above

13. Which of the following antacids is an antihistamine
    a. Ranitidine
    b. Lansoprazole
    c. Terfenadine
    d. Luminol

14. Which of the following on hydrolysis with dilute alkali followed by acidification gives benzoic acid.
    a. Benzotrichloride
    b. Benzalchloride
    c. Benzyl chloride
    d. P-chlorotoluene

15. The number of lone pair of electrons on Xe atoms in XeF_2, XeF_4 & XeF_6 molecules are respectively
    a. 3,2 and 1
    b. 4,3 & 2
    c. 2,3 & 1
    d. 3,2 & 0

16. Which of the following is a primary pollutant
    a. CO
    b. DAN
    c. Aldehydes
    d. H_2SO_4

17. For the reation $SnO_{2(s)} + 2H_{2(g)} \longrightarrow 2H_2O_{(g)} + Sn_{(1)}$ at 900 K the equilibrium steam Hydrogen mixture was found to be 40% H_2 by volume the Kp is
    a. 1.15
    b. 2.25
    c. 7.5
    d. 10

18. Glyptal polymer is obtained from glycerol by reacting with
    a. Molanic acid
    b. Phthalic acid
    c. Maleic acid
    d. Acetic acid

19. In the following sequence of reactions compound 'D' is

$$CH_3CH_2OH \xrightarrow{P+I_2} A \xrightarrow[Ether]{Mg} B \xrightarrow{HCHO} C \xrightarrow{H_2O} D$$

    a. Propanal
    b. Butanal
    c. N-butyl alcohol
    d. N-propyl alcohol

20. In which of the following molecules/ions all the bonds are not equal

    a. XeF_4 b. BF_4 c. SF_4 d. SiF_4

21. H_2O_2 can not oxidise

    a. $PbS_{(s)}$ b. $O_{3(g)}$ c. $Na_2SO_{3(aq)}$ d. $KI_{(aq)}$

22. The relative basic character of the following is

    a. $ClO^- < ClO_2^- < ClO_3^- < ClO_4^-$

    b. $ClO_4^- < ClO_3^{--} < ClO_2^- < ClO^-$

    c. $ClO_3^- < ClO_4^{--} < ClO_2^- < ClO^-$

    d. $ClO_2^- < ClO^- < ClO_3^- < ClO_4^-$

23. Phenol is heated with a solution of a mixture of KBr and $KBrO_3$. The major product obtained in the above reaction is
    a. 3-bromophenol
    b. 4-bromophenol
    c. 2,4,6-tribromophenol
    d. 2- bromophenol

24. The number of disulphide linkage present in insulin is
    a. 3
    b. 4
    c. 1
    d. 2

25. 32 g of CaC_2 reacts at 27^oC with excess of water to produce acetylene gas. The work done will be
    a. -300 cal
    b. -300 J
    c. -2400 cal
    d. -2400 J

26. Which of the following bicarbonates does not exist as solid?

    a. $KHCO_3$ b. $NaHCO_3$ c. C_sHCO_3 d. $LiHCO_3$

27. Phosphorous compound used in Holme's signals is

    a. PCl_3 b. Ca_3P_2 c. P_2O_5 d. P_2O_3

28. In the following reaction

    $C_2H_5 - O - C_2H_5 \xrightarrow{\text{Red P + HI}} 2X + H_2O$, X is
    a. Ethane
    b. Ethylene
    c. Butane
    d. Propane

29. Which of the following polymer do not involve cross linkages
    a. Melmac
    b. Bakelite
    c. Polyethylene
    d. Vulcanised rubber

30. A reaction is spontaneous at low temperature but non-spontaneous at high tempreture which of the following is true for this reaction.
    a. $\Delta H > O, \quad \Delta S > O$
    b. $\Delta H < O, \quad \Delta S < O$
    c. $\Delta H > O \quad \Delta S = O$
    d. $\Delta H < O \quad \Delta S > O$

31. Among the elements of group 14 reducing power of the divalent species decreses in the order
    a. Ge > Sn > Pb
    b. Sn > Ge > Pb
    c. Pb > Sn > Ge
    d. Sn > Pb > Ge

32. Lithium metal crystallises in a body center cubic crystal. If the length of the side of the unit cell of lithium is 351 pm. The atomic radius of lithium will be
    a. 151.8 pm
    b. 75.5 pm
    c. 300.5 pm
    d. 240.8 pm

33. Zinc is white cold and yellow when heated. It is due to the development of
    a. Frenkel defect
    b. Schottky defect
    c. Metal excess defect
    d. Metal deficiency defect

34. Which of the following are the correct axial distances and axial angles for rhombohedral system

    a. $a=b=c \quad \alpha=\beta=\delta \quad \neq 90^o$

    b. $a=b\neq c \quad \alpha=\beta=\delta \quad = 90^o$

    c. $a\neq b=c \quad \alpha=\beta=\delta \quad = 90^o$

    d. $a\neq b\neq c \quad \alpha\neq\beta\neq\delta \quad = 90^o$

35. Henry's law constant for the solubility of N_2 gas in water at 298 K is $1x10^5$ atm. The number of moles of N_2 from air dissolved in 10 moles of water at 298 K and 5 atm. Pressure is

    a. 4×10^{-4} b. 4×10^{-15} c. 5×10^{-4} d. 4×10^{-6}

36. 0.2 mole Hcl and 0.1 mole pf $CaCl_2$ were dissolved in water to have 500 ml of solution. The molarity of Cl^- ions in the solution is
    a. 0.04 m
    b. 0.80 m
    c. 0.40 m
    d. 0.08 m

37. A solution of A and B with 0.2 mole fraction of A found to have total vapour pressure of 125 mm. Pure a & B have vapour pressure 100 mm & 150 mm respectively will it show
    a. +ve deviation
    b. –ve deviation
    c. No deviation
    d. Anything can happen

38. The hydrogen electrode is dipped in a solution of Ph=3 at 25 degree Centigrade. The potential of the cell would be, (2.3036 RT/F = 0.059v)
    a. 0.177 V
    b. 0.087 V
    c. -0.177 V
    d. 0.059 V

39. What is the current strength in ampere will be required to liberate 10 g of iodine from KI solution in one hour
    a. 1.11 amp
    b. 2.11 amp
    c. 4 amp
    d. 10 amp

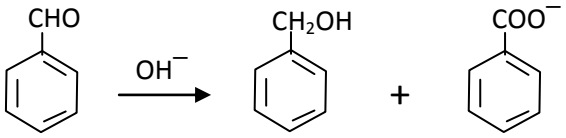
40. Aluminium displaces hydrogen from dilute Hcl where as silver does not the e.m.f. of the cell prepared by combining Al / Al^{+3} and Ag/Ag^{+} is 2.46 V. The reduction potential of silver electrode is +0.8 V. The reduction potential of aluminium electrode is,
    a. + 1.66 V
    b. - 3.26 V
    c. + 3.26 V
    d. – 1.66 V

41. The reaction A→B follows first order kinetics. The time taken for 0.8 mole of A to produce 0.6 mole of B is 1 hour. What is the time for conversion of 0.9 mole of A produce 0.675 mole of B.
    a. 1 hour
    b. 0.5 hour
    c. 0.25 hour
    d. 2.0 hour

42. Gaseous product obtained on thermal decomposition of $(NH_4)_2Cr_2O_7$ is

    a. NH_3 b. N_2 c. O_2 d. NO

43. In the cannizzaro reaction given below, the slowest step is



a. The attack of OH^- at the carbonyl group
b. Transfer of hydride ion to carbonyl group
c. The abstract of proton from the carboxylic acid
d. The deprotonation of $C_6H_5CH_2OH$

44. $CH_3NH_2 + CHCl_3 + KOH \rightarrow$ (Nitrogen containing compd) + Ku + H_2O that compound is

a. CH_3-C≡N b. CH_3-NH-CH_3 c. CH_3-N^-≡C^+ d. CH_3-N^+≡C^-

45. The pKa of acetic acid is 4.74. The concentration of CH_3COOH is 0.01 M. The pH of CH_3COOH is
a. 3.37
b. 4.37
c. 4.74
d. 0.474

46. [A] $\xleftarrow[\text{Lindlar's Catalyst}]{H_2}$ CH_3-C≡C-H $\xrightarrow{\text{Sodium in liquid ammonia}}$ B.

[A] and [B] are respectively

a. Cis, trans – 2 – butane
b. both trans – 2 – butane
c. Trans, cis – 2 – butane
d. both cis – 2 – butane

47. The half-life of a reaction is holved as the initial concentration of reactant doubled. The order of reaction is
a. 0
b. 2
c. 1
d. 4

48. Which of the following compound would not form silver mirror with Tollen's reagent.

a. CH_3CHO b. HCHO c. R.CO.CHOH-R d. $CH_3.CO.CH_3$

49. Arrange Ce^{+3}, La^{+3}, Pm^{+3} and Yb^{+3} in increasing order of their ionic radii

a. $Yb^{+3} < Pm^{+3} < Ce^{+3} < La^{+3}$
b. $Ce^{+3} < Yb^{+3} < Pm^{+3} < La^{+3}$
c. $Yb^{+3} < Pm^{+3} < La^{+3} < Ce^{+3}$
d. $Pm^{+3} < La^{+3} < Ce^{+3} < Yb^{+3}$

50. How many moles of magnesium phosphate $Mg_3(PO_4)_2$ will contain 0.25 mole of oxygen atoms?

a. 1.25×10^{-2} b. 2.5×10^{-2} c. 0.02 d. 3.125×10^{-2}

51. Which of the following molecule has highest dipole moment?

a. BF_3 b. NH_3 c. NF_3 d. B_2H_6

52. Which of the following is true in respect of adsorption

a. $\Delta G<0$ $\Delta S>0$ $\Delta H<0$
b. $\Delta G<0$ $\Delta S<0$ $\Delta H<0$
c. $\Delta G>0$ $\Delta S>0$ $\Delta H<0$
d. $\Delta G<0$ $\Delta S<0$ $\Delta H>0$

53. Which of the following is least reactive towards nucleophilic displacement reaction when treated with aqueous KOH.

a. 2,4,6 – trichlorobenzene
b. 2,4 – dinitro chlorobenzene
c. 4 – nitrochlorobenzene
d. 3 – nitro chlorobenzene

54. Arrange the following amines in order of increasing basicity

n-butylamine(I) sec-butylamine(II)
iso-butylamine(III) tert-butylamine(IV)

a. I < II < II < IV
b. III < IV < I < II
c. IV < III < II < I
d. II < III < I < IV

55. If the average velocity of N_2 molecule os 0.3 m/s at 27^oC, then the velocity of 0.6 m/s will takes place at

a. 273 K
b. 927 K
c. 1000 K
d. 1200 K
e.

56. From which of the following species it is easiest to remove one electron

a. O(g) b. $O^{-2}(g)$ c. $O^{+}(g)$ d. $O^{-}(g)$

57. Cupellation process is used in the metallurgy of
a. Cu
b. Ag
c. Al
d. Fe

58. Haloform reaction can not be used to prepare

a. CHF_3 b. $CHCl_3$ c. $CHBr_3$ d. CHI_3

59. All of the following can denaturate proteins without hydrolysis except
a. Enzyme treatment
b. Mechanical stress
c. Heat
d. Lowering of pH

60. A Vessel filled with a mixture of oxygen and nitrogen. At what ratio of partial pressure will the mass of gases be identical

a. $PO_2 = 0.5P_{N2}$ b. $PO_2 = P_{N2}$ c. $PO_2 = 1.14\ P_{N2}$ d. $PO_2 = 0.875P_{N2}$