SATISH SCIENCE ACADEMY

DHANORI PUNE-411015

CHEMISTRY

MHT - CET - Chemistry

Time Allowed: 1 hour **Maximum Marks: 50**

1. One requires 0.01 mole of NaOH. The mass of NaOH to be taken is _____. **[1]**

   a) 0.4 g
   b) 0.04 g
   c) 4.0 g
   d) 40 g

2. Hydrogen spectrum gave a series of lines at $\frac{5R}{36}$, $\frac{3R}{16}$ and $\frac{21R}{100}$ cm^{-1} (R = Rydberg constant in cm^{-1}). These lines belong to _____. **[1]**

   a) Lyman series
   b) Paschen series
   c) Pfund series
   d) Balmer series

3. Which of the following Lewis symbols is INCORRECT? **[1]**

   a) 
   b) 
   c) 
   d) 

4. What is the oxidation number of gold in the complex $[AuCl_4]^-$? **[1]**

   a) +1
   b) +4
   c) +3
   d) +2

5. Dihydrogen is used for preparation of _____. **[1]**

   a) metal hydrides
   b) dioxygen
   c) metal oxides
   d) dinitrogen

6. Densities of two gases are in the ratio 1 : 2 and their temperatures are in the ratio 2 : 1, then the ratio of their respective pressures is _____. **[1]**

   a) 1 : 1
   b) 1 : 2
   c) 2 : 1
   d) 4 : 1

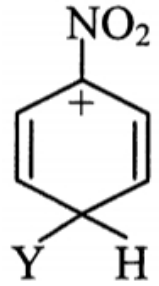
7. Which of the following statements is INCORRECT? **[1]**

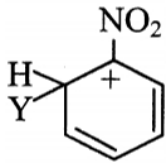
   a) Charcoal is an effective adsorbent due to its porous nature.
   b) For a given mass, nickel metal sheet having smooth surface is a good adsorbent compared to nickel metal sheet having rough surface.
   c) Colloidal substances are good adsorbents as they provide larger surface area for a given mass.
   d) For a given mass, finely divided platinum is a good adsorbent compared to a large piece of platinum metal.

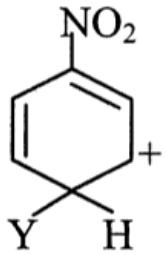
8. One mole of a symmetrical alkene on ozonolysis gives two moles of an aldehyde having a molecular mass of 44 u. The alkene is _____. **[1]**

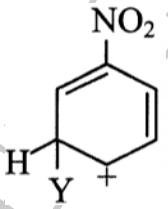
a) but-2-ene
b) ethene
c) but-1-ene
d) propene

9. Which of the following carbocations is expected to be most stable? **[1]**

a) 

b) 

c) 

d) 

10. Among the following, which crystal will be soft and has a low melting point? **[1]**

a) Ionic
b) Covalent
c) Molecular
d) Metallic

11. Carborundum and benzoic acid are examples of _____ crystals respectively. **[1]**

a) ionic, covalent network
b) covalent network, molecular
c) molecular, metallic
d) metallic, ionic

12. In a solid, oxide ions are arranged in ccp. Cations A occupy one-sixth of the tetrahedral voids and cations B occupy one-third of the octahedral voids. The formula of the compound is _____ **[1]**

a) ABO_3
b) AB_2O_3
c) $A_2B_2O_3$
d) A_2BO_3

13. The vapour pressures of pure liquids A and B are 400 and 600 mm Hg, respectively at 298 K. On mixing the two liquids, the sum of their initial volumes is equal to the volume of the final mixture. The mole fraction of liquid B is 0.5 in the mixture. The vapour pressure of the final solution, the mole fractions of components A and B in the vapour phase, respectively are _____. **[1]**

a) 500 mm Hg, 0.4, 0.6
b) 450 mm Hg, 0.5, 0.5
c) 500 mm Hg, 0.5, 0.5
d) 450 mm Hg, 0.4, 0.6

14. True solutions contain solute particles with diameters in the range of _____ nm. **[1]**

a) 10 to 200
b) 1 to 20
c) 0.1 to 2
d) 100 to 2000

15. To observe an elevation of boiling point of 0.05 °C, the amount of solute (Mol. Wt. = 100) to be added to 100 g of water (K_b = 0.5) is _____. **[1]**

a) 0.75 g

b) 2 g

c) 1 g

d) 0.5 g

16. For a given reaction, $\Delta H = 35.5$ kJ mol^{-1} and $\Delta S = 83.6$ J K^{-1} mol^{-1}. The reaction is spontaneous at_____ . (Assume that ΔH and ΔS do not vary with temperature) **[1]**

a) T < 425 K

b) T > 298 K

c) T > 425 K

d) all temperatures

17. Calculate the work done during the compression of 2 mol of an ideal gas from a volume of 1 m^3 to 10 dm^3 at 300 K against a pressure of 100 kPa. **[1]**

a) +99 kJ

b) -99 kJ

c) +22.98 kJ

d) -22.98 kJ

18. A certain reaction for which the enthalpy change is 24.85 kJ, is at equilibrium at 82°C. Find the value of ΔS for this reaction. **[1]**

a) 70 J $K^{-1}mol^{-1}$

b) 60 J K^{-1} mol^{-1}

c) 68.5 JK^{-1} mol^{-1}

d) 55 J K^{-1} mol^{-1}

19. The conversion of oxygen to ozone represented by the equation $3O_2 \rightarrow 2O_3$ is an endothermic reaction. Enthalpy change ΔH accompanying the reaction _____. **[1]**

a) is negative

b) is positive

c) is either negative or zero

d) is zero

20. The rate law for a reaction between the substances A and B is given by, rate = $k[A]^n [B]^m$. On doubling the concentration of A and halving the concentration of B, the ratio of the new rate to the earlier rate of the reaction will be _____. **[1]**

a) $2^{(n-m)}$

b) $\frac{1}{2^{(m+n)}}$

c) (n - m)

d) (m + n)

21. For a zero order reaction, the integrated rate equation is _____. **[1]**

a) $kt = [A]_t - [A]_0$

b) $[A]_t = -kt + [A]_0$

c) $[A]_t = kt - [A]_0$

d) $kt = \frac{[A]_t}{[A]_0}$

22. Which of the following is used in low-temperature gas thermometry? **[1]**

a) Helium

b) Sulphur dioxide

c) Chlorine

d) Argon

23. Identify a metalloid from the following list of elements. **[1]**

a) Tellurium

b) Carbon

c) Neon

d) Sodium

24. Match the following. **[1]**

Column I	**Column II**

i. Fluorspar	a. $KCl.MgCl_2.6H_2O$
ii. Epsom salt	b. Na_3AlF_6
iii. Cryolite	c. $MgSO_4.7H_2O$
iv. Carnallite	d. CaF_2

a) (i) - (c), (ii) - (d), (iii) - (a), (iv) - (b)

b) (i) - (d), (ii) - (c), (iii) - (b), (iv) - (a)

c) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)

d) (i) - (d), (ii) - (c), (iii) - (a), (iv) - (b)

25. Identify the INCORRECT statement. **[1]**

a. Transition metals are good homogeneous catalysts.

b. Mo/Fe is used in Fischer Tropsch process in the synthesis of gasoline.

c. Transition metals are good heterogeneous catalysts.

d. Both transition metals and their compounds exhibit good catalytic properties.

a) Option (a)

b) Option (b)

c) Option (c)

d) Option (d)

26. In the extraction of iron from haematite, which of the following step is carried out in a blast furnace? **[1]**

a) Smelting

b) Roasting

c) Refining

d) Concentration

27. Dubnium resembles both _____. **[1]**

a) niobium(V) and protactinium(V)

b) rutherfordium(IV) and zirconium(IV)

c) hafnium(IV) and zirconium(IV)

d) niodium(V) and tantalum(V)

28. The electronic configuration of Gd^{2+} is _____. **[1]**

(At. No. of Gd is 64)

a) $[Xe]\ 4f^8$

b) $[Xe]\ 4f^7\ 5d^1$

c) $[Xe]\ 4f^7\ 5d^1\ 6s^2$

d) $[Xe]\ 4f^7$

29. Which of the following statements is INCORRECT? **[1]**

a. The stability of chloride complexes of Cu^{2+}, Mn^{2+}, Cd^{2+} and Co^{2+} follows the order $[CuCl4]2^- > [CoCl_4]^{2-} > [MnCl_4]^{2-} > [CrCl_4]^{2-}$

b. The stability of the coordination complex is inversely proportional to the value of equilibrium constant.

c. Higher the basicity of the ligand, stable are the coordination complexes.

d. Stronger the metal ligand interaction, greater is the stability of the complex.

a) Option (d)

b) Option (b)

c) Option (c)

d) Option (a)

30. Which of the following is TRUE about secondary valence? **[1]**

a) Secondary valencies and are ionizable.

b) Number of secondary valencies is equal to the oxidation state of the central metal.

c) Secondary valencies do not have a fixed spatial arrangement around the metal ion.

d) Secondary valencies can be satisfied by negative ions or neutral molecules or both.

31. The oxidation state of iron (Fe) in $[Fe(CN)_6]^{4-}$ _____. **[1]**

a) 1

b) 0

c) 4

d) 2

32. The energy difference between t_{2g} and e_g level in an octahedral crystal field is _____. **[1]**

a) 4 Dq

b) 10 Dq

c) 6 Dq

d) 8 Dq

33. Alkyl halides are _____ in nature. **[1]**

a) acidic

b) ionic

c) non-polar

d) polar

34. The reaction of 4-bromobenzyl chloride with NaCN in ethanol leads to _____. **[1]**

a) 4-bromo-2-cyanobenzyl chloride

b) 4-cyanobenzyl chloride

c) 4-bromobenzonitrile

d) 4-bromobenzyl cyanide

35. Alkyl halides can be converted into Grignard reagent by _____. **[1]**

a) warming with magnesium in dry ether

b) warming with $MgCl_2$

c) refluxing with $MgCl_2$ solution

d) boiling with magnesium ribbon in alcoholic solution

36. Ethylene glycol is prepared from _____ by reaction with aqueous NaOH. **[1]**

a) 1,2-dibromoethane

b) bromoethane

c) 1,2-dibromopropane

d) 1,3-dibromopropane

37. Which of the following is an organic oxide? **[1]**

a) Ether

b) Carboxylic acid

c) Alcohol

d) Phenol

38. The product 'C' in the following reaction is _____. **[1]**

$CH_3Br \xrightarrow{alc.KCN}$ 'A' $\xrightarrow{H_3O^+}$ 'B' $\xrightarrow{LiAlH_4}$ 'C'

a) CH_3OH

b) CH_3CHO

c) CH_3CH_2OH

d) CH_3COOH

39. C_6H_5-O-CH_3 is named as _____. **[1]**

a) anisole

b) methyl phenyl ether

c) all of these

d) methoxybenzene

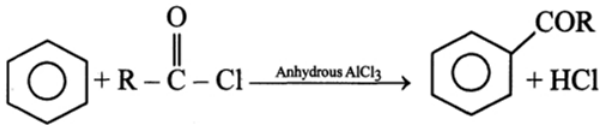
40. $CH_3CH_2 - \underset{\underset{O}{||}}{C} - ONa + NaOH \xrightarrow[\triangle]{CaO} A + B$; A and B are respectively _____. **[1]**

a) n-butane and sodium carbonate

b) n-propane and sodium carbonate

c) methane and sodium carbonate

d) ethane and sodium carbonate

41.  is an example of _____. **[1]**

a) Friedel-Craft's acylation

b) Sandmeyer reaction

c) Friedel-Craft's alkylation

d) Fittig condensation

42. Which one is NOT the reaction of diazonium salt? **[1]**

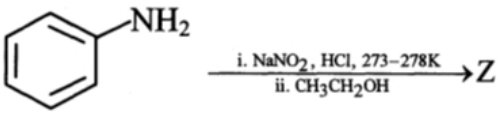
a) Carbylamine reaction

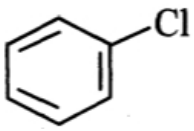
b) Orange dye test

c) Gattermann reaction

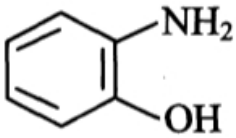
d) Sandmeyer reaction

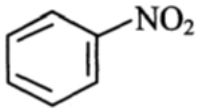
43. Identify Z in the following reaction: **[1]**



a) 

b) 

c) 

d) 

44. Lower aliphatic amines are soluble in water because they _____. **[1]**

a) are basic

b) are acidic

c) form hydrogen bonds with water

d) are lighter than water

45. Amines are considered as the organic derivatives of _____. **[1]**

a) urea

b) ammonia

c) alkane

d) amino acids

46. Which of the following statements are CORRECT? **[1]**

I. Adenine and guanine are derived from the parent compound pyrimidine.

II. Nucleotides are formed by adding a phosphate group to the 3'-OH of a nucleoside.

III. A nucleotide of DNA having adenine as base is named as dAMP.

IV. Nucleotides are monophosphates of nucleosides.

a) II and III

b) III and IV

c) I and IV

d) I and III

47. Which amino acid has an aromatic ring? **[1]**

a) Tyrosine

b) Alanine

c) Lysine

d) Glycine

48. Treatment of rubber with sulphur is called _____. **[1]**

a) hybridization

b) sulphonation

c) condensation

d) vulcanization

49. Which of the following polymer is an example of fibre? **[1]**

a) Silk

b) Nylon 6,6

c) All of these

d) Dacron

50. _____ can be categorised as benign solvent. **[1]**

a) Carbon tetrachloride

b) Dichloromethane

c) Water

d) Chloroform