SATISH SCIENCE ACADEMY

DHANORI PUNE-411015

CHEMISTRY

MHT - CET - Chemistry

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

1. The number of oxygen atoms in 4.4 g of CO_2 is approximately _____. **[1]**

   a) 6×10^{22} b) 12×10^{23}

   c) 6×10^{23} d) 1.2×10^{23}

2. Which of the following could be explained by considering particle nature of light? **[1]**

   i. Diffraction of light
   ii. Photoelectric effect
   iii. Black-body radiation
   iv. Interference of light

   a) i and iv b) i and iii

   c) iii and iv d) ii and iii

3. Highest covalent character is found in which of the following? **[1]**

   a) CaF_2 b) $CaBr_2$

   c) $CaCl_2$ d) CaI_2

4. The oxidation number of Mn is maximum in _____. **[1]**

   a) MnO_2 b) $MnCl_2$

   c) MnO_4^- d) Mn_2O_3

5. Which of the following statements about $LiAlH_4$ is INCORRECT **[1]**

   a. It is a colourless solid.
   b. It reacts violently with water and even with atmospheric moisture.
   c. It is used as an oxidizing agent in organic synthesis.
   d. It is a source of hydride (H^-).

   a) option (b) b) option (c)

   c) option (a) d) option (d)

6. For one mole of an ideal gas, the slope of the V versus T curve at a constant pressure of 2 atm is X lit mol^{-1} K^{-1}. **[1]**
   The value of the ideal universal gas constant **R** in terms of X is _____.

   a) X lit atm mol^{-1} K^{-1} b) 2X lit atm mol^{-1} K^{-1}

   c) 2X atm lit^{-1} mol^{-1} K^{-1} d) $\frac{X}{2}$ lit atm mol^{-1} K^{-1}

7. Choose the CORRECT statement. **[1]**

a) Colloidal system is homogeneous.

b) Lyophobic colloid can be coagulated by persistent dialysis.

c) Lyophilic colloids are irreversible.

d) Detergent is an example of multimolecular colloid.

8. A mixture of ethyl iodide and n-propyl iodide is subjected to Wurtz reaction. The hydrocarbon that will NOT be formed is _____. **[1]**

a) n-butane

b) n-propane

c) n-hexane

d) n-pentane

9. Which of the following compound does NOT belong to the same family of compounds as the others? **[1]**

a) $H-\underset{\underset{O}{\|}}{C}-CH_2CH_3$

b) $H-\underset{\underset{O}{\|}}{C}-H$

c) $H_3C-\underset{\underset{O}{\|}}{C}-CH_3$

d) $H_3C-\underset{\underset{O}{\|}}{C}-H$

10. The coordination number of each sphere in a close-packed one-dimensional structure is _____. **[1]**

a) 8

b) 2

c) 1

d) 4

11. A tetrahedral void is surrounded by _____ spheres. **[1]**

a) six

b) four

c) three

d) two

12. The number of octahedral voids per atom in ccp structure is _____. **[1]**

a) 8

b) 4

c) 1

d) 2

13. The boiling point of a solution of 0.11 g of a substance in 15 g of ether was found to be 0.1 °C higher than that of the pure ether. The molecular weight of the substance will be _____. (K_b = 2.16 K kg mol^{-1}) **[1]**

a) 178 g mol^{-1}

b) 148 g mol^{-1}

c) 158 g mol^{-1}

d) 168 g mol^{-1}

14. On dissolving 18 g solid in 100 g H_2O at 20 °C, water vapour pressure decreases from 17.53 mm to 17.22 mm. The molecular weight of the solid is _____. **[1]**

a) 18 g mol^{-1}

b) 27 g mol^{-1}

c) 183 g mol^{-1}

d) 274 g mol^{-1}

15. While dealing with colligative properties of nonelectrolyte solutions, the relatively dilute solutions with concentrations _____ or less are considered. **[1]**

a) 0.2 M

b) 2 M

c) 0.5 M

d) 1 M

16. Which of the following conditions will apply for the conversion of ice into water? **[1]**

	ΔH	ΔS	ΔG
(A)	-	-	Negative at low T
(B)	+	-	Positive at low T
(C)	+	+	Positive at low T
(D)	-	+	Negative at low T

a) option (D)

b) option (A)

c) option (B)

d) option (C)

17. ΔU for a system that does 1000 cal of work on the surroundings when 200 cal of heat are absorbed by the system is _____. **[1]**

a) + 1200 cal

b) + 800 cal

c) - 1200 cal

d) - 800 cal

18. In a closed insulated container, a liquid is stirred with a paddle to increase its temperature. In this process, which of the following is TRUE? **[1]**

a. $\Delta U = W = Q = 0$

b. $\Delta U \neq 0$,$Q = W = 0$

c. $\Delta U = W \neq 0$,$Q = 0$

d. $\Delta U = Q \neq 0$, $W = 0$

a) option (c)

b) option (a)

c) option (b)

d) option (d)

19. The combustion enthalpies of carbon, hydrogen and methane are -395.5 kJ mol^{-1}, -285.8 kJ mol^{-1} and -890.4 kJ mol^{-1} respectively at 25 °C. The value of standard enthalpy of formation of methane at that temperature is _____ . **[1]**

a) 890.4 kJ mol^{-1}

b) - 107.7 kJ mol^{-1}

c) -76.1 kJ mol^{-1}

d) - 298.8 kJ mol^{-1}

20. In a first order reaction A $\rightarrow$ B, if k is rate constant and initial concentration of the reactant A is 0.5 M then the half life is _____. **[1]**

a) $\frac{\log 2}{k\sqrt{0.5}}$

b) $\frac{\log 2}{k}$

c) $\frac{\ln 2}{k}$

d) $\frac{0.693}{0.5k}$

21. The rate of a certain reaction is given by, rate = k $[H^+]^n$. The rate increases 100 times when the pH changes from 3 to 1. The order (n) of the reaction is _____. **[1]**

a) 1.5

b) 0

c) 2

d) 1

22. Find the INCORRECT statement. **[1]**

a. Mixture of He and O_2 is used for respiration by sea divers.

b. mixture of 85 % Ar and 15 % H_2 is filled in electric bulb to increase life of filament.

c. Helium is used as shielding gas for arc welding.

d. Mixture of Ne and He is used in certain protective electrical devices such as voltage stabilizers.

a) Option (b)

b) Option (a)

c) Option (d)

d) Option (c)

23. Hexahalides of group 16 elements undergo _____. **[1]**

a) sp^3

b) $sp^3 d^2$

c) $sp^3 d$

d) dsp^3

24. Which one statement about sulphur dioxide gas is INCORRECT? **[1]**

a) It decolourises acidified potassium permanganate solution

b) It is a dehydrating agent

c) Two S - O bonds are equal

d) It has an angular shape

25. The most basic hydroxide from following is _____. **[1]**

a) $Pr(OH)_3$ (Z = 59)

b) $Ho(OH)_3$ (Z = 67)

c) $La(OH)_3$ (Z = 57)

d) $Sm(OH)_3$ (Z = 62)

26. If lanthanoid ion (X) having nf electrons is green coloured, then the lanthanoid ion (Y) having (14 - n)f electrons is _____ coloured. **[1]**

a) blue

b) red

c) orange

d) green

27. FeS_2 is _____. **[1]**

a) magnetite

b) limonite

c) iron pyrites

d) haematite

28. Lanthanoid series contains _____ elements. **[1]**

a) 6

b) 14

c) 8

d) 10

29. The CORRECT charge on and coordination number of 'Fe' in $K_3[Fe(CN)_6]$ are _____ respectively. **[1]**

a) +3, 6

b) +3, 3

c) +2, 6

d) +2, 4

30. Which would exhibit coordination isomerism? **[1]**

a) $[Cr(NH_3)_6][Co(CN)_6]$

b) $[Co(en)_2Cl_2]^+$

c) $[Cr(en)_2Cl_2]^+$

d) $[Cr(NH_3)_6]Cl_3$

31. Which of the following complexes are paramagnetic in nature? **[1]**

I. $[Fe(CN)_6]^{3-}$

II. $[Fe(CN)_6]^{4-}$

III. $[CoF_6]^{3-}$

IV. $Ni(CO)_4$

a) I and II

b) III and IV

c) I and IV

d) I and III

32. Two complexes $PtCl_4.2NH_3$ and $PtCl_4.2KCl$ do not give a precipitate of AgCl with $AgNO_3$ solution. The structures of these complexes are _____. **[1]**

a) $[Pt(NH_3)_2Cl_4]$, $K_2[PtCl_5]Cl$

b) $[Pt(NH_3)_2Cl_4]$, $K_2[PtCl_6]$

c) $[Pt(NH_3)_2Cl_2]Cl_2$, $K_2[PtCl_6]$

d) $[Pt(NH_3)_2]Cl_4$, $K_2[PtCl_6]$

33. $CH_3 - \underset{CH_3}{\overset{Br}{\underset{|}{\overset{|}{C}}}} - CH_3 \xrightarrow[-HBr]{Alc.\ NH_3} Y$ **[1]**

Y in this reaction is _____.

a) but-2-ene

b) 2-methylpropan-2-amine

c) 2-methylpropene

d) 2-amino-2-methylpropane

34. Which of the following group of compounds are extinguisher, antiseptic, insecticide and anesthetic respectively? **[1]**

a) $CHCl_3$, CHI_3, DDT, CCl_4

b) CCl_4, CHI_3, $CHCl_3$, DDT

c) CCl_4, CHI_3, DDT, $CHCl_3$

d) DDT, CHCl3, CCl4, CHI_3

35. The optically active product obtained from S_N2 reaction of a Dextro rotatory compound will be: **[1]**

a) racemic mixture

b) laevo rotatory

c) partially optically active

d) dextro rotatory

36. When methoxymethane is heated with dilute sulphuric acid, the product obtained is _____. **[1]**

a) methanol

b) iodomethane

c) methanal

d) methane

37. The general formula of aliphatic ethers is same as that of _____. **[1]**

a) polyhydric alcohols

b) monohydric alcohols

c) trihydric alcohols

d) dihydric alcohols

38. Which of the following compounds on reactions with Grignard's reagent followed by hydrolysis forms tertiary alcohol? **[1]**

a) Propanone

b) Methanal

c) Propanal

d) Ethanal

39. Decreasing order of boiling points of: n-Pentanol (A), n-Pentane (B), Pentan-3-ol (C), and 2,2-Dimethylpropanol (D) is _____. **[1]**

a) B, D, C, A

b) A, B, C, D

c) C, A, D, B

d) A, C, D, B

40. The IUPAC name of α-methyl butyraldehyde is _____. **[1]**

a) 3-methylbutanal
b) pentanal
c) 2-methylbutanal
d) methylbutanal

41. Carboxylic acid reacts with ammonia resulting in the formation of _____. **[1]**

a) imine
b) oxime
c) amide
d) amine

42. Phthalimide $\xrightarrow{Alc.KOH}$ P $\xrightarrow{CH_3CH_2Br}$ Q $\xrightarrow{Aq.NaOH}$ R + S **[1]**

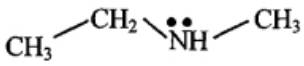
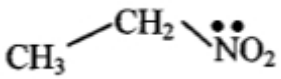
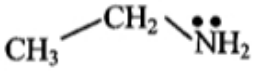
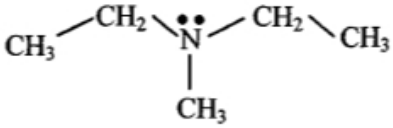
R and S in the sequence are _____.

a) sodium salt of phthalic acid + ethylamine
b) sodium salt of phthalic acid + aniline
c) sodium salt of benzoic acid + ethylamine
d) sodium salt of benzoic acid + benzylamine

43. With respect to +I effect, the order of stabilization of conjugate acids of 1 °, 2 °, 3 ° amines and ammonia is: **[1]**

a) $\overset{+}{N}H_4 < R-\overset{+}{N}H_3 < R_2\overset{+}{N}H_2 < R_3\overset{+}{N}-H$
b) $\overset{+}{N}H_4 > R-\overset{+}{N}H_3 > R_2\overset{+}{N}H_2 > R_3\overset{+}{N}-H$
c) $\overset{+}{N}H_4 < R_3\overset{+}{N}-H < R-\overset{+}{N}H_3 < R_2\overset{+}{N}H_2$
d) $\overset{+}{N}H_4 < R-\overset{+}{N}H_3 < R_2\overset{+}{N}H_2 > R_3\overset{+}{N}-H$

44. Identify the compound that will react with Hinsberg's reagent to give a solid which dissolves in alkali. **[1]**

a) 
b) 
c) 
d) 

45. Lowest boiling point will be of the compound _____. **[1]**

a) $C_2H_5N(CH_3)_2$
b) $CH_3CH_2CH_2NHCH_3$
c) $(C_2H_5)_2NH$
d) $CHCH_2CH_2CH_2NH_2$

46. Proteins $\xrightarrow[\text{hydrolysis}]{\text{Complete}}$ X **[1]**

The functional groups present in X are _____ groups.

a) carboxyl and amino
b) carbonyl and amino
c) amino and amide
d) carboxyl and nitro

47. Identify the CORRECT statements from the following. **[1]**

I. Plants utilize the minerals absorbed by their roots to produce proteins.
II. Lipids are the main ingredient of vegetable oils and milk fats.
III. Nucleic acids constitute the genetic material of organisms.
IV. Primary structural materials of organisms are lipids.

a) Only II, III
b) Only I, III
c) I, II, III
d) All of these

48. Identify the copolymer among the following. **[1]**

a) Teflon
b) Polycarbonates
c) Acrylic glass
d) Polythene

49. The compounds required for the formation of novolac are _____. **[1]**

a) benzene + methanal
b) methanal + urea
c) phenol + methanal
d) benzaldehyde + phenol

50. X-ray diffraction gives all the information regarding nanoparticles EXCEPT the _____. **[1]**

a) particle size
b) binding nature
c) crystal structure
d) geometry