GuruAanklan Foundation/MHT-CET/Examination
Physics + Chemistry
Set - [A]

ANSWER KEY

1.	(C)	2.	(A)	3.	(B)	4.	(D)	5.	(D)	6.	(D)
7.	(B)	8.	(A)	9.	(A)	10.	(B)	11.	(C)	12.	(B)
13.	(A)	14.	(A)	15.	(C)	16.	(B)	17.	(D)	18.	(C)
19.	(C)	20.	(C)	21.	(A)	22.	(C)	23.	(A)	24.	(C)
25.	(C)	26.	(A)	27.	(C)	28.	(A)	29.	(B)	30.	(B)
31.	(B)	32.	(A)	33.	(D)	34.	(C)	35.	(A)	36.	(B)
37.	(B)	38.	(A)	39.	(C)	40.	(C)	41.	(D)	42.	(C)
43.	(C)	44.	(D)	45.	(D)	46.	(D)	47.	(A)	48.	(B)
49.	(C)	50.	(D)	51.	(A)	52.	(D)	53.	(A)	54.	(A)
55.	(D)	56.	(C)	57.	(A)	58	(A)	59	(D)	60.	(A)
61.	(C)	62.	(C)	63.	(D)	64.	(B)	65.	(C)	66.	(D)
67.	(D)	68.	(C)	69.	(C)	70.	(D)	71.	(B)	72.	(A)
73.	(A)	74.	(C)	75	(D)	76.	(C)	77.	(B)	78.	(C)
79.	(C)	80.	(C)	81.	(B)	82.	(B)	83.	(D)	84.	(B)
85.	(B)	86.	(D)	87.	(D)	88.	(C)	89.	(C)	90.	(C)
91.	(D)	92.	(C)	93.	(B)	94.	(D)	95.	(B)	96.	(C)
97.	(C)	98.	(A)	99.	(A)	100.	(A)				

PHYSICS

1. (C)

$$3\times16=6\times V$$

$$V=8$$

$$K.E=\frac{1}{2}mV^2=\frac{1}{2}\times6\times64=192$$

2. (A)

$$n_1=60\,r.p.h=1\,r.p.m=\frac{1}{60}\,r.p.s$$

$$n_2=50\,r.p.h=\frac{50}{60}\,r.p.m=\frac{5}{360}\,r.p.s$$

$$t=7\,mins$$

$$\alpha=\frac{\omega_2-\omega_1}{t}$$

$$=\frac{2\pi\left(n_2-n_1\right)}{t}$$

$$=\frac{2\times3.14\left(1-\frac{5}{6}\right)}{7\times60\times60}$$

$$=\frac{6.28\times1}{7\times60\times60\times6}$$

$$=4.15\times10^{-5}\,rad/s^2$$

3. (B)

$$B.E=-\left(T.E\right)$$

$$T.E=\frac{1}{2}\left(P.E\right)$$

$$\therefore P.E=-2\left(B.E\right)$$

$$=-2\left(4\times10^8\,J\right)$$

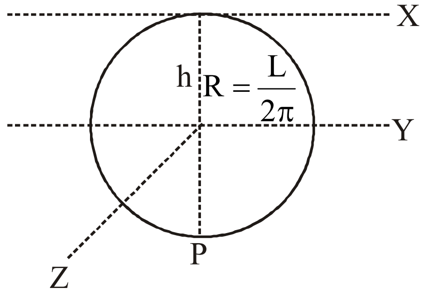
$$=-8\times10^8\,J$$

4. (D)

Since area velocity is constant; area acceleration is zero.

5. (D)

$L = 2\pi R \qquad \therefore R = \frac{L}{2\pi}$



Let Z, P, X and Y be four axes of rotation as shown.

$I_p + I_y = I_z$ ....perpendicular axes theorem.

Also $I_p = I_y$ ..... both axes are along diameter.

$\therefore 2I_y = I_z$

$$I_y = \frac{I_z}{2} = \frac{MR^2}{2} = \frac{M}{2}\left(\frac{L^2}{4\pi^2}\right)$$

$$I_x = I_y + Mh^2$$

$$h = R = \frac{L}{2\pi}$$

$$I_x = \frac{ML^2}{8\pi^2} + \frac{ML^2}{4\pi^2}$$

$$= \frac{ML^2}{\pi^2}\left[\frac{12}{32}\right]$$

$$\rho = \frac{M}{L}$$

$$M = \rho L$$

$$I_x = \frac{\rho L \times L^2}{\pi^2} \times \frac{3}{8}$$

$$I_x = \frac{3\rho L^3}{8\pi^2}$$

6. (D)

Watt is the unit of power $= \frac{\text{Energy}}{\text{time}}$

7. (B)

Given that, $\sqrt{\frac{r_1^2 + r_2^2 + r_3^2 + r_4^2 + r_5^2}{5}} = 8\,\text{cm}$

$$\therefore r_1^2 + r_2^2 + r_3^2 + r_4^2 + r_5^2 = 64 \times 5\,\text{cm}^2$$

$$I = m r_1^2 + m r_2^2 + m r_3^2 + m r_4^2 + m r_5^2$$

$$= m\left(r_1^2 + r_2^2 + r_3^2 + r_4^2 + r_5^2\right)$$

$$= 1\text{g} \times 64 \times 5\,\text{cm}^2$$

$$I = 320\,\text{g cm}^2$$

8. (A)

$$\text{Total K.E} = \text{K.E}_{\text{trans}} + \text{K.E}_{\text{Rot}}$$

$$= \frac{1}{2}mv^2 + \frac{1}{2}I\omega^2$$

$$= \frac{1}{2}mv^2 + \frac{1}{2}\left(\frac{2}{5}MR^2\right)\omega^2$$

$$= \frac{1}{2}mv^2 + \frac{1}{5}M\left(R^2\omega^2\right)$$

$$= \frac{1}{2}mv^2 + \frac{1}{5}mv^2$$

$$= \frac{7}{10}mv^2$$

$$= \frac{7}{10}\times 1\times (1)^2$$

$$= 0.7\ \text{J}$$

9. (A)

$$F = -kx$$

$$|F| = kx$$

F will be maximum, if x is maximum,

$$F = kA$$

$$k = m\omega^2$$

$$F = m\omega^2 A$$

$$= 10\times 10^{-3}\times\left(\frac{2\pi}{T}\right)^2\times 0.5$$

$$= 10\times 10^{-3}\times\frac{4\pi^2}{\pi^2}\times 25\times 0.5$$

$$F = 0.5\text{N}$$

10. (B)

Force acting on a particle performing SHM is given as, $F = -kx$

$\therefore$ The force is correctly represented by graph in option B.

11. (C)

$$\vec{a} + \vec{b} = 11\hat{i} - 5\hat{j} + 4\hat{k}$$

$$\left|\vec{a} + \vec{b}\right| = \sqrt{11^2 + 5^2 + 4^2} = 9\sqrt{2}$$

12. (B)

$$\text{Strain energy per unit Volume} = \frac{\text{Strain Energy}}{\text{Volume}}$$

$$\frac{1.8\times10^{-3}}{V} = 6\times10^{-3}$$

$$\frac{1.8\times10^{-3}}{6\times10^{-3}} = A\times\ell = \pi r^2\times\ell$$

$$3\times10^{-1} = \pi\times\left(\frac{1}{\pi^2}\right)\times\ell$$

$$3\times10^{-1} = \frac{\ell}{\pi}$$

$$\ell = 3\times10^{-1}\times\pi$$

$$\ell = 9.42\times10^{-1} = 0.942\text{m}$$

13. (A)

Low adhesion is used for making raincoats waterproof.

14. (A)

$$S.E = T(2dA) = T\times2\pi r^2$$

$$= 0.035\times3.14\times\left(1\times10^{-2}\right)^2\times2$$

$$S.E = 2.19\times10^{-5}\text{ J}$$

15. (C)

$$F = T\times\ell$$

$$F = T\times(2\times4L)\ldots$$

$$F = 8TL$$

16. (B)

$$W = FS\cos\theta,\ \theta = 90^\circ, W = 0$$

17. (D)

$$\frac{I_{max}}{I_{min}} = \frac{(a_2+a_1)^2}{(a_2-a_1)^2} = \frac{(4+3)^2}{(4-3)^2} = \frac{49}{1}$$

18. (C)

$$y = 2A\sin\left(\frac{2\pi x}{\lambda}\right)\cos\left(\frac{2\pi t}{T}\right)$$

$$y = 5\sin\left(\frac{\pi x}{3}\right)\cos(40\pi t)$$

$$\frac{2\pi x}{\lambda} = \frac{\pi x}{3}$$

$\lambda = 6$

distance between two node $= \frac{\lambda}{2} = 3\text{cm}$

19. (C)

$a = \sqrt{a_1^2 + a_2^2 + 2a_1a_2\cos\alpha}$

$a^2 = 2a^2 + 2a^2\cos\alpha$

$a^2 = 2a^2(1+\cos\alpha)$

$1+\cos\alpha = \frac{1}{2}$

$\cos\alpha = \frac{-1}{2}$

$\alpha = \frac{2\pi}{3}$

20. (C)

For a closed pipe; fundamental frequency is given by, $n = \frac{v}{4L}$, where L is the length of air column.

If 'ℓ' is the length of pipe,

$n_1 = 400H_z \rightarrow L_1 = \ell - 10$

$n_2 = 300H_z \rightarrow L_2 = \ell - 6$

$\therefore n_1 = \frac{v}{4L_1}$ and $n_2 = \frac{v}{4L_2}$

$\therefore \frac{n_1}{n_2} = \frac{L_2}{L_1}; \frac{400}{300} = \frac{\ell-6}{\ell-10}; \therefore \ell = 22\text{cm}$

$\frac{4}{3} = \frac{\ell-6}{\ell-10}; 4\ell - 40 = 3\ell - 18$

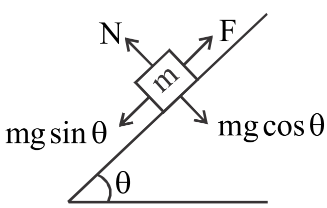
$\ell = 40 - 18 = 22\text{ cm}$

21. (A)

$F_{max} = \mu N = \mu mg\cos\theta$

$= 0.7 \times 2 \times 9.8 \times \frac{\sqrt{3}}{2}$

$= 0.7 \times 0.8 \times \sqrt{3}$



$F = -mg\sin\theta = 2 \times 9.8 \times \frac{1}{2} = 9.8\text{ N}$

22. (C)
Change in pressure at an ideal gas which causes intermolecular distance.

23. (A)
Emissive power of block body is greater than emissive power of other bodies.

$\therefore E_R < E_B$

24. (C)

$E = e\sigma AT^4$

$\therefore P = \frac{E}{t} = \frac{e\sigma AT^4}{t}$

$t = 1\,\text{second}$

$P = e\sigma AT^4$ watts

$= 0.35 \times 5.7 \times 10^{-5} \frac{\text{erg}}{\text{cm}^2\,\text{sec}\,\text{k}^4} \times T^4 \times 0.30\,\text{cm}^2$

$= 0.35 \times 5.7 \times 10^{-5} \times (3000)^4 \times 0.30 \times 10^{-7} \frac{J}{s}$

$= 0.35 \times 5.7 \times \left(3 \times 10^3\right)^4 \times 10^{-12} \times 0.3$

$= 0.35 \times 5.7 \times 81 \times 0.30$

$= 48.2$ watts

25. (C)

$E = e\sigma T^4$

26. (A)

$h_1\rho_1 g = h_2\rho_2 g$

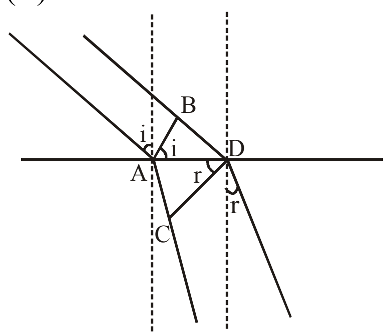
$4 \times 1.1 \times g = 2 \times \rho_2 \times g$

$2.2 = \rho_2$

27. (C)

$\mu_1\lambda_1 = \mu_2\lambda_2$

28. (A)



$\mu = \frac{\sin i}{\sin r} = \frac{BD/AD}{AC/AD} = \frac{BD}{AC}$

29. (B)

Red light deviates minimum.

30. (B)

path difference $= n\lambda$ for bright point

$3.75 \times 10^{-6}\,m = n \times 5 \times 10^{-7}\,m$

$n = \frac{3.75}{5} \times \frac{10^{-6}}{17^{-7}}$

$= \frac{37.5}{5} = 7.5$

$n = 7.5 \rightarrow$ not an integer

$\therefore$ Point is dark

31. (B)

Sparkles of diamond is due to total internal reflection, which is due to high refractive index.

32. (A)

$$\frac{I_{max}}{I_{min}} = \left(\frac{\sqrt{I_1} + \sqrt{I_2}}{\sqrt{I_1} - \sqrt{I_2}}\right)^2$$

$$= \left(\frac{\sqrt{9} + \sqrt{4}}{\sqrt{9} - \sqrt{4}}\right)^2$$

$$= \left(\frac{3+2}{3-2}\right)^2$$

$$= \frac{25}{1}$$

33. (D)

$R = n^{\frac{1}{3}} r$

$C^1 = 4\pi \varepsilon_0 R$

$C = 4\pi \varepsilon_0 r$

$Q = n q_0$

$q_0 = CV \ = 4\pi \varepsilon_0 rV$

$V^1 = \frac{Q^1}{C^1} = \frac{n q_0}{4\pi \varepsilon_0 R}$

$V^1 = n^{\frac{2}{3}} V$

$\frac{V^1}{V} = n^{\frac{2}{3}}$

$U = \frac{1}{2} QV$

$U \alpha V$

$\therefore \frac{U^1}{U} = \frac{V^1}{V}$

$\frac{U^1}{U} = n^{\frac{2}{3}}$

34. (C)

$V = IR$

$$\therefore I \alpha \frac{1}{R}$$

$$R = \rho \frac{\ell}{A}$$

$$\therefore \frac{I_1}{I_2} = \frac{R_2}{R_1}$$

$$\frac{I_1}{I_2} = \frac{\rho \frac{\ell_2}{A_2}}{\rho \frac{\ell_1}{A_1}}$$

$$\frac{I_1}{I_2} = \frac{\ell_2}{A_2} \times \frac{A_1}{\ell_1} = \frac{\ell_2}{\ell_1} \times \frac{r_1^2}{r_2^2} = \left(\frac{\ell_2}{\ell_1}\right) \times \left(\frac{r_1}{r_2}\right)^2$$

$$= \frac{3}{4} \times \left(\frac{2}{3}\right)^2 = \frac{3}{4} \times \frac{4}{9} \; \frac{I_1}{I_2} = \frac{1}{3}$$

35. (A)

Potential Gradient

$$K = \frac{V}{L} = \frac{6}{3} = 2 \, V/m$$

$\therefore$ potential difference across a length of 50 cm will be

$$V^1 = K\ell$$

$$V^1 = 2 \times 0.5$$

$$= 1V$$

36. (B)

If we keep obect at twice the focal length we will get real image of the size of object.

37. (B)

$$I_g = 0.04 I$$

$$\frac{I}{I_g} = \frac{G+5}{5} = \frac{1}{0.04}$$

$$\frac{G+5}{5} = 25$$

$$G = 24s$$

$$G = 24 \times 5$$

$$= 120 \, \Omega$$

38. (A)

$$I=\frac{V}{Z}=\frac{V}{\sqrt{R^2+X_L^2}}=\frac{200}{\sqrt{30^2+20^2}}=\frac{200}{\sqrt{1300}}=\frac{20}{\sqrt{13}}A$$

39. (C)

Magnetic potential, $V=\frac{\mu_0}{4\pi}\cdot\frac{M}{r}$ .... (M is pole strenght)

$$=\frac{\left[MLT^{-2}A^{-2}\right]\left[LA^{-1}\right]}{[L]}=\left[MLT^{-2}A^{-1}\right]$$

40. (C)

$$P_{av}=\frac{i_m}{\sqrt{2}}\times\frac{e_m}{\sqrt{2}}\times\cos\phi$$

$$=\frac{4\times60}{2}\times\frac{1}{2}$$

$$\boxed{P_{av}=60\,\text{watts}}$$

41. (D)

$$B=\frac{\ell I}{2\pi r}$$

$$B\,\alpha\,\frac{I}{r}$$

$B_1=\frac{1}{2}$ $\qquad\frac{B_1}{B_2}=\frac{1}{4},$ $\qquad 1:4$

$$B_2=\frac{2}{1}$$

42. (C)

$$I=\frac{NBA}{Rt}=\frac{20\times25\times10^{-4}}{100}\times1000=0.5\,A$$

43. (C)

$$\eta=\frac{\text{Output Power}}{\text{Input Power}}$$

$$\therefore \text{Output Power}=\eta\times\text{Input Power}$$

$$=\frac{70}{100}\times v\times i$$

$$=\frac{70}{100}\times210\times0.1$$

$$=14.7\,W$$

$$\approx15\,W$$

44. (D)

Radiowaves have energy less than the work function of every substance.

45. (D)

$$\lambda = \frac{h}{\sqrt{2meV}}$$

$$\frac{\lambda_p}{\lambda_c} = \sqrt{\frac{M_e}{M_p}}$$

$$\frac{\lambda_e}{\lambda_p} = \sqrt{\frac{M_p}{M_e}}$$

46. (D)

$$E_n = \frac{E_1}{n^2} = \frac{-13.6\ {}_{e}V}{n^2}$$

$$E_4 = \frac{-13.6\ {}_{e}V}{16}$$

$$E_4 = -0.85\ {}_{e}V$$

47. (A)

$$W_0 = \frac{hc}{\lambda_0}$$

$$\therefore \lambda_0 = \frac{hc}{w_0} = \frac{hc}{w_0 \times c}$$

$$= \frac{1240 \times 10^9}{2}$$

$$\lambda_0 = 6215\ \text{Å}$$

48. (B)

For the working of a transiston, emitter junction should be forward biased and collector junction should be revers biased.

49. (C)

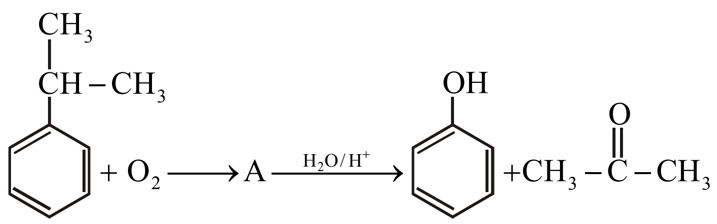
The Troposphere extends from the surface of earth upto a height of 12 km.

50. (D)

Inside a magnet magnetic lines are from south to north.

CHEMISTRY

51. (A)



52. (D)

Benzaldehyde with the help of base performs cannizzaro reaction.

($\because$ aromatic compound cannot do addition reaction with $NaHSO_3$) where as all ketones performs addition of salt reaction.

53. (A)

H – I – weak bond – easily breaks – releases H^+ fastly hence – Strong Acid.

H – F – Strong bond – not easily breaks – not releasing H^+ fastly – hence less acidic (weak acid)

54. (A)

General Formula $C_x\left(H_2O\right)_y$

55. (D)

$$\begin{array}{c} CH_3 \\ | \\ CH_3-C-Br \\ | \\ CH_3 \end{array} + aq.KOH \xrightarrow{\Delta} KBr + \begin{array}{c} CH_3 \\ | \\ CH_3-C-OH \\ | \\ CH_3 \end{array}$$

2-Methyl propan-2-ol

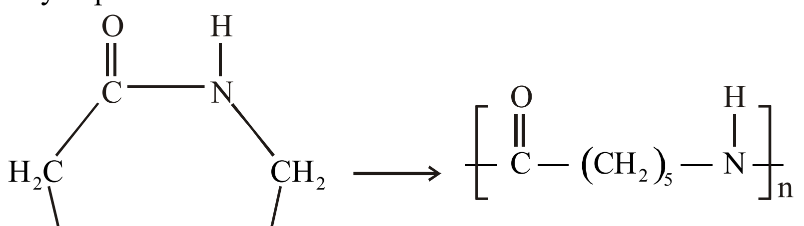
56. (C)

Tranquilizers are antidepressant.

57. (A)

Nylon - 6

Poly Caprolactum



Nylon-6

58 (A)

In lanthanoids promethium is only radioactive. Rest all non radioactive.

59 (D)

Aldehyde $\longrightarrow$ Alkanal

Ether $\longrightarrow$ Alkoxy alkane

Alcohols $\longrightarrow$ Alkanol

Ketone $\longrightarrow$ Alkanone

60. (A)

Salt bridge increases junction potential which stops the current I = 0

So, V = 0

61. (C)

In order to solve such problem, first write the formule of molecule/compound

The formula of carbon dioxide CO_2

Molecular mass of $CO_2 = 12.0 + 16.0 \times 2 = 44\,g\,mol^{-1}$

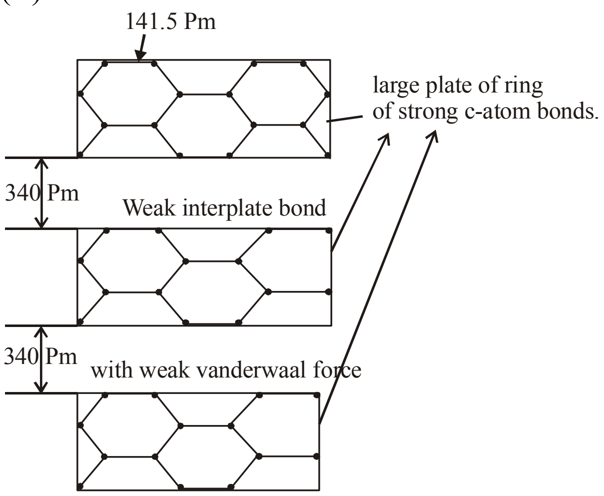
Atomic mass of $C = 12.0\,g\,atom^{-1}$

Percentage of $C = \frac{12}{44} \times 100 = 27.27\%$

62. (C)

All the hydride compounds have 3 bonds pair and one lone pair as we more down. The group electronegativity of central atom decreases so, tendency to keep bond pair electron towards. The central atom decreases and to keep the lone pair of electron towards itself increases. Thus lone pair availability decreases down the group.

63. (D)



64. (B)

P is wrong $\rightarrow$ Frenkel defect caused due to huge difference in size.
S is wrong $\rightarrow$ Schottky defect decreases mass and density of substance
Q is correct $\rightarrow$ Frenkel defect arises due to disallocation of atom.
R is correct $\rightarrow$ Trapping of an electron in the lattice leads to formation of F-centre.

65. (C)

$$\Delta T_f = K_f \times m = K_f \times \frac{\text{no. of moles of solute}}{\text{mass of solvent in kg}}$$

$$\Delta T_b = K_b \times m = K_b \times \frac{\text{no. of moles of solute}}{\text{mass of solvent in kg}}$$

Both electrolyte are equimolar, hence both electrolyte from above formula will give same change in freezing point and same change in boiling point.

66. (D)

$$H_2 + I_2 \longrightarrow 2HI$$

$$\therefore \text{Rate of reaction} = -\frac{d(H_2)}{dt} = -\frac{d(I_2)}{dt} = +\frac{1}{2}\frac{d[HI]}{dt}$$

Multiplying by 2

$$= -2 \times \frac{d[H_2]}{dt} = -2 \times \frac{d[I_2]}{dt} = \frac{d[HI]}{dt}$$

67. (D)

In BrF_5^-, Br being less electronegative is the central atom.

In Br, no. of valence $e^- = 7$

5 F atoms shaped with 5 Br atoms.

So, no. of electrons shared = 5 + 5 = 10

$\therefore$ No. of bond pairs $= \frac{10}{2} = 5$

No. of lone pair $= \frac{7-5}{2} = 1$

Thus, the shape of BrF_5 with 5 *bp* and 1 *lp* is square pyramidal.

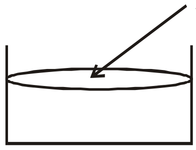
68. (C)

1 molal aqueous solution

$\downarrow$

1 moles of solute present in 1 kg mass of water

1 mole of solute ($n_2 = 1$)



$\rightarrow 1000\,g \text{ water} \rightarrow n_1 = \frac{\text{mass of water}}{\text{molar mass of water}} = \frac{1000\,g}{18\,g\,mol^{-1}}$

= 55.55 mol

So mole fraction of solute $X_2 = \frac{n_2}{n_1 + n_2} = \frac{1}{1 + 55.55} = \frac{1}{56.55} = 0.0177$

69. (C)

$[M(en)_2 (C_2O_4)]NO_2$

$\therefore$ Let the oxidation number = X

$X + (2 \times \text{charge of en}) + (1 \times \text{charge of } C_2O_4) + (1 \times \text{charge of } NO_2) = 0$

$\therefore X + (2 \times 0) + (1 \times (.2)) + (1 \times (-1)) = 0$

$\therefore X - 2 - 1 = 0 \qquad \boxed{\therefore X = 3}$

$\therefore$ en – gives 4 lone pair

$\underline{C_2O_4 \text{ – gives 2 lone pair}}$

6 lone pair means 6 Coordination number.

70. (D)

$$\overset{+1}{H_2}\overset{-1}{O_2} + \overset{+1}{Na_2}\overset{+4}{C}\overset{-2}{O_3} \longrightarrow \overset{+1}{Na_2}\overset{-1}{O_2} + \overset{+4}{C}\overset{-1}{O_2} + \overset{+1}{H_2}\overset{-2}{O}$$

Hence, the oxidation state of all the elements remain the same as before. Thus, it does not involve oxidation or reduction processes. None of the elements changes its oxidation number.

71. (B)

Mineral of Iron

Pyrolusite – MnO_2

Malachite – $Cu(OH)_2 \cdot CuCO_3$

Cassiterite – SnO_2

Magnetite – Fe_3O_4

72. (A)

Potassium dichromate is a good oxidising agent, it oxidises other substance

$$\begin{array}{lll} SO_2 & \longrightarrow & H_2SO_4 \\ \downarrow & & \downarrow \\ (+4) & & (+6) \text{ – Oxidation of Sulphur} \end{array}$$

$$\begin{array}{lll} NO_3^- & \longrightarrow & NO_2^- \\ \downarrow & & \downarrow \\ (+5) & & (+3) \text{ – This is reduction cannot done by } K_2Cr_2O_7 \end{array}$$

$$\begin{array}{lll} CH_3CHO & \longrightarrow & CH_3CH_2OH \\ \downarrow & & \downarrow \\ (+2) & & (+1) \text{ – This is reduction cannot done by } K_2Cr_2O_7 \end{array}$$

73. (A)

Lithium being very small in size polarises a large CO_3^{2-} ion leading to the formation of more stable Li_2O and CO_2. All the carbonates of alkali metals (except lithium carbonate) are thermally quite stable. That's why Li_2CO_3 is decomposed at a lower temperature whereas Na_2CO_3 at higher temperature.

74. (C)

$$\underset{H}{\overset{H}{\diagdown}}C = C\underset{H}{\overset{H}{\diagup}} + HBr \longrightarrow \underset{(A)}{H-\overset{H}{\underset{H}{C}}-\overset{H}{\underset{H}{C}}-Br} \xrightarrow{\text{aq. NaOH}} \underset{(B)}{CH_3-CH_2-OH} + NaBr$$

$$CH_3-CH_2-OH + Na \longrightarrow \underset{(C)}{CH_3-CH_2-O\,Na}$$

$$\longrightarrow CH_3-CH_2-O-Na + CH_3I \longrightarrow \underset{\text{Ethyl-methyl ether}}{CH_3-CH_2-O-CH_3} + NaI$$

75 (D)

$SN^{2'}$s reactivity $\rightarrow 1^o > 2^o > 3^o$

So,

$$H - \overset{H}{\underset{H}{\overset{|}{\underset{|}{C}}}} - Cl + OH^- \longrightarrow OH - \overset{H}{\underset{H}{\overset{|}{\underset{|}{C}}}} - H + Cl^-$$

Complete inversion can be seen

76. (C)

The product obtained by the hydrolysis of Me_3SiCl contains only one –OH group which when subjected to polymerisation makes the polymer incapable for further polymerisation, thus, controls the chain length.

77. (B)

Order of basic characteristics in aqueous solution is

$(CH_3)_2\ NH > CH_3NH_2 > (CH_3)_3N > NH_3$

due to both inductive effect and steric hindnance. Hence basic characteristics are,

$(CH_3)_2\ NH > CH_3NH_2 > (CH_3)_3N > C_6H_5NH_2$

78. (C)

$$\begin{matrix}H\\ \end{matrix}\!\!>C = O + 4(H) \xrightarrow[\Delta]{Zn-Hg/Conc.\,HCl} \begin{matrix}H\\ \end{matrix}\!\!>CH_2 + H_2O$$

Clemmenson reaction

79. (C) Protium $\left(H^1\right)$, deutrium$\left(H^2\right)$ and tritium $\left(H^3\right)$ are three isotopes of hydrogen. Thus, their mass ratio is 1 : 2 : 3.

80. (C) Thermos flask - contains insulator & insulated system is called as isolated system.

81. (B)

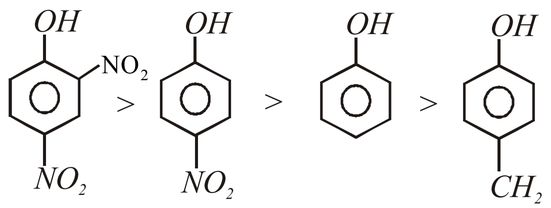
Electron withdrawing groups ↑ ses acidity.

Electron releasing groups ↓ ses acidity.

$-NO_2 = \text{EWG}$

$-CH_3 = \text{ERG}$

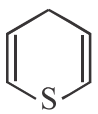
$-H = \text{Neutral}$

Acidity order : 

82. (B) Water on calcium chloride is an example of absorption as water is also distributed in the bulk.

83. (D) Secondary cell $\rightarrow$ rechargeable cell $\rightarrow$ lead storage battery & Nickel - cadmium storage cell.

84. (B)



thiophene

It is heterocyclic compound as it contains foreign element (element other than C and H) in the cyclic chain.

85. (B)

Greater the concentration of reactants faster is the reaction, i.e, as concentration increases rate also increases.

86. (D)

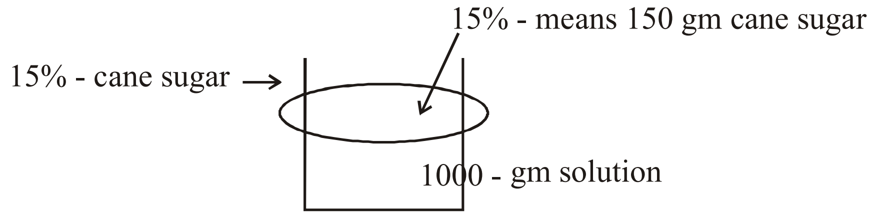
Carboxyl group – means – COOH group.

Acetyl group – means $-\overset{\overset{\displaystyle O}{\|}}{C}-Cl$ group

Formo group – means formyl group $\underset{\displaystyle \text{H}}{\underset{|}{-\text{C}}}=0$

Oxo group – means $\underset{\displaystyle \text{O}}{\underset{\|}{-\text{C}-}}$

87. (D)



So, number of moles of cane sugar $=\dfrac{\text{Mass of sugarcane}}{\text{Molar mass of sugarcane}}=\dfrac{150}{342}\text{mol}$

Molar mass of sugarcane $=\text{C}_{12}\text{H}_{22}\text{O}_{11}$

$$=(\text{C}\times 12)+(22+1-1)+(11\times 0)$$

$$=(12\times 12)+(22\times 1)+(11\times 16)$$

$$=144+22+176$$

$$=342\ \text{g mol}^{-1}$$

$\text{T}=(150+273)\text{k}$

$=423\text{k}$

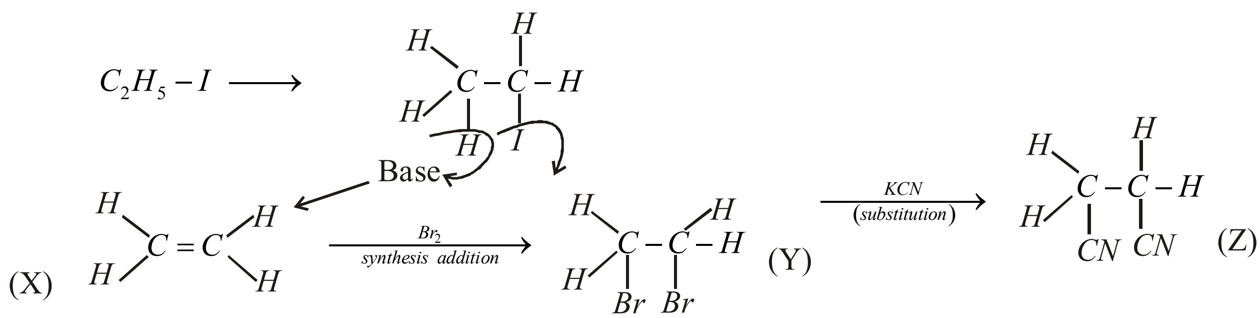
So, $\text{PV}=\text{nRT}$

$$\therefore\ \text{P}=\dfrac{\dfrac{150}{342}\times 0.0821\times 423}{1\text{L}}$$

$=15.05\,\text{atm}$

88. (C)

a/c KOH = elimination (Base)



89. (C) $\text{Phenol} + FeCl_3 \longrightarrow \text{Violet colour}$

$\text{Benzoic acid} + FeCl_3 \longrightarrow \text{No colour}$

90. (C) Milk is lime is a suspension of slaked lime in water.

91. [D]

$\therefore$ 10 g/L of urea is Isotonic with 5% W/V – nonvolatile solute

$$\therefore C_{\text{urea}} = C_{\text{non-volatile}}$$

$$\therefore \frac{n_{\text{urea}}}{V_{\text{urea}}} = \frac{n_{\text{non-volatile}}}{V_{\text{non-volatile}}}$$

$$\therefore \frac{\text{Mass}_{\text{urea}}}{\text{Molar mass}_{\text{urea}} \times V_{\text{urea}}} = \frac{\text{Mass}_{(\text{non-volatile})}}{\text{Molar mass of non-volatile} \times V_{\text{non-volatile}}}$$

$$\therefore \frac{10\text{ g}}{60\text{ g mol}^{-1} \times 1\text{ L}} = \frac{50\text{ g}}{\text{Molarmass of non-volatile} \times 1\text{ L}}$$

$$\therefore \text{Molarmass of non-volatile} = \frac{50\text{ g} \times 60\text{ g mol}^{-1}}{10}$$

$$= 300\text{ g mol}^{-1}$$

92. (C) $2O_3 \xrightarrow{\Delta} 3O_2$

$$O_3 \longrightarrow \frac{3}{2}O_2$$

93. (B)

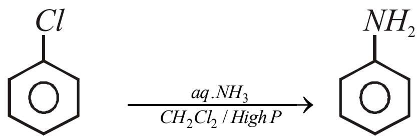
Alumina is amphoteric oxide, which reacts with acid as well as base.

94. (D)

Binary means - 2 i.e. 1 solute, +1 solvent can be having any phase forms binary solution.

95. (B)

In haloarenes C – X bond can be broken and replaced by $^{-}OH, ^{-}CN, ^{-}NH_2$ under high pressure.



Aniline

96. (C)

2, 3 dimethyl butane

$$\begin{array}{cccc} C - & C - & C - & C \\ & | & | & \\ & C & C & \end{array}$$

above structure (carbon skeleton) can be prepared from iso propyl iodide.

$$C-\underset{\underset{\displaystyle C}{|}}{C}\Big|-X+-\underset{\underset{\displaystyle C}{|}}{C}-C\Big|-X \xrightarrow{Na/ether} C-\underset{\underset{\displaystyle C}{|}}{C^{\bullet}} + {}^{\bullet}\underset{\underset{\displaystyle C}{|}}{C}-C+X_2 \longrightarrow C-\underset{\underset{\displaystyle C}{|}}{C}-\underset{\underset{\displaystyle C}{|}}{C}-C$$

97. (C)

$$\text{Normality} = \frac{\text{Gm eq. wt. of solute}}{\text{Volume of solution in dm}^3} = \frac{29\text{g eq.}}{1\,\text{dm}^3}$$

= two normal solution.

98. (A)

Phenol is known as carbolic acid

99. (A)

$$C_{(s)} + 2H_{2(g)} \longrightarrow CH_{4(g)} \qquad ....\Delta H = ?$$

$$\therefore \Delta H = \Sigma\Delta_C H_{(\text{reactant})} - \Sigma\Delta_c H_{(\text{product})}$$

$$= \left[\left(1\times\Delta_c H_{(c)}\right) + \left(2\times\Delta_c H_{(H_2)}\right)\right] - \left[1\times\Delta_c H_{(CH_4)}\right]$$

$$= \left[(-393.71) + (2\times -285.77)\right] - \left[1\times -890.36\right]$$

$$= [-393.71 - 571.54] - [-890.36]$$

$$= [-965.25] + 890.36$$

$$= -74.86\,\text{kJ}$$

100. (A) (A) 0.1 M - Sugar solution - non electrolyte $\rightarrow$ 0.1 M

(B) 0.1 M - KCl - $0.1k^+ + 0.1Cl^{-1} = 0.2\,M$ - strong electrolyte $\rightarrow$ 0.2 M

(C) $0.1M\ Ba(NO_3)_2 = 0.1Ba^{2+} + 0.2\,NO_3^- = 0.3M \rightarrow 0.3M$

(D) $0.1M\,\text{silver nitrate} - 0.1AgNO_3 \begin{cases} 0.1Ag^+ \\ 0.1NO_3^- \end{cases} \rightarrow 0.2\,M$

As the increase in nonvolatile solute in a volatile solvent decreases the vapour pressure. So, less number of moles is there in sugar solution. So it will give highest pressure of vapour.