FULL PAPER TEST KEY SOLUTIONS - 1

1) 3	2) 2	3) 4	4) 3	5) 4	6) 3	7) 2	8) 1	9) 3	10) 1	11) 3	12) 2	13) 2	14) 2	15) 2
16) 1	17) 1	18) 1	19) 3	20) 1	21) 1	22) 1	23) 4	24) 2	25) 3	26) 1	27) 2	28) 2	29) 2	30) 2
31) 1	32) 2	33) 1	34) 3	35) 1	36) 1	37) 3	38) 1	39) 4	40) 4	41) 2	42) 2	43) 3	44) 1	45) 3
46) 1	47) 2	48) 2	49) 2	50) 4	51) 1	52) 2	53) 3	54) 1	55) 3	56) 2	57) 1	58) 2	59) 2	60) 3
61) 2	62) 1	63) 3	64) 3	65) 1	66) 2	67) 3	68) 4	69) 2	70) 1	71) 4	72) 1	73) 2	74) 1	75) 4
76) 1	77) 2	78) 3	79) 1	80) 3	81) 3	82) 4	83) 1	84) 3	85) 3	86) 2	87) 1	88) 4	89) 2	90) 4
91) 2	92) 1	93) 3	94) 3	95) 3	96) 4	97) 1	98) 1	99) 4	100) 1	101) 2	102) 1	103) 1	104) 4	105) 4
106) 1	107) 3	108) 3	109) 4	110) 2	111) 4	112) 2	113) 4	114) 1	115) 2	116) 1	117) 2	118) 3	119) 2	120) 2
121) 2	122) 1	123) 4	124) 2	125) 3	126) 4	127) 3	128) 4	129) 3	130) 3	131) 3	132) 3	133) 2	134) 2	135) 3
136) 4	137) 4	138) 1	139) 3	140) 2	141) 3	142) 2	143) 2	144) 4	145) 1	146) 1	147) 2	148) 2	149) 4	150) 4
151) 2	152) 3	153) 3	154) 3	155) 1	156) 1	157) 2	158) 1	159) 4	160) 3	161) 2	162) 4	163) 1	164) 3	165) 2
166) 4	167) 2	168) 1	169) 1	170) 1	171) 3	172) 4	173) 3	174) 4	175) 3	176) 1	177) 2	178) 1	179) 1	180) 3

Solution :-

1)

The K.E of in coming electron is

$$\text{K.E} = \frac{p^2}{2m} = \frac{\left(\frac{h}{\lambda}\right)^2}{2m} = \frac{h^2}{2\lambda^2 m}$$

assuming that all of this energy is converted into a photon that photon energy is

$$\frac{hc}{\lambda_0} = \frac{h^2}{2\lambda^2 m}$$

$$\therefore \lambda_0 = \frac{2mc\lambda^2}{h}$$

2)

Given mass of oxygen molecule

$(m^1) = 2.76 \times 10^{-26} Kg$

Boltzmann's constant(KB)=$1.38 \times 10^{-23} TK^{-1}$

$V_{rms} = vescape = 11.2\, Kmps$

$= 11.2 \times 10^3 m/s$

$U_{rms} = \sqrt{\frac{3K_BT}{m_1}}$

$\Rightarrow (u_{rms})^2 = \frac{3K_BT}{m_1}$

$(11.2 \times 10^3)^2 = 3 \times \frac{1.38 \times 10^{-23}}{22.76 \times 10^{-26}}$

$T = \frac{250.88}{3} \times 10^3 = 83.6 \times 10^3$

$= 8.36 \times 10^4 K$

3)

$\lambda_e = \lambda_p \Rightarrow K.E \propto \frac{1}{m}$

$$\frac{h}{\sqrt{2m_e KE_e}} = \frac{h}{\sqrt{2m_p KE_p}}$$

$m_e KE_e = m_p KE_p$

$KE\, \alpha\, \frac{1}{m}$

KE of e^- greater than KE of proton

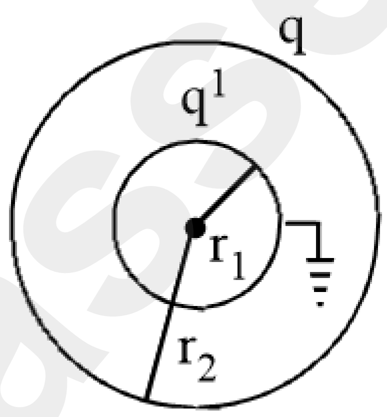
$\because m_e < m_p$

4)

$V_{in} = 0$

$$\frac{1}{4\pi\varepsilon_0}\frac{q_1}{r_1} + \frac{1}{4\pi\varepsilon_0}\frac{q}{r_2} = 0$$

$$\frac{q^1}{r_1} = \frac{-q}{r_2} \Rightarrow q^1 = -q\left(\frac{r_1}{r_2}\right)$$



5)

Number of photoelectrons $\propto$ Intensity

$$\propto \frac{1}{(\text{Distance})^2}$$

6)

$$\lambda = \frac{h}{\sqrt{2Em}} = \frac{6.6 \times 10^{-34}}{\sqrt{2 \times 0.08 \times 1.6 \times 10^{-19} \times 1.67 \times 10^{-27}}}$$

7)

$h = 4.14 \times 10^{-15} ev - s$
$c = 3 \times 10^{-8}\, m/s$
$\lambda_1 = 3250 \times 10^{-10}\, m$
$\lambda_2 = 2536 \times 10^{-10} m$
$w = \frac{1}{2} mv^2$
$\frac{hc}{\lambda} = \frac{1}{2} mv^2$
$v^2 = \frac{2hc}{m\lambda}$
$v = \sqrt{\frac{2hc}{m\lambda}}$
$= \sqrt{\frac{2 \times 4.14 \times 10^{-15} \times 3 \times 10^{8}}{9.1 \times 10^{-31} \times 2536 \times 10^{-10}}}$
$V \approx 0.6 \times 10^{6}\, m/s$

8)

The potential gradient is ϕ.
In first case (Open circuit) potential difference
$E_1 = \phi \times 600$
In the second case with R= 2 Ω resistance
$E_2 = \phi \times 400$
so$E_1/E_2 = 3/2$
but $E_1 = Ir$,r is the internal resistance of the emf cell
and $E_2 = I\frac{rR}{(r+R)}$ since R is in parallel combination with internal resistance r.
therefore,
$\frac{E_1}{E_2} = \frac{3}{2} = \frac{r+R}{R}$
$\implies r = 1\, ohm$

or
from the formula
$r = R\left(\frac{l_1}{l_2} - 1\right)$
$= 2 \times \left(\frac{600}{400} - 1\right) = 1\, ohm$

9)

$\lambda = \frac{h}{\sqrt{3mKT}}$
$E = \frac{3}{2} KT = \frac{3}{2} \times 1.38 \times 10^{-23} \times 300$
$E = 450 \times 1.38 \times 10^{-23} J$
$E = \frac{450 \times 1.38 \times 10^{-23}}{1.6 \times 10^{-19}}$
$E = 0.388\, eV$

10)

When NPN transistor is used as an amplifier, majority charge carrier electrons of N-type emitter move from emitter to base and than base to collector.

11)

For NPN transiator, $\alpha = 0.96$; β will be
$\beta = \frac{\alpha}{1-\alpha} = \frac{0.96}{1-0.96} = 24$

12)

$F = 2\cos wt \qquad w = \frac{2\pi}{T}$
$F = 2\cos\left(\frac{2\pi}{8}\right)t$
$F = \frac{dp}{dt} \Rightarrow dp = F\, dt$
$\int dp = \int F\, dt = \int_0^8 2\cos\left(\frac{\pi}{4}t\right) dt$
$t = 2\left(\frac{\sin\frac{\pi}{4}t}{\frac{\pi}{4}}\right)_0^8 = \frac{8}{\pi}[\sin 2\pi - \sin 0]$
$= 0$

13)

Schwarz schild radius $R = \frac{2GM}{C^2}$
$= \frac{2 \times 6.67 \times 10^{-11} \times 5.98 \times 10^{24}}{9 \times 10^{16}}$
$\approx 10^{-2}\, \mathrm{m}$

14)

$\frac{1}{\alpha} - \frac{1}{\beta} = 1$
$\beta = \frac{\alpha}{1-\alpha}$

15)

The de-Brogile wavelength, $\lambda = \frac{h}{mv}$
Here $\lambda = \frac{h}{m_e\frac{c}{2}}$ and $\lambda_p = \frac{h}{m_p c}$
Given, $\lambda_e = \lambda_p$
So, $\frac{h}{m_e\frac{c}{2}} = \frac{h}{m_p c} \Rightarrow \frac{\mu_\varepsilon}{\mu_\pi} = 2$
Ratio of KE $\frac{k_e}{k_p} = \frac{\frac{1}{2}m_e v_e^2}{\frac{1}{2}m_p v_p^2} = \frac{2mpc^2}{4mpc^2} = \frac{1}{2}$

16)

from definition current gain
$\beta = \left(\frac{\Delta I_C}{\Delta I_B}\right)_{V_C}$

17)

Given
$U = \propto V$
$\frac{fnRT}{2} = \propto V$
$\therefore T \propto V$
Hence P is constant
$C_P = \left(\frac{f+2}{2}\right) R = \frac{(3+2)R}{2}$
$= \frac{5R}{2}$

18)

$\frac{\Delta l}{l} = \frac{F}{AY} = \frac{mg}{A(Y)} = 10^{-4}$

19) For enchroching of wave slit width $\underset{<}{\simeq}$ Wave length

$$\Rightarrow \lambda = \frac{h}{mv}, \quad \lambda < d$$

$$d < \frac{h}{|p_y|}$$

$$|p_y|\, d < h$$

20)

$$K_{\max} = h\nu - W_0 = 6.6 \times 10^{-34} \times 8 \times 10^{14} - 3.2 \times 10^{-19}$$

$$= 2.1 \times 10^{-19} J$$

21) By conservation of energy

Total energy at A = Total energy at B

$$\frac{1}{2}PE = PE + KE$$

$$\frac{-GMm}{2a} = \frac{-GMm}{r} + \frac{1}{2}mv^2$$

$$GMm\left(\frac{1}{r} - \frac{1}{2a}\right) = \frac{1}{2}mv^2$$

$$v = \sqrt{GM\left(\frac{2}{r} - \frac{1}{a}\right)}$$

22)

$$F = \frac{Gm^2}{d^2} + \frac{Gm^2}{D^2} \rightarrow (1)$$

$$= Gm^2\left(\frac{1}{d^2} + \frac{1}{D^2}\right)$$

$$F = Gm^2\sqrt{\left(\frac{1}{d^2}\right)^2 + \left(\frac{1}{D^2}\right)^2} \rightarrow (2) \text{ and } (4)$$

$$F = Gm^2\left(\frac{1}{d^2} - \frac{1}{(D-d)^2}\right) \rightarrow (3)$$

23) Balanced wheatstone's bridge

$$C_{eff} = c' + c''$$

$$c' = \frac{3 \times 6}{3 + 6} = \frac{18}{9} = 2\mu$$

$$c'' = \frac{4 \times 8}{4 + 8} = \frac{4 \times 8}{12} = \frac{8}{3}\mu$$

$$C_{eff} = 2 + \frac{8}{3} = \frac{14}{3}\mu$$

24) Intercept on stopping potential axis ie y-axis gives $\frac{W}{e}$ which smaller for A than B.

25) w= area of trepezium

$$= \frac{1}{2}\left(1 \times 10^5 + 5 \times 10^5\right) 4$$

$$= 6 \times 10^5 \times 2$$

$$= 12 \times 10^5 J$$

26)

$$\beta_{dc} = \frac{\alpha_{dc}}{1 - \alpha_{dc}} \Rightarrow (1 - \alpha_{dc})\frac{\alpha_{dc}}{\beta_{dc}}$$

$$\frac{\beta_{dc} - \alpha_{dc}}{\alpha_{dc} \cdot \beta_{dc}} = \frac{\beta_{dc}\left(1 - \frac{\alpha_{dc}}{\beta_{dc}}\right)}{\alpha_{dc} \cdot \beta_{dc}}$$

$$= \frac{1 - \frac{\alpha_{dc}}{\beta_{dc}}}{\alpha_{dc}} = \frac{1 - (1 - \alpha_{dc})}{\alpha_{dc}}$$

$$= \frac{1 - 1 + \alpha_{dc}}{\alpha_{dc}} = 1$$

27)

$$i = \frac{Q}{t} = \frac{ne}{t} = 1.8 \times 10^{14} \times 1.6 \times 10^{-19} = 28.8 \times 10^{-6} A$$

$$= 29\,\mu A$$

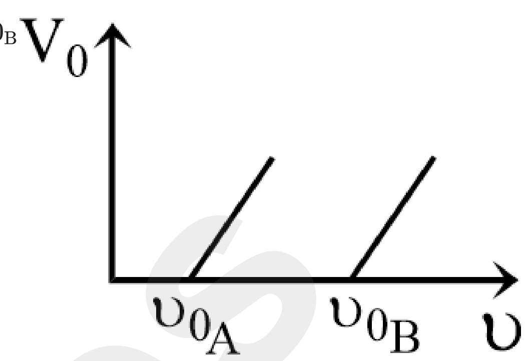
28)

$$\gamma = \frac{C_p}{C_v}$$

$$\gamma C_p - C_v = R \quad \left[\because \frac{C_p}{C_v} = \gamma\right]$$

$$C_v = \frac{R}{\gamma - 1}$$

29) $\upsilon_{0_A} < \upsilon_{0_B}$



30)

$$i_e = i_b + i_c \Rightarrow i_c = i_e - i_b$$

31)

$$\lambda = \frac{h}{\sqrt{2mE}} \Rightarrow \lambda \propto \frac{1}{\sqrt{m}} \Rightarrow \frac{\lambda_p}{\lambda_\alpha} = \sqrt{\frac{m_\alpha}{m_p}} = \frac{2}{1}$$

32)

$$\lambda = \frac{h}{mv_{rms}}$$

$$\Rightarrow \lambda = \frac{6.6 \times 10^{-34}}{2 \times 1.67 \times 10^{-27} \times 3 \times 10^3} = 0.66\,\overset{0}{A}$$

33) In a PNP transistor, the base region is very thin and is doped with penta valent impurity (N - region) or N - type region, which is relatively smaller than p - region

34) Charge on outre surface $= \frac{Q_1 + Q_2 + Q_3}{2}$

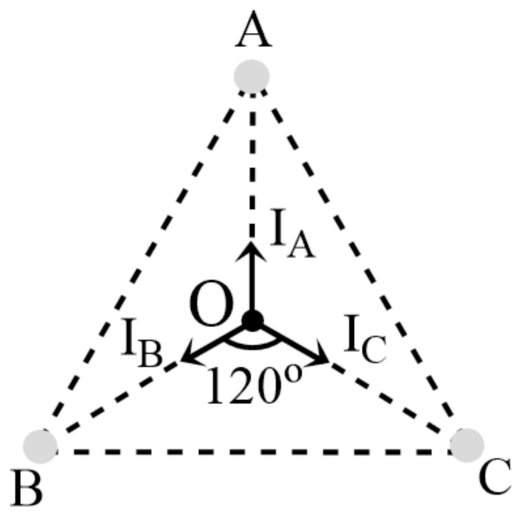
$$= \frac{Q + 0 - 2Q}{2} = \frac{-Q}{2}$$

35) For no emission of photoelectron, energy of incident light < Work function $\Rightarrow\ h\nu < \phi\ \Rightarrow \nu < \frac{\phi}{h}$

36) Due to three particles net intensity at the centre

$I = \vec{I}_A + \vec{I}_B + \vec{I}_C = 0$

because these three intensities are equal in magnitude and the angle between each other is 120^o.



37) Due to 10.2 eV photon one photon of energy 10.2 eV will be detected.

Due to 15 eV photon the electron will come out of the atom with energy (15 - 13.6) = 1.4 eV.

38)

$E_{ph} = E_e$

$p_{ph}e = p_e v \rightarrow (1)$

$\frac{\lambda_{ph}}{\lambda_e} = \frac{p_e}{p_{ph}} = \frac{e}{v} > 1$

39)

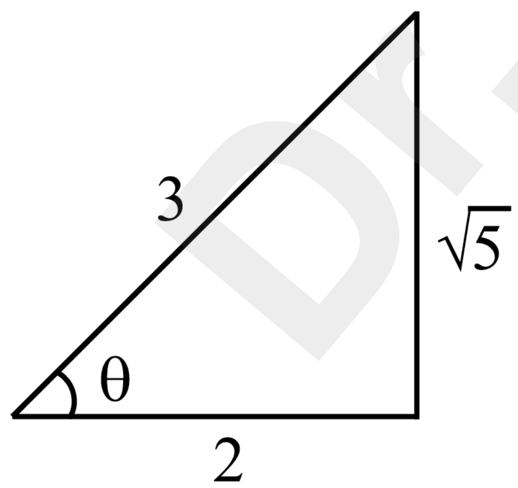
$\bar{a} = 6\hat{i} + 6\hat{j} - 3\hat{k},\ \bar{b} = 7\hat{i} + 4\hat{j} + 4\hat{k}$

$|\bar{a}| = \sqrt{36+36+9} = 9\ |\bar{b}| = \sqrt{49+16+16} = 9$

$\bar{a}.\bar{b} = 42 + 24 - 12 = 54$

$\cos\theta = \frac{\bar{a}.\bar{b}}{a\,b} = \frac{54}{9 \times 9} = \frac{2}{3}$

$\sin\theta = \frac{\sqrt{5}}{3} \Rightarrow \theta = \sin^{-1}\left(\frac{\sqrt{5}}{3}\right)$



40) We have $AD = C\ln(BD)$

That is, [B][D] is dimensionless or $[B] = \frac{1}{[D]}$

and $[A][D] = [C]$

if the dimension of two quantities that are being added/subtracted do not match, then that option is meaningless.

- Option 1 : $[C] - [D]$
- Option 2 : $[A^2] - \frac{1}{[D]^2}[A]^2[D]^2$
- Option 3 : $\frac{[A]}{[B]} - [A][D] = \frac{[A]}{[B]} - \frac{[A]}{[B]}$
- Option 4 : $\frac{[A]}{[D]} - \frac{[C]}{[D]}$

41)

$v = \frac{W_0}{h} + \frac{eV_0}{h}$

$v' = \frac{W_0}{h} + \frac{2eV_0}{h}$

$= \left(\frac{W_0}{h} + \frac{eV_0}{h}\right) + \frac{eV_0}{h}$

$= v + \frac{eV_0}{h}$

42)

$m_1 r_1 \omega^2 = \frac{Gm_1m_2}{r^2}$

$\Rightarrow \frac{m_2 r}{m_1 + m_2}.\omega^2 = \frac{Gm_2}{r^2}$

$\Rightarrow r^3\omega^2 = G(m_1 + m_2)$

$\Rightarrow \frac{2G}{\omega^2}.\omega^2 = G(m_1 + m_2)$

$\Rightarrow m_1 + m_2 = 8$ (from given data

$r = \left(\frac{2G}{\omega^2}\right)^{1/3}$)

From the given data m_1-m_2=6

m_1 =7 ,m_2=1

43) In the active region, emitter junction is forward biased and collector junction is reverse biased.

In cutoff region, both junctions are reverse biased.

In saturated region, both junctions are forward biased.

44) Emitter is most heavily doped, which sends the majority charge carries towards the collector

45)

$hv = W + eV_S$

$eV_S = hv - W$

$V_S = \frac{h}{e}v - \frac{W}{e}$

$Y = mx + c$

$\therefore m = \frac{h}{e}$

46) Each protein has one or more polypeptide chains which gives $1^0, 2^0, 3^0, 4^0$ structures which are responsible for function and activity of the proteins, on heating protein loses biological activity due to destroying of $2^o, 3^o$ & 4^o structures.

47) 'Be' compounds are predominantly covalent due to high polarising power of Be^{+2}

48) The reaction is endothermic in reverse direction and hence increase in temperature will favour reverse reaction.

49) Let the rate of reaction depends on xth power of [A]. Then

$r_1 = k[A]^x$ and $r_2 = k[2A]^x$

$\therefore \frac{r_1}{r_2} = \frac{[A]^x}{[2A]^x}$

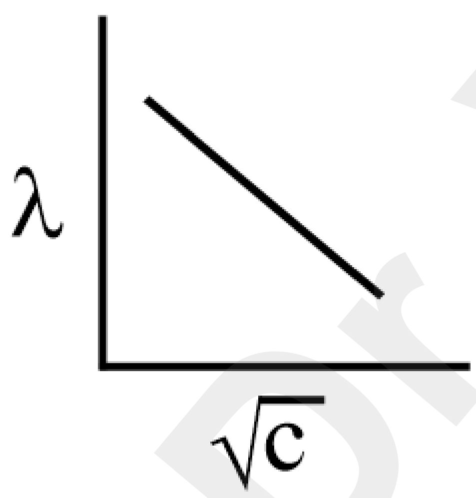
$= \frac{1}{4} = \left(\frac{1}{2}\right)^2 \ (\because r_2 = 4r_1)$

$\therefore x = 2$

As the reaction rate does not depend upon the concentration of B. Hence, the correct rate law will be

rate $= K[A]^2[B]^o$ or $= K[A]^2$

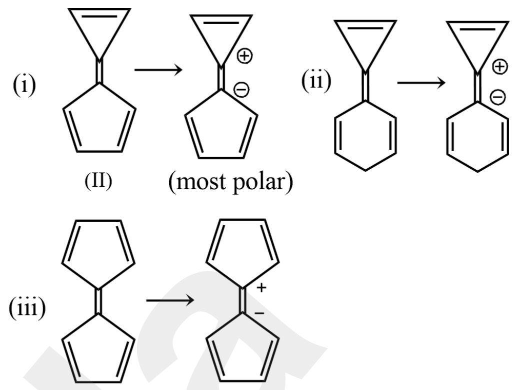
50) All these observations are correct Attraction forces weakes with increase is dilution.



51) Boron has giant molecular structure.

52) In solid state NaCl does not contains free ions so it does not conduct electricity.

53) In case of II polarity is more readily favoured because both rings formed is Aromatic.
(Dia. i)
In case of III one of the ring becomes aromatic by polarisation (one of the ring is nonaromatic)
(Dia. ii)
In case of I, none of the ring becomes aromatic & one is antiaromatic by polarity
(Dia. iii)
Anti aromatic structures are least stable (more reactive)



54) Atoms have a mass of order $\rightarrow 10^{-26} kg$.

55) To prepare tertiary butyl methyl ether by williamson's synthesis, tert-butyl group should be taken in the form of alkoxide

$(CH_3)_3CONa + CH_3Cl \rightarrow$
$(CH_3)_3C - O - CH_3 + NaCl$

56) EDTA is a hexadentate ligand and in an octahedral complex the coordination no. is 6. Therefore only one EDTA molecule is required to make an octahedral complex.

57) ${}_{64}Gd{=}_{54}[Xe]6s^2 4f^7 5d^1$

58) $2Ag^+ + H_2 \rightarrow 2Ag + 2H^+$

$E^0_{cell} = E_{RHS} - E_{LHS}$

$0.80 = E_{RHS} - 0$

$E_{RHS} = 0.80\ V$

$\therefore$ oxidation potential = - 0.8

59)

$$\begin{array}{cccc} 2AB_2 & \rightleftharpoons & 2AB+ & B_2 \\ 2 & & 0 & 0 \\ 2-2x & & 2x & x \end{array}$$

$$K_C = \frac{(AB)^2(B_2)}{(AB_2)^2} = \frac{(2x)^2 \, . \, x}{(2-2x)}$$

$$K_C = \frac{4x^3}{2[1-x]^2} = 2x^3$$

$$n = 2 - 2x + 2x + x = 2 + x$$

$$P_{AB_2} = \frac{2-2x}{2+x} \times P$$

$$P_{AB} = \frac{2x}{(2+x)} . P$$

$$P_{B_2} = \frac{x}{(2+x)} . P$$

$$P_{B_2} = \frac{x}{(2+x)} . P$$

$$P_{AB} = x . P$$

$$P_{B_2} = \frac{x}{2}$$

$$K_P = \frac{P_{AB^2} . P_{B_2}}{P_{AB_2^2}}$$

$$= \frac{[x.P]^2 \, . \, \frac{x}{2} . P}{[(1-x).P]^2}$$

$$= \frac{x^2 . P^2 . \frac{x}{2} . P}{(1-x)^2 . P^2}$$

$$K_P = \frac{x^3 . P}{2[1-x]^2}$$

$$K_P = \frac{x^3 . P}{2}$$

$$n^2 = \frac{2K_P}{P}$$

$$n = \left(\frac{2K_P}{P}\right)^{1/3}$$

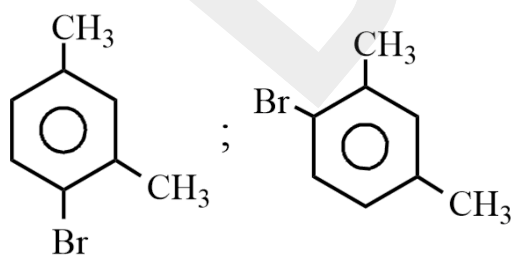
60)

$$\Delta H^0 = a - b$$
$$= c$$

61)

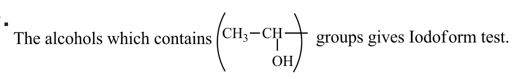
$-CH_3 \rightarrow$ O, P directing group

Ortho = minor ; Para = major



62)

Refer the figure.



63)

$\left[Co(en)_3\right]_2(SO_4)_3$ Tris (ethane -1, 2 diamine) cobalt (III) sulphate

64)

Glucose contains free aldehyde group which can reduce Ag_2O solution to a silvery white precipitate of silver. This property can be used to develop a silvery white reflecting surface on one side of a mirror.

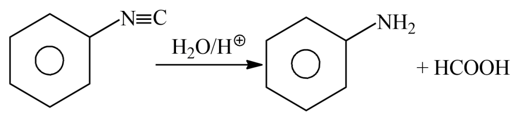
65)

A + B $\rightarrow$ C (no by product)

66)

The triple bond is $C_6H_5NC^-$ breaks to its $C_6H_5NH_2$ and HCOOH

$$C_6H_5NC + H_2O \xrightarrow{H^+} C_6H_5NH_2 + HCOOH$$



67)

Bakelite is thermosetting polymer. It becomes infusible on heating and can not be remoulded

68)

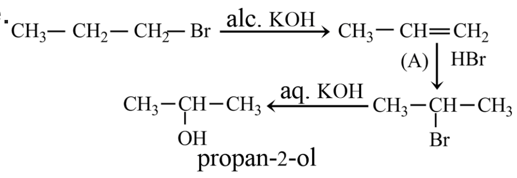
K_C or K_P do not depend on concentration, but depends only on temperature.

69)

$$CH_3COOH \xrightarrow{LiAlH_4} CH_3CH_2OH$$

70)

Refer the figure.



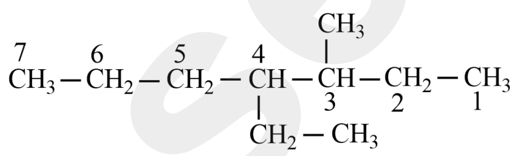
71)

Ligand is lewis bases. NH_3, anions are considered to be lewis bases.

72)

Given name is 3 - Methyl - 4 - ethyl heptane

but correct name is : 4 - Ethyl - 3 - methyl heptane.



73)

$$r = K[A]^n$$
$$2.4 = K[2.2]^2$$
$$0.6 = K[1.1]^n$$
$\therefore 4 = (2)^n$ or $n = 2$

74)

In F.C.C packing efficiency = 74%

75)

$$P^{OH} = P^{Kb} + \log\left[\frac{Salt}{Base}\right]$$

$$P^{OH} = 4.74 + \log\left[\frac{0.01}{0.02}\right]$$

$$= 4.74 + \log 1 - \log 2$$
$$= 4.74 + 0 - 0.3010$$

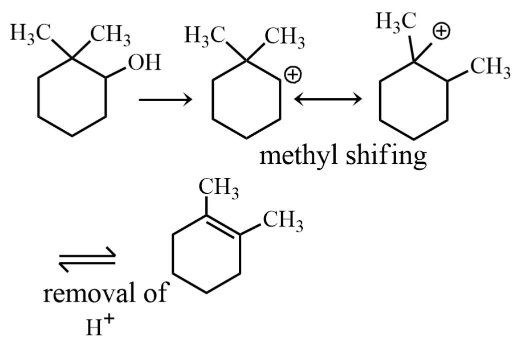
$$P^{OH} = 4.44$$

$$pH = 9.56$$

76)

$H_2N - NH_2, KOH$ in ethylene glycol is called Wolff kishner reductant.

77) As per saytzeff rule In β - Elemination of Alcohols the preferable product contains more number of methyl groups which is attached to double bond.



78)

$$CH_3 - CH = CH - CH_2 - CH_2 - CN \xrightarrow[H_2O]{DIBAL-H} CH_3 - CH = CH - CH_2 - CH_2 - CHO$$

79) The tail end of the soap molecule is ionic & hydrophilic since soap molecules have both properties of nonpolar & polar groups. soap can act as an emulsifier.

80) The acidic nature increases in order

$NaNO_2$	<	$NaCl$	<	H_2S	<	H_2SO_4
Salt Of SB WA		Salt Of SA SB		Weak Acid		Strong Acid

81) In a galvanic cell, the electrons flow from anode to cathode through the external circuit. At anode (–ve pole) oxidation and at cathode (+ pole) reduction takes place.

82) There are three electron releasing alkyl groups in 4. The anion $RCOO^-$ is least stabilized due to accumulation of negative charge on $RCOO^-$. Hence 4 in the weakest acid.

83) $pH = 7.4, [H^+] = 10^{-7.4} = 3.98 \times 10^{-8} = 4 \times 10^{-8}$

84) $H_2O(g) \rightleftharpoons H_{2(g)} + \frac{1}{2}O_{2(g)}$

This is an endothermic process (dissociation) so, increase in temperature shift equilibrium right

85)

$$CH_3 - \overset{H}{\overset{|}{C}} = \boxed{O + H_2}$$

$$NOH \rightarrow \underset{Acetaldoxime}{CH_3 - CH = N - OH} + H_2O$$

86) Amylopectin is not soluble in water.

87) $Ca(OH)_2 \rightarrow Ca^{2+} + 2OH^-$

It is AB_2 type of substance, $K_{sp} = 4s^3$

89) At cathode

$PbO_2 + 2H_2O \rightleftharpoons Pb^{+4} + 4OH^-$

$Pb^{+4} + 2e^- \rightarrow Pb^{-2}, Pb^{+2} + SO_4^{-2} \rightarrow PbSO_{4(S)}$

$4OH^- + 4H^+ \rightleftharpoons 4H_2O$

The net reaction at cathode is

$\underset{(s)}{PbO_2} + \underset{(aq)}{SO_4^{-2}} + \underset{(aq)}{4H^+} + 2e^- \rightarrow PbSO_{4(S)} + 2H_2O\,(l)$

At anode

$Pb \rightleftharpoons Pb^{+2} + 2e^-$

$Pb^{+2} + SO_4^{-2} \rightleftharpoons PbSO_{4(S)}$

The net reaction at anode

$Pb_{(s)} + SO^{-2}_{4(aq)} \rightarrow PbSO_{4(s)} + 2e^-$

The overall reaction is

$Pb_{(s)} + PbO_{2(s)} + 2H_2SO_4 \underset{charge}{\overset{discharge}{\longleftrightarrow}} 2PbSO_4 + 2H_2O$

The net reaction at anode

$Pb_{(s)} + SO^{-2}_{(aq)} \rightarrow PbSO_4 + 2e^-$

90) Octahedral complexes of type Ma_3b_3 can show facial meridonial geometrical isomerism.

$\therefore\ x = 3$

$[CoCl_3(NH_3)_3]$

94) II and IV In prokaryotes, a hypothesis was given in 1961 to explain the protein synthesis regulation. This hypothesis was given by F Jacob and J Monod and for this awarded Nobel prize in 1965. The hypothesis was known by the name operon model. The operator gene in the segment of DNA, which exercise a control over transcription. In the absence of lactose, the repressor binds with the operator gene.

96) Maximum energy can be derived from fat molecules as compared to any other biomolecules. The energy derived from any nutrients is through its oxidation. Fatty acids are in most reduced forms because of the presence of H, hence oxidizing such heavily reduced molecular yields more energy

97) After the sperm entrance, secondary oocyte gives rise to ovum (mature egg cell), that participates in fertilization.

98) Transposons are also called jumping genes. These are part of DNA which move from one chromosome to another

104) Xylem is a conducting tissue which helps in conduction of water from root to different parts of the plant. Along with water, mineral salts some organic nitrogen (Amides) and hormones also translocated

106) A syncytium or symplasm is a multinucleated cell that can result from multiple cell fusions of uninuclear cells, in contrast to a coenocyte, which can result from multiple nuclear divisions without accompanying cytokinesis.

107) The ascending limb has two specialised regions, a proximal thin segment, in which NaCl diffuses out into the interstitial fluid passively, and a distal thick segment, in which NaCl is actively pumped out.

108) The Phenotype of F 1 generation resembles the Dominant character of the parents.
For example, When a Tall pea plant was pollinated with a Short pea plant, The Phenotype was Tallness because Tallness is the Dominant character.

109) H_1 histone is present in the linker region. In the nucleosome, two molecules of each of H_2A,H_2B, H_3 and H_4 are present to form octamer.

112) Slowly developing chronic inflammation usually of lymphvessels of lower limbs.

116) Hydathodes are the structures that discharge water from the interior of the leaf to its surface in a process called guttation. Hydathodes are present on the margins of leaf where vascular supply (veins) ends. As, water escape in the form of droplets, They are also called water stomata

117) The vertical arrangement stands for the taxon. From kingdom to the species where as the horizontal arrangement stands of lateral groups of a same taxa example:- species, sub-species etc.

123) 255 equational divisons are required for the formation cells from a single $(255+1=256)$

124) * Many plants produce and store same chemicals that make the herbivore sick when they are enter, inhibit feeding or digestion, disrupt its reproduction or even kill it. For instance the calotropis glowing in abaundend feilds produces highly poisonous cardiac glycosides.
* Morphological defers includes thorns of Acacia, cactus etc.

132) The commonly recognised class of plant hormones are auxin, gibberellin, cytokinin, ABA and ethylene. Some scientist believes that flower initiation is controlled by plant hormones called florigen. A German plant physiologist George Melchers has also proposed the existence of vernalin (i.e., vernalisation initiating substance). Both these hormones are not been isolated so far. So, it still remains to be a hypothetical chemical.

134) Climax community is near equilibrium with nature. So the net productivity of the climax community becomes stable

135)

138) 1) Brassica shows - 4 sepals, 4 petals, 6 stamens, 2 carpels
2) Allium shows - 6 petals, 6 stamens, 3 carpels
3) Solanum shows - 5 setals, 5 petals, 5 stamens, 2 carpels
4) Beans shows - 5 sepals, 5 petals, 10 stamans, 1 carpel

140) Stock is the one that receives the graft which has 2n =48. This would produce the root which will have 2n =48. The scion (graft) microspore mother cell with 2n =24 would produce microspores (n = 12).

142) DNA segment having the base sequences 3'TAC ATG GGT CCG 5'.
mRNA -sequence ------------------------------ 5'AUG UAG CCA GGC 3'
Anti codon of aminoacyl t-RNA is ------------- B-UAC, A- AUC, D-GGU, C- CCG
The correct order of alphabets. - B, A, D, C

148) A four-year-old girl became the first gene therapy patient on September 14, 1990, at the NIH Clinical Center. She has adenosine deaminase (ADA) deficiency, a genetic disease which leaves her defenceless against infections.

150) In Apogamy, parthenogenesis and sporophytic budding, development of embryosac occurs without fertilization. So, these are all different types of Apomixis types.

151) The protoplasm of the cells is nothing but water in which different molecules are dissolved and (several particles) suspended. In protoplasm, the content of water is 85%.

152) In hemichordata eq- Balanoglossus body is divisible into proboscis, collar and trunk.

153) The interval in the cell cycle between two cell divisions when the individual chromosomes cannot be distinguished, interphase was once thought to be the resting phase but it is far from a time of rest for the cell. It is the time when DNA is replicated in the cell nucleus.

157) In platyhelmenthes the excretion should be done by flame cells.

158) Day neutral plants do not need a specific photoperiod to produce flowers. They are also called intermediates or photoneutrals. Their photoperiod varies from a few hours to 24 hours of uninterrupted light, e.g., tomato, cucumber, sunflower, maize and cotton, etc.

161) Oxidative phosphorylation is a mechanism for ATP synthesis in both plant and animal cells. It involves the chemiosmotic coupling of electron transport and ATP synthesis. Oxidative phosphorylation occurs in the mitochondria.

162) Asexual reproduction: In which involvement of sex cells do not takes place.

163) Deficiency of Mg^{+2} and K^{+} causes both chlorosis (Yellowing of leaves due to non - synthesis of chlorophyll) and Necrosis (Death of tissue)

166) Uneven heat shock may result into The significant enhancement of pore size of the bacterial cell wall, making the rDNA to move into the host cell

167) The drugs, which are commonly abused are opioids, cannabinoids, and coca alkaloids. Majority of these are obtained from flowering plants. Some are obtained from fungi. Opioids are the drugs, which bind to specific opioid receptors present in our central nervous system and gastrointestinal tract.

169) $Bacillus\ thuringiensis$ (or Bt) is a Gram-positive, soil-dwelling bacterium, commonly used as a biological pesticide. $B.\ thuringiensis$ also occurs naturally in the gut of caterpillars of various types of moths and butterflies, as well on leaf surfaces, aquatic environments, animal feces, insect-rich environments, and flour mills and grain-storage facilities.

170) Dorsal root of spiral nerve contains sensory neurons

171) These are produced through micro-propagation or tissue culture. They are genetically identical to the parent plant, e.g., apple, tomato or banana.

173) All energy-releasing pathways whether aerobic (requiring oxygen) begin with a pathway called glycolysis, which occurs in the cytoplasm (cytosol). Aerobic respiratory pathway is appropriately termed amphibolic. Aerobic respiration is the main energy-releasing pathway leading to ATP formation. It occurs in the mitochondria. Aerobic respiration yields thirty-six ATP.

176) Glycine is a nonpolar amino acid. It is the simplest of the 20 natural amino acids; its side chain is a hydrogen atom. Because there is a second hydrogen atom at the ± carbon, glycine is not optically active

177) Cyathium is a special inflorescence that belongs to family Euphorbiaceae, Verticellaster is also a type of special inflorescence is Labiatae. Synandrous stamens is characteristic feature of Cucurbitaceae. Syngenesious stamens are found in Asteraceae.

178) Nervecord is mid dorsal, heart is ventral in position in chordatas