MP Murlidhar Mohol & APMA initiative

Mission NEET 2025

TIME : 3 HRS. **PAPER - II** **MARKS: 720**

DATE : 17.04.2025

PCB : ENTIRE XI + XII NCERT

Note:

* Every correct answer (+4 Mark)
* Every wrong answer (–1 Mark)
* Not attempted question (0 Mark)

1. (1) From law of mass – action

$$n_i^2 = n_e \times n_h$$

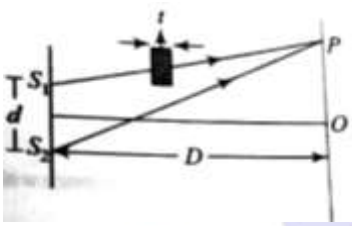
where n_i is the concentration of electron – hole pair and n_h is the concentration of acceptor or holes

Given $n_i = 10^{19}$ per m^3, $n_h = 10^{21}$ per m^3

$(10^{19})^2 = n_e \times 10^{21}$

$$\Rightarrow n_e = \frac{10^{38}}{10^{21}} = 10^{17} \text{ per } m^3$$

2. (3)



When a thin transparent plate of mica is introduced in the path of one of the two interfering light beams (as shown)m then the entire fringe pattern is displaced towards the beam in the path of which the plate is introduced, but the fringe width is not changed

3. (2) Putting the dimensions for quantities in the expression containing ε_0

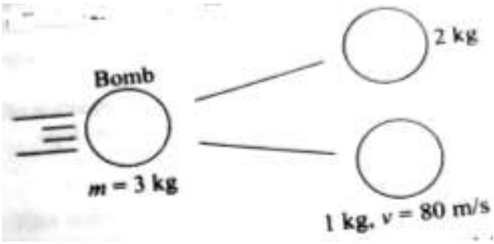
From coulomb's law two stationary point charges q_1 and q_2 attract / repel each other with a force F, which is directly proportional to the product of charges and inversely proportional to the square of distance r between them

That is, $F = \frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r^2} \quad \Rightarrow \varepsilon_0 = \frac{1}{4\pi}\frac{q_1q_2}{Fr^2}$

$\therefore$ Dimensions of permittivity

$$[\varepsilon_0] = \frac{[A^2T^2]}{[MLT^{-2}][L^2]} = [M^{-1}L^{-3}T^4A^2]$$

4. (4) From the law of conservation of momentum, when no external force acts upon a system of two (or more) bodies, then the total momentum of the system remains constant



Momentum before explosion = momentum after explosion
Since bomb v at rest, its velocity is zero hence
$mv = m_1v_1 + m_2v_2$
$3 \times 0 = 2v_1 + 1 \times 80$
$\Rightarrow v_1 = -\frac{80}{2} = -40 \text{ m/s}$
Total energy imparted is
$KE = \frac{1}{2}m_1v_1^2 + \frac{1}{2}m_2v_2^2$
$= \frac{1}{2} \times 2 \times (-40)^2 + \frac{1}{2} \times 1 \times (80)^2$
= 1600 + 3200 = 4800 J
= 4.8 kJ

5. (2) From Stefan's law if the emissive power of a body at absolute temperature T be e, then the energy emitted by its unit area per second is $\sigma T^4 \times e$, also if A is the surface area of the body, then
$E = \sigma T^4 eA$
When R' = 100 R and T' = $\frac{T}{2}$ then energy emitted is
$E' \propto 4\pi(100R)^2\left(\frac{T}{2}\right)^4$

$$\propto \left(\frac{100}{4}\right)^2 \times 4\pi R^2 T^4$$

$$\therefore\ E' = \left(\frac{100}{4}\right)^2 \times E$$

$$\therefore \frac{E'}{E} = 625$$

6. (4) We have $B = \frac{\mu_0}{4\pi}\frac{2\pi i R^2}{\left(R^2 + r^2\right)^{3/2}}$

Given r >> R, then we have, neglecting R

$$B = \frac{\mu_0}{4\pi}\frac{2\pi i R^2}{r^3}$$

Also area = πR^2

$$\therefore\ B = \frac{\mu_0}{2\pi}\frac{Ai}{r^3} \qquad \Rightarrow B \propto \frac{1}{r^3}$$

7. (1) Equipotential surface are surfaces of constant scalar potential. They are used to visualize an n – dimensional scalar potential functional in (n – 1) dimensional space. The gradient of the potential denoting the direction of greatest increase is perpendicular to the surfaces. Hence equipotential surfaces associated with an electric field, which is increasing in magnitude along the x-direction are planes parallel to yz – plane

8. (3) α - particle is equivalent to helium nucleus. The emission of an α – particle from the atom of an element reduces its atomic number by 2 and mass number by 4

Hence the radioactive emission is as follows

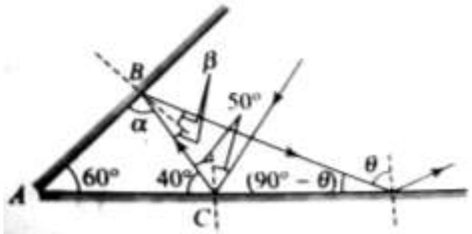
$${}_zX^A \xrightarrow{\alpha \text{ partilce}} {}_{z-2}X^{A-4} + {}_zHe^4\ (\alpha\,\text{Particle})$$

Also from the law of conservation of momentum

$m \times 0 = m_y v_y + m_\alpha v_\alpha \qquad = (A-4)v_y + 4v$

$$\Rightarrow v_y = \frac{4v}{A-4}$$

9. (3) Let required angle be θ



From geometry of figure

In Δ ABC $\alpha = 180^0 - (60^0 + 40^0) = 80^0$

$\Rightarrow \beta = 90^0 - 80^0 = 10^0$

In Δ ABD, $\angle A = 60^0$, $\angle B = (\alpha + 2\beta)$

$= (80 + 2 \times 10) = 100^0$ and $\angle$ D = (900 - θ)

$\because \angle A + \angle B + \angle D = 180^0$

$\Rightarrow 60^0 + 100^0 + (90^0 - \theta) = 180^0$

$\Rightarrow \theta = 70^0$

10. (1) Kinetic energy of photoelectron is eV_0 where V_0 is stopping potential

From Einstein's photoelectric equation

$$E_k = \frac{1}{2}mv^2{}_{max} = hv - W$$

Where E_k is the maximum kinetic energy of electron v is the frequency and W is the work function

$$\therefore \frac{1}{2}mv^2{}_{max} = 4eV - 2eV = 2eV$$

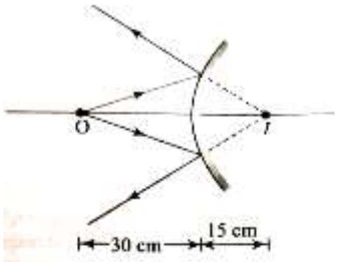
But $\frac{1}{2}mv^2{}_{max} = eV_0$

Where V_0 is stopping potential

Thus $eV_0 = 2$ eV

$\Rightarrow V_0 = 2$ V

11. (4)



u = - 30 cm, f = + 30 cm, by using mirror formula

$$\frac{1}{f}=\frac{1}{v}+\frac{1}{u}\Rightarrow\frac{1}{+30}=\frac{1}{v}+\frac{1}{(-30)}$$

v = 15 cm, behind the mirror

12. (2) $Y=V^{x}A^{y}F^{z}$

13. (4) $V_{max}=at=50\,ms^{-1}$

$$S=\frac{1}{2}\times 50\times 15$$

$$<V>=\frac{S}{\Sigma A}=25\,ms^{-1}$$

14. (2) $\frac{dt}{dt}=15\pi[\cos 3\pi t-\sqrt{3}\sin 3\pi t]$

t = 0

$$\frac{dy}{dt}=V=15\pi\ \ m/s$$

15. (4) $u=gt_1$ …(1)

$ut_2=\frac{1}{2}gt_2^2$ …(2)

16. (2) $mg(\sin\theta+\mu\cos\theta)=3\text{mg}(\sin\theta-\mu\cos\theta)$

17. (3) $v_1=u_1\left[\frac{m_1-m_2}{m_1+m_2}\right]$

18. (3) Energy density $\frac{1}{2}(\text{Y}\propto\Delta\,\text{t})(\alpha\cdot\Delta\,\text{t})$

19. (1)

20. (3) $I=\frac{Mr^2/2}{4}$

But $\frac{M}{4}=m$ and $r=\frac{2l}{\pi}$

21. (2) $F\cdot r=I\cdot R$

$\theta=\frac{1}{2}\propto t^2$

22. (3) $KE=\frac{GMm}{2r}$

23. (4) $\Delta l=l(\alpha_s-\alpha_c)\Delta\,\text{t}$

24. (1) $Q_{AB}=x\cdot C_p\cdot dT \quad =n\times\frac{3R}{2}\times 2T_0=3P_0V_0$

$Q_{BC}=x\cdot C_p\cdot dT \quad =n\times\frac{5R}{2}\times 3T_0=\frac{15}{2}P_0V_0$

$\Sigma Q=10.5P_0V_0$

25. (1) THEORY

26. (2) $\mu = \frac{C_B}{C_A} = \frac{1}{SinC}$

27. (4) $F = \frac{R}{2}(\mu - 1)$

$\frac{1}{F} = \frac{1}{V} + \frac{1}{u}$

28. (1) $n_1\lambda_1 = n_2\lambda_2$

29. (1) $\mathrm{R} = \delta\frac{\mathrm{L}}{\mathrm{A}} = \delta\frac{\mathrm{L}}{\mathrm{L}^2} = \frac{\delta}{\mathrm{L}}$

$\mathrm{R} \propto \frac{1}{\mathrm{L}}$

$\mathrm{V} \rightarrow \frac{\mathrm{V}}{27}$

$\mathrm{L} \rightarrow \frac{3}{3}$

30. (4) Diamagnetic substances repel the field lines

31. (3) $\varepsilon = -M \cdot \frac{dI}{dt}$

32. (1) After a long time inductor acts as a short circuit

33. (2) $NIAB = C\theta$

Where $I = \frac{\varepsilon}{R + r}$

34. (3) $\rightarrow V \propto \frac{1}{n}$

35. (4) Wattless current $= I_{rms} Sm\phi$

36. (1) $\frac{2hc}{\lambda} - \phi = E$

$\frac{3hc}{\lambda} - \phi = 2E$

37. (1) Conceptual

38. (4)

39. (4)

40. (2) The n^{th} order dark fringe is at a distance y_n from the central zero-order bright fringe where

$y_n = \left(n + \frac{1}{2}\right)\lambda \frac{D}{d}$ Here $n = 0, 1, 2, 3, \ldots$etc

or $y_n = \left(n - \frac{1}{2}\right)\lambda \frac{D}{d}$ Here $n = 1, 2, 3, \ldots$etc

For the point on the screen directly infront of one of the slit, $y_n = \frac{d}{2}$

So, $\frac{d}{2} = \left(n - \frac{1}{2}\right)\lambda \frac{D}{d}$

or $\lambda = \frac{d^2}{D(2n-1)}$

41. (2) The condition of diffraction minimas due to single-slit Fraunhofer diffraction pattern is given by

$$e\sin\theta = \pm\frac{\lambda}{e}$$

For first diffraction minima on either side of central maxima, $m = 1$

$$\therefore \sin\theta = \pm\frac{\lambda}{e}$$

Since θ is small,

$$\sin\theta \approx \tan\theta = \pm\frac{\lambda}{e}$$

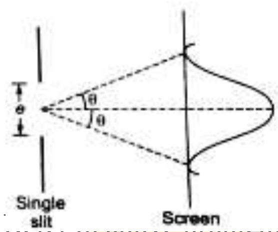
where $\tan\theta = \frac{5mm}{2m}$

$$= \frac{5\times10^{-3}}{2} = 2.5\times10^{-3}$$

$$\therefore \lambda = 2.5\times10^{-3}e = 2.5\times10^{-3}\times0.2\,mm$$

$$= 5\times10^{-7}m = 5000\text{Å}$$

42. (4)



Refer to above problem

$$\theta = \frac{\lambda}{e}$$

$$2\theta = \frac{2\lambda}{e}$$

$$= \frac{2\times(6\times10^{-5}\text{ cm})}{0.02\text{cm}}$$

$$= 6\times10^{-3}\text{radian}$$

43. (3) THEORY

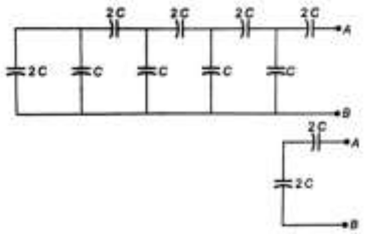
44. (3) $n\lambda_1 = (n+1)\lambda_2$

$7500\,n = 6000\,(n+1)$

$5n = 4n + 4$

$n = 4$

45. (4)



The left side mesh of the given circuit contains two capacitors of capacitance 2C each in series. Their effective capacitance is C, and the circuit is now reduced as shown in the adjoining figure. In this figure again the left side mesh contains two capacitors of capacity C each in parallel. Their effective capacitance is 2C and so on. Thus finally we find now effective capacitance across

AB is $\dfrac{2C \times 2C}{2C + 2C} = C$

46. (3) $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$

$\frac{20}{28}$ mole $\frac{5}{2}$ mole

Min $\rightarrow$ $\underbrace{\frac{5}{7} \qquad \frac{5}{6}}$ $\qquad \frac{5}{7} \times 2 = \frac{10}{7}$ mole = 1.42 mole

LR Dividing by coeff.

47. (4) Mass of C = 600 x $\frac{60}{100}$ = 360 g = 30 mole

Moles of C converted to CO = 30 x $\frac{60}{100}$ = 18 mole

$\therefore$ Moles of C converted to CO_2 = 12 mole

$\therefore$ Total heat = 18 x 100 + 12 x 400 = 6600 kJ

48. (4) Total no. of nodes = n – 1

49. (1) Exceptional configuration of Pt.

50. (2) Small increase of covalent radius from As to Bi is due to poor shielding effect of d and f electrons.

51. (3) Unununnium $\Rightarrow$ Z = 111

[Rn] $7s^1 5f^{14} 6d^{10}$ below Au i.e. 11^{th} group

For Z $\geq$ 104, Group No. = Z – 100 (upto Z = 118)

52. (4) A) $BrF_5 \rightarrow 5\sigma\ bp + 1l\ p \Rightarrow sp^3d^2$ - Square pyramidal

B) $H_2O \rightarrow 2\sigma\ bp + 1l\ p \Rightarrow sp^3$ - Bent/V-shape

C) $ClF_3 \rightarrow 3\sigma\ bp + 2l\ p \Rightarrow sp^3d$ - T-shape (2 lp in equatorial positions)

D) $SF_4 \rightarrow 4\sigma\ bp + 1l\ p \Rightarrow sp^3d$ - See-saw (1 lp in equatorial position)

53. (2) In NH_3 bond moments and orbital moment are in same direction.

In NF_3, bond moments and orbital moment are in opposite direction.

$\therefore\ \mu_{net} \rightarrow NH_3 > NF_3$

54. (1) On dissolution of NaCl in water, NaCl undergoes dissociation due to which randomness increases, i. e. $\Delta S > 0$

55. (4) $\Delta_{sol}H = \Delta_{lattice}H + \Delta_{hydration}H$

$4 = 788 + \Delta_{hydration}H$

$\therefore \Delta_{hydration}H = -784 \text{ kJ mol}^{-1}$

56. (1) $Br_2\,(l) \rightarrow Br_2\,(g)$ $\Delta_{vap}H$ of $Br_2\,(l)$ = 'a' kJ mol^{-1}

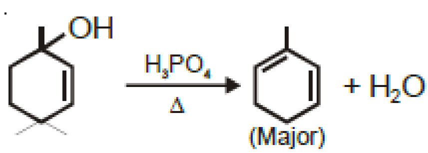
$Br_2\,(g) \rightarrow 2Br\,(g)$ $\Delta_{bond}H$ of $Br_2\,(g)$ = 'y' kJ mole

$Br_2\,(l) \rightarrow 2Br\,(g)$ $\Delta_{atom}H$ of $Br_2\,(l)$ = 'x' kJ/mol

According to Hess's law

$a + y = x \Rightarrow x > y$ - a, x & y are positive

57. (2)



Major alkene is formed by saytzeff rule.

58. (1)

	A	+ 2B	$\rightleftharpoons$	2C	+ D
t = 0	a	$\frac{3a}{2}$			
	$a - x$	$\frac{3a}{2} - 2x$		2x	x

At eqm, $a - x = \frac{3a}{2} - 2x$

$\therefore \quad x = \frac{a}{2}$

$$K = \frac{[C]^2[D]^2}{[A][B]^2} = \frac{a^2 x \frac{a}{2}}{\frac{a}{2} x \left(\frac{a}{2}\right)^2} = 4$$

59. (2) A (s) $\rightleftharpoons$ B (g) + C (g)

$\qquad\qquad P_1 \qquad P_1 + P_2$

D (s) $\rightleftharpoons$ C (g) + E (g)

$\qquad\qquad P_1 + P_2 \qquad P_2$

$\therefore K_{P_1} = P_1(P_1 + P_2) = x$

$K_{P_2} = P_2(P_1 + P_2) = y$

$\therefore$ Total pressure = $(P_1 + P_2) \times 2 = 2\sqrt{x+y}$

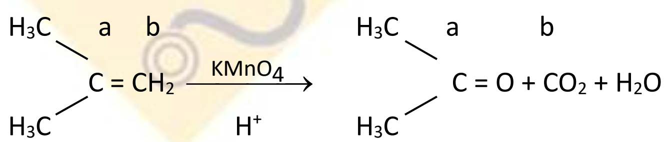
60. (3) If element is in its highest O.S., it can act only as O.A.
If element is in its lowest O.S., it can act only as RA.
$H_3PO_4 \rightarrow$ O.S. of P = +5 (highest O.S. of P)
$\therefore$ It can act only as OA.

61. (4) EAN = Z – ON + 2 x CN
= 78 – 4 + 2 x 6 = 86

62. (2) $H_3PO_4 + 12\ (NH_4)_2MoO4 + 21HNO_3 \longrightarrow (NH_4)_3PO_4 .12MoO_3 + 21NH_4NO_3 + 12H_2O$
Ammonium phosphomolybdate (yellow)

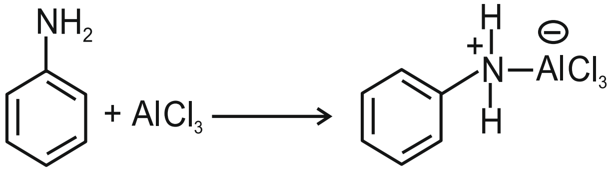
63. (2) A mixture of liquids having low difference in BP are separated by fractional distillation and the liquid having lower BP comes out first.

64. (4)



2-methyl propene Acetone

65. (4) Aniline does not undergo Friedel-Crafts reaction due to formation of complex with $AlCl_3$.



66. (4) pOH = 14 – 12 = 2

$\therefore [OH^-] = 10^{-2}$ M

$Ba(OH)_2 \rightleftharpoons Ba^{2+} + 2OH^-$

s 2s

$2s = 10^{-2}$

$\therefore s = \frac{10^{-2}}{2}$

$K_{sp} = 4s^3$

$= 4 \times \left(\frac{10^{-2}}{2}\right)^3 = 5.0 \times 10^{-7}$

67. (3) RLVP = x_{sotute}

Smaller the molar mass, greater will be the no. of moles of the solute and hence greater mole fraction and greater RLVP.

68. (2) Both the solutions have same concentration.

$\therefore \frac{2}{M_A} = \frac{8}{M_B}$

$\therefore M_B = 4M_A$

69. (4) $2A \rightleftharpoons A_2$

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

$i = 1-\alpha+\frac{\alpha}{2} = 1-\frac{\alpha}{2}$

$\Delta T_f = ik_f m$

$0.2 = \left(1 - \frac{\alpha}{2}\right) x\, 1.86\, x \frac{0.7}{93 x 42} x\, 1000$

$\alpha = 0.8 = 80\%$

70. (1) 1) $Cu^{2+} + 2e^- \rightarrow Cu$; $\Delta G_1^0 = -2F x\, 0.34$

2) $Cu^+ + e^- \rightarrow Cu$; $\Delta G_2^0 = -1F x\, 0.522$

3) $Cu^{2+} + e^- \rightarrow Cu^+$; $\Delta G_3^0 = -1F x\, E^0$

According to Hess's Law

(1) = (2) + (3)

$\therefore -2F x\, 0.34 = -F x\, 0.522 - F x\, E^0$

$\therefore E^0 = 0.158\, V$

71. (3) For zero order reaction,

$t_{1/2} = \frac{[A]_0}{2k}$

$\therefore k = \frac{0.2}{2 x 6} = \frac{0.1}{6} mh^{-1}$

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

$\therefore t = \frac{[A]_0 - [A]_t}{k} = \frac{0.5 - 0.2}{0.1} x\, 6$ = 18.0 h

72. (3) $\log_{10}\left[-\frac{d[A]}{dt}\right] = \log_{10}\left[\frac{d[B]}{dt}\right] + \log_{10} 2$

$\therefore -\frac{d[A]}{dt} = 2\frac{d[B]}{dt}$

$\therefore -\frac{1}{2}\frac{d[A]}{dt} = \frac{d[B]}{dt}$

$\therefore$ Reacton : $2A \rightarrow B$

$2C_2H_4 \rightarrow C_4H_8$

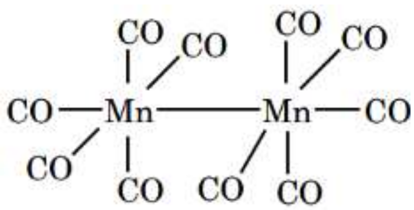
73. (3) For Lanthanoids, stable O.S. = +3

$\therefore Eu^{2+}$ tends to get oxidized to Eu^{+3} i.e. acts a R.A.

74. (1) Aluminium chloride in acidified aqueous solution $[Al(H_2O)_6]^{3+}$

Hybridization = $sp^3d^2 \Rightarrow$ Octahedral

75. (1)



$[Mn_2(CO)_{10}]$

Total 6 bonds $\therefore sp^3d^2 \therefore$ Octahedral

76. (3) Complexes showing optical isomers

i) cis – $[Cr(ox)_2Cl_2]^{3-}$

ii) $[Co(en)_3]^{3+}$,

iii) cis – $[Pt(en)_2Cl_2]^{2+}$

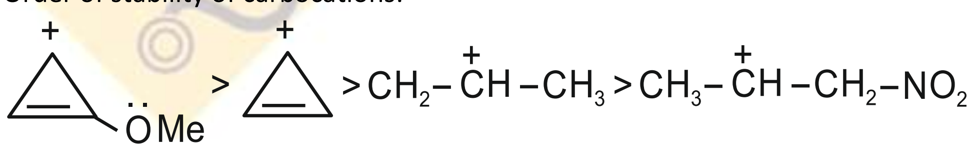
iv) cis – $[Co(en)_2Cl_2]^{+}$,

trans isomers possess a plane of symmetry and hence are optically inactive.

77. (1) Formalin is 40% aqueous solution of formaldehyde.

78. (1) Greater the stability of intermediate carbocation, greater is the reactivity.

Order of stability of carbocations:



Aromatic & back bonding by – OMe | aromatic | 2^0 | destabilized by –I effect of – NO_2 group

79. (3) order of acidity : Phenol > water > alcohols

80. (1) Phenolic OH group cannot be Substituted by Cl^- or I^- due to partial double bond character in C – O bond.

81. (2) Friedel Crafts alkylation to form isopropyl benzene (cumene) followed by oxidation to phenol (P).
Oxidation of phenol by $Na_2Cr_2O_7/H_2SO_4$ produces benzophenone (A).
Phenol on reaction with Br_2/CS_2 giver p-bromophenol (B) as major product.

82. (3) It is nucleophilic addition reaction.
Order of reactivity of carbonyl compounds:

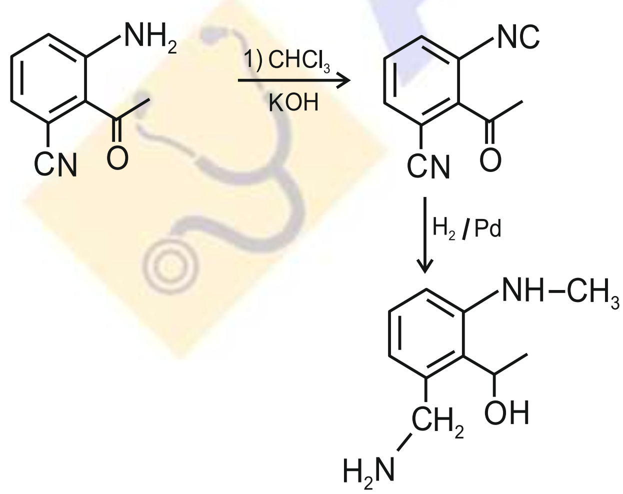
$$\underset{\text{Propanal}}{CH_3 - CH_2 - \overset{\overset{O}{||}}{C} - H} > \underset{\text{Acetone}}{CH_3 - \overset{\overset{O}{||}}{C} - CH_3}$$

Rate of reaction Increases with increase in concentration of methanol (nucleophile).

83. (3) Cross Cannizaro reaction

84. (1) Primary amines ($R\text{-}NH_2$) with primary alkyl group (R) can be prepared by Gabriel phthalimide synthesis.

85. (4)



86. (1) In amylopectin, the straight chain is formed by C_1 - C_4 glycosidic linkage between α-D-Glucose and branching. is formed by C_1 - C_6 glycosidic linkages.

87. (2) Glucose and galactose are C-4 epimers of each other.

88. (3) Carbon belongs to second period and hence can form $p\pi - p\pi$ bonds only.

89. (2)

90. (3)