FINAL MOCK TEST# 08 (NEET) SOLUTIONS

1) $X = \frac{me^4}{8\epsilon_0^2 ch^3}$ this is Rydberg's const which has dimension as L^{-1} & hence wave no.
∴ option (4)

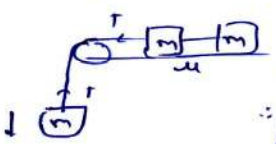
2) $L = mv(2R) = m.\sqrt{\frac{GM}{2R}}.2R$
$L = m\sqrt{2GMR}$
∴ option (1)

3) $v = \sqrt{\frac{2gh}{1+k^2/R^2}} = \sqrt{\frac{10gl\sin\theta}{7}}$
∴ option (3)

4) $P = Fv = m\frac{dv}{dt}v$
∴ $v\,dv = \frac{P}{m}dt$ ∴ $\frac{v^2}{2} = \frac{P}{m}t$
∴ $v \propto \sqrt{t}$ & $\frac{ds}{dt} \propto \sqrt{t}$
∴ $ds = \int t^{1/2}dt$
∴ $s \propto t^{3/2}$ ∴ option (4)

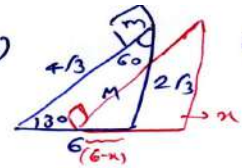
5) loss in KE $= \frac{1}{2}\mu(u_{rel})^2$
$= \frac{1}{2}\frac{(m)(2m)}{3m}(|2u\hat{i} - u\hat{j}|)^2$
$KE_{loss} = \frac{5}{3}mv^2$
∴ % loss $= \frac{\frac{5}{3}mv^2}{3mv^2} = \frac{5}{9}\times 100 = 56\%$
∴ option (2)

6) $w = \frac{1}{2}k(l+l_1)^2 - \frac{1}{2}kl^2$
$= \frac{1}{2}k(2ll_1 + l_1^2)$ ∴ option (1)

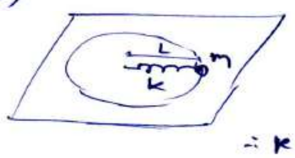
7) 

$mg - T = ma$
$T - 2\mu mg = 2ma$
∴ $a = \frac{g(1-2\mu)}{3}$
∴ option (3)

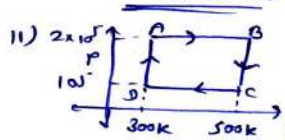
8) $F = 600 - 2\times10^5 t$
$F = 0$ at $\frac{600}{2\times10^5}$ sec $= t$
$\int F dt$ = avg impulse.
∴ impulse $= \int_0^{\frac{600}{2\times10^5}}(600 - 2\times10^5 t)\,dt = 0.9\,Ns$ ∴ option (4)

9) 

here $2(6-x) = 8x$
∴ $x = 1.2m$
∴ option (3)

10) 

Spring force will provide necessary centripetal force
∴ $k(R-L) = mR\omega^2$
∴ $R = \frac{kL}{k - m4\pi^2f^2}$
& spring force $= mR\omega^2$
$= \frac{m\omega^2 kL}{k - m4\pi^2f^2}$
∴ option (1)

11) 

$n = 2$ moles

11) $W_{AB} = P\Delta V = nR\Delta T = 2R(500-300)$
$= 400R$
∴ option (3)

12) at const temp,
$W = 2.303nRT\log\frac{P_1}{P_2}$
$= 2.303\times2\times R\times300\log\frac{10^5}{2\times10^5}$
$= -414.6R \approx -414R$
∴ option (1)

13) $W = W_{AB} + W_{BC} + W_{CD} + W_{DA}$
$= 400R + 2.303\times2\times R\times500\log\frac{2\times10^5}{10^5} + (-400R) + (-414R)$
$W = 276R$ ∴ option (2)

14) $\Delta l_1 = \Delta l_2$ ∴ $\frac{F_1 l_1}{A_1 Y} = \frac{F_2}{A_2}\frac{l_2}{Y}$
∴ $F_2 = F_1\left(\frac{A_2}{A_1}\right)\left(\frac{l_1}{l_2}\right)$ & $A_1 l_1 = A_2 l_2$ as volume is same
∴ $F_2 = 9F_1$ ∴ option (4)

15) $\frac{aT}{x} = \frac{\omega^2 xT}{x} = \frac{4\pi^2}{T^2}.T = \frac{4\pi^2}{T} = $ const
all other terms changes with time ∴ option (2)

Solution

16) $v^2 = u^2 + 2gh$

$V_b^2 = (0.4)^2 + 2\times10\times0.2$

$V_b = \sqrt{4.16} \approx 2\ m/s$

$A_{top}V_{top} = A_{bottom}V_{bottom}$

$\therefore \frac{\pi(8\times10^{-3})^2}{4}\times0.4 = \frac{\pi d^2}{4}\times 2 \quad \therefore \boxed{d = 3.6\times10^{-3}m}$

$\therefore$ option(3)

17) $V_1 = \frac{dy_1}{dt} = 0.1\times100\pi\cos(100\pi t + \pi/3)$

$V_2 = \frac{dy_2}{dt} = -0.1\pi\sin\pi t = 0.1\pi\cos(\pi t + \pi/2)$

$\therefore \phi = \phi_1 - \phi_2 = \pi/3 - \pi/2 = -\pi/6 \quad \therefore$ option(1)

18) $\omega = \frac{1}{2}F\ell \quad \therefore$ option(4)

19) no. of moles of first gas $= \frac{n_1}{N_A}$

lly 2^{nd} gas $= \frac{n_2}{N_A}$ & 3^{rd} gas $= \frac{n_3}{N_A}$

as no loss of eng

$\frac{3}{2}\frac{(n_1+n_2+n_3)}{N_A}RT = \frac{3}{2}\frac{n_1RT_1}{N_A} + \frac{3}{2}\frac{n_2RT_2}{N_A} + \frac{3}{2}\frac{n_3RT_3}{N_A}$

$\therefore \boxed{T_{mix} = \frac{n_1T_1 + n_2T_2 + n_3T_3}{n_1+n_2+n_3}} \quad \therefore$ option(1)

20) for terminal velocity forces must get balanced

$\therefore V\rho_1 g = V\rho_2 g + kV_t^2$

$\therefore \boxed{V_t = \sqrt{\frac{Vg(\rho_1-\rho_2)}{k}}} \quad \therefore$ option(1)

21) $n_1 = \frac{1}{2\ell_1}\sqrt{T/m} \quad \therefore n_1 : n_2 : n_3 = \frac{1}{\ell_1} : \frac{1}{\ell_2} : \frac{1}{\ell_3}$

$\therefore 1 : 2 : 6 = \frac{1}{\ell_1} : \frac{1}{\ell_2} : \frac{1}{\ell_3}$

$\therefore \ell_1 = 60$ & $\ell_2 = 30$ & $\ell_3 = 10$

$\therefore$ Position of bridge $\Rightarrow$ 60cm & 90 cm

$\therefore$ option(2)

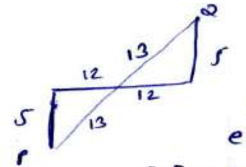
22) $i = neAV_d \quad \therefore V_d = \frac{i}{neA} = \frac{1.1}{neA}$

$n \Rightarrow$ no. of $e^{\ominus}$ / Volume $= \frac{(\frac{mass}{atomic\ mass}\cdot N_A)}{Volume}$

$n = \frac{\rho N_A}{atomic\ mass} = (\frac{9}{63}\times10^6)\times 6.023\times10^{23}$

$e = 1.6\times10^{-19}$ & $A = \pi(\frac{10^{-3}}{2})^2$

$\therefore \boxed{V_d = \frac{1.1}{neA} = 0.1\ mm/s} \quad \therefore$ option(3)

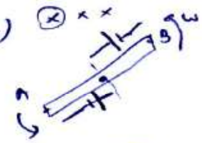
23) 

force on complete wire is same as effective length PQ

$\therefore F = I\ell B = 10\times26\times10^{-2}\times5$

$\boxed{F = 13N}$

$\therefore$ option(2)

24) 

so net emf = 0

$\therefore$ option(2)

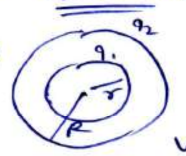
25) $v = \sqrt{T/m}$ & $T \propto x$ → by Hook's law

$\therefore v \propto \sqrt{x}$

$\therefore \frac{V_2}{V_1} = \sqrt{\frac{x_2}{x_1}} = \sqrt{\frac{1.5x}{x}} \quad \boxed{V_2 = 1.22V}$

$\therefore$ option(1)

26) option (2)

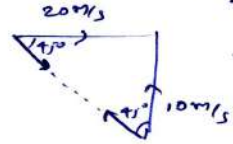
27) 

$\frac{q_1}{4\pi r^2} = \frac{q_2}{4\pi R^2} \quad \therefore q_1 = \frac{Qr^2}{R^2+r^2}$

& $q_1 + q_2 = Q$ & $q_2 = \frac{QR^2}{r^2+R^2}$

$V_{net} = \frac{1}{4\pi\varepsilon_0}\frac{q_1}{r} + \frac{1}{4\pi\varepsilon_0}\frac{q_2}{R}$

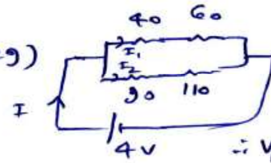
$\therefore V_{net} = \frac{Q}{4\pi\varepsilon_0}\frac{(r+R)}{(r^2+R^2)} \quad \therefore$ option(2)

28) 

$f' = \frac{V + V_0\cos45}{V - V_s\cos45}f = \left(\frac{340 + 10/\sqrt{2}}{340 - 20/\sqrt{2}}\right)\times280$

$= 298\ Hz$

$\therefore$ option(2)

29) 

$I = I_1 + I_2$

$\therefore I_1 = \frac{4}{100}$ & $I_2 = \frac{4}{200}$

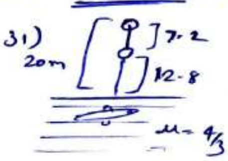
$\therefore V_A - V_B = I_1 40 = \frac{4}{100}\times40$

& $V_A - V_D = I_2\times90 = \frac{4}{200}\times90$

$\therefore$ eqn ② − eqn ①

$\therefore V_B - V_D = \frac{90\times4}{200} - \frac{40\times4}{100} = 0.2V \quad \therefore$ option (2)

30) option(3)

31) 

$V^2 = u^2 + 2as$

$V^2 = 2\times10\times7.2$

$\therefore \boxed{V = 12}$

& ${}_{\omega}\mu_a = \frac{Real\ height}{app.\ height}$

$\therefore V_{app} = \frac{V_{real}}{{}_{\omega}\mu_a}$

$= \mu_\omega \cdot V_{real}$

$\boxed{V_{app} = 4/3\times12 = 16\ m/s}$

$\therefore$ option(3)

Sol^n

32)

$\frac{1}{f} = (\mu-1)\left(\frac{1}{R} - \frac{1}{-R}\right)$

$\therefore \boxed{f = R}$

& for water lens

$\frac{1}{f'} = \left(\frac{4}{3}-1\right)\left(\frac{2}{R}\right) \therefore \boxed{f' = -\frac{3f}{2}}$

$\therefore \frac{1}{F} = \frac{1}{f} + \frac{1}{f} + \frac{1}{f'} \qquad \therefore \frac{1}{F} = \frac{2}{f} - \frac{3}{2f}$

$\therefore \boxed{F = \frac{3f}{4}} \therefore$ option(4)

33) magnifying power, $9 = \frac{f_o}{f_e} \quad \therefore \boxed{f_o = 9f_e}$

& $f_o + f_e = 20 \quad \therefore \boxed{f_e = 2\,cm \;\&\; f_o = 18\,cm}$

$\therefore$ option(3)

34) $I = 2I_o'(1+\cos\phi) = 4I_o'\cos^2\phi/2$

at x path diff $= \frac{xd}{D}$

$\therefore$ phase diff $= \frac{2\pi}{\lambda}\frac{xd}{D} = \frac{2\pi x}{\beta}$

$\therefore \boxed{I_p = 4I_o'\cos^2\frac{\pi x}{\beta}} = I_o\cos^2\frac{\pi x}{\beta}$

$\therefore$ option(2)

35) $\mu = \frac{1}{\sin i_c} \quad \& \; \mu = \frac{1}{3/5} = 5/3$

& $\tan i_c = 5/3 \quad \therefore \boxed{i_c = \tan^{-1}(5/3)}$

$\therefore$ option(2)

36) $\lambda = \frac{h}{p} = \frac{h}{\sqrt{2mKE}} = \frac{6.63\times10^{-34}}{\sqrt{2\times1\times0.5}} = 6.63\times10^{-34}\,m$

$\therefore$ option(2)

37) wavelength of the K_α lines for given isotopes of lead (Pb) can be given by

$\frac{1}{\lambda} = R(Z-1)^2\left(\frac{1}{1^2} - \frac{1}{2^2}\right)$

Z is same for Pb^{208}, Pb^{206}, Pb^{204}

$\therefore \quad \frac{1}{\lambda_1} = R(82-1)^2\left(\frac{1}{1^2}-\frac{1}{2^2}\right) = \frac{1}{\lambda_2} = \frac{1}{\lambda_3}$

$\therefore \lambda_1 = \lambda_2 = \lambda_3 \quad \therefore \boxed{\lambda_2 = \sqrt{\lambda_1\lambda_3}}$

Option(1)

38) $\frac{N_1}{N_2} = \frac{1}{e} = \frac{N_o e^{-6\lambda t}}{N_o e^{-3\lambda t}} \quad \frac{1}{e^{3\lambda t}} = \frac{1}{e}$

$\therefore 3\lambda t = 1 \quad \therefore \boxed{t = \frac{1}{3\lambda}} \therefore$ option(2)

39) $A_v = \beta\,\frac{R_o}{R_i} = 50\times5/1 = 250$

$\therefore$ option(1)

40) $P_M = P_C\left(1+\frac{m^2}{2}\right)$

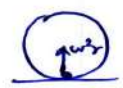
$= 2\left(1+\frac{(1/2)^2}{2}\right) = 2.25\,W$

$\therefore$ option(4)

41) option(2)

42) option(4)

43) option(4)



44) option(2)

45) option(3)

46. (c)

Sol. Sb_2S_3 is a negatively charged sol. The most effective coagulating agent will be electrolyte with highest positive charge on the cation. Viz, $Al_2(SO_4)_3$. The order is

$Al^{3+} > Ca^{2+} > Na^{+} > NH_4^{+}$

47. (c)

Sol. $Na_3[AlF_6]$ $3NaF + AlF_3$

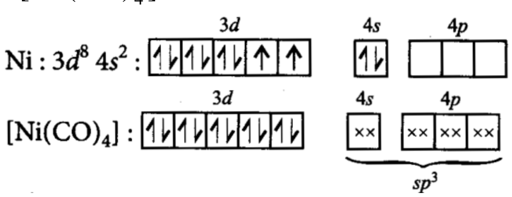
NaF and AlF_3 both are ionic compounds and so ionise to give ions. This increases the electrical conductivity and lowers the melting point of Al_2O_3 .

At cathode : Al^{3+} (melt) + $3e^{-}$ Al.

At anode : $C(s) + O^{2-}$ (melt) $\longrightarrow$ CO (g) + $2e^{-}$; $C(s) + 2O^{2-}$ (melt) $\longrightarrow$ CO_2 (g) + $4e^{-}$.

48. (a)

Sol. In $[NI(CO)_4]$ oxidations state of Ni = 0



sp^3 hybridizations has tetrahedral shape.

49. (b)

Sol. In $[Cu(NH_3)_6]^{2+}$, oxidation state of $Cu = +2$,

$Cu^{2+} = 3d^9$

$3d^9 = t_{2g}^6 e_g^3$

50. (b)

Sol. Rate $= k[X]^0[Y]^0$ or rate = k

51. (a)

Sol. E^0 is intensive property and it does not depend on mass of F_2 taking part.

52. (b)

Sol. $\frac{r_{H_2}}{r_{He}} = \sqrt{\frac{4}{2}} = \sqrt{2}$

$\therefore$ (a) is incorrect

$\frac{r_{H_2}}{r_{O_2}} = \sqrt{\frac{32}{2}} = 4$

(b) is correct

$\frac{r_{H_2}}{r_{CO}} = \sqrt{\frac{28}{2}} = \sqrt{14}$

(c) is incorrect

$\frac{r_{H_2}}{r_{CO_2}} = \sqrt{\frac{2}{44}} = \sqrt{\frac{1}{12}}$

(d) is incorrect

53. (c)

Sol. High T, low P

54. (c)

Sol. Removal of Ist electron is easier because of bigger size but 2nd electron is to be removed from ns^2 np^6 configuration i.e. stable noble gas configuration. So $IE_2 >> IE_1$.

55. (c)

Sol. Elements A,B,C and D are N,O,F and Mg respetively.

56. (b)

Sol. lp of e^{-} s of nitrogen is donated to the vacant d-orbital of Si.

57. (b)

Sol. T $\uparrow$ pH $\downarrow$

58. (a)

Sol. $K_c = \frac{[PCl_3][Cl_2]}{[PCl_5]} = \frac{2.1 \times 2.1}{1.9} = 2.32$

59. (c)

Sol. The resonating structures should have same number of electron pairs.

60. (b)

Sol. Halogenation of alkanes is an example of free radical substitution reaction

61. (c)

Sol. In conductors there is no gap or overlapping between valence band and conductions band. The insulators have a large gap while semiconductor have a small energy gap.

62. (d)
Sol. Colligative, solvent, lower, concentration, higher
concentration, solution

63. (d)
Sol. All the given points about freons are correct.

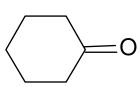
64. (a)
Sol. $C_4H_{10}O$ can have two structures:

$CH_3CH_2CH_2CH_2OH$ and $C_2H_5OC_2H_5$

Since it does not react with Na metal, it cannot be an alcohol.

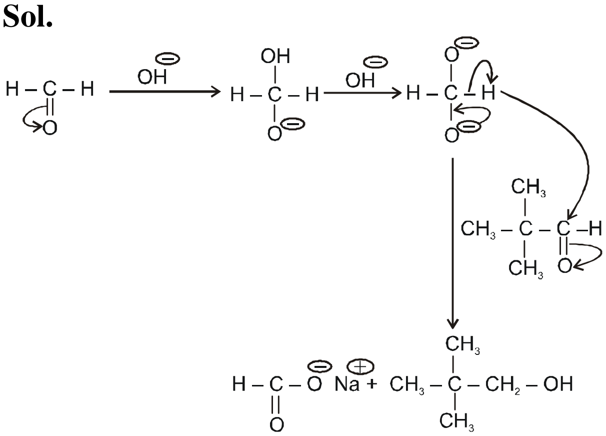
$$C_2H_5OC_2H_5 + \underset{\text{excess}}{HI} \longrightarrow 2C_2H_5I + H_2O$$

65. (a)
Sol.

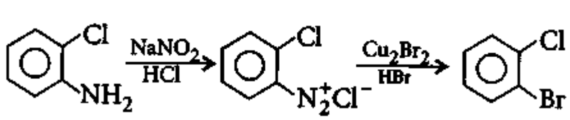


H at α – C takes part which is condensed to carbonyl group of second molecule; heating causes α, β elimination.

66. (a)
Sol.

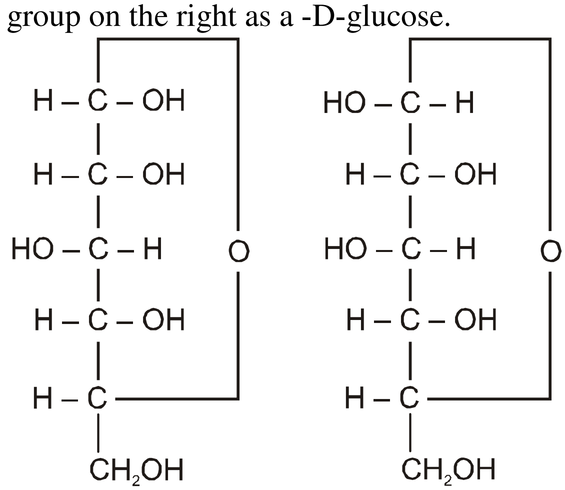


67. (c)
Sol. :



68. (a)
Sol. : NH_3 is more basic than H_2O therefore NH_2^- (Conjugate base of weak acid NH_3) is a stronger base than OH^- thus decreasing order of basic strength is $NH_2^- > OH^- > NH_3 > H_2O$

69. (c)
Sol. Due to cyclic hemiacetal or cyclic hemiketal structures, all the pentoses and hexoses exist in two stereoisomeric forms i.e., a form in which the OH at C_1 in aldoese and C_2 in ketoses lies towards the right and b form in which it lies towards left. Thus glucose, fructose, ribose etc, all exist in a and b form. Glucose exists in to forms a -D-glucose and b -D glucose. a -D-(+) equilibrium mixture b -(D) glucose (+) glucose. As a result of cyclization of anomeric (C – 1) becomes asymmetric and the newly formed – OH group may be either on left or on right in Fischer projection thus resulting in the formation to two isomers (anomers). The isomers having – OH group ot the left of the C – 1 designated b -D glucose and the other having – OH group on the right as a -D-glucose.



α-D-glucos and β-D-glucos

70. (a)
Sol. Pure monomers are required because even the traces or impurities act like inhibitors which leads to the formations of polymers with shorter chain lengths.

71. (b)
$(C + S) \longrightarrow CO_2 + SO_2$

$$n_{SO_2} = \frac{n_{CO_2}}{2}$$

Let wt. of C = x

So, wt. of S = 12 – x

$$\frac{12-x}{32} = \frac{1}{2}\left(\frac{x}{12}\right)$$

x = 5.14 g.

72. (c)

Sol. The production of dihydrogen can be increased by reacting carbon monoxide of syngas mixtures with steam in the presence of iron chromate as catalyst.

$$CO_{(g)} + H_2O_{(g)} \xrightarrow[\text{Catalyst}]{673K} Co_{2(g)} + H_{2(g)}$$

This is called water-gas shift reaction.

73. (d)

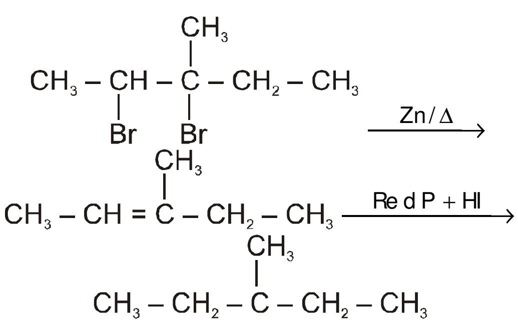
Sol. Both have same number of electrons i.e. 22, so isoelectronic and are linear so also isostructural.

74. (d)

Sol. due to lower lattice energy

75. (a)

Sol.



76. (c)

Sol. value of K_c predicts the extent of the reaction.

77.(b)

The two equilibria existing in the same solution are

$$NH_3 + H_2O \rightleftharpoons NH_4^+ + OH^- \quad K_b = \frac{[NH_4^+][OH^-]}{[NH_3]} = 1.8\times10^{-5}$$

$$\text{And, } C_5H_5N + H_2O \rightleftharpoons C_5H_5NH^+ + OH^- \quad K_b = \frac{[C_5H_5NH^+][OH^-]}{[C_5H_5N]} = 1.52\times10^{-9}$$

Considering the first reaction, the concentration of ammonia is $= \frac{0.005}{0.200L} = 0.025M$

Therefore, $K_b = 1.8\times10^{-5} = \frac{x^2}{0.025}$ or $x = 6.7 \times 10^{-4}$ M = $[NH_4^+] = [OH^-]$

Now, since the dissociation constant of pyridine is much less than that of ammonia, the OH^- obtained from pyridine will be negligible as compared to those obtained from NH_4OH.

∴ we need not consider the second equilibrium and report the value as 6.7×10^{-4} M.

The answer is (2)

78.(d)

79.(d)

$x \quad +1 \quad -2$

$C_{12} \; H_{22} \; O_{11}$

$$\therefore 12x + 22\times(+1) + 11\times(-2) = 0 \text{ or } x = 0$$

80.(c)

First we have to find out wt of $CaCO_3$ which gives 0.959g of CaO $= \frac{100}{56}\times 0.959g = 1.7125\ g$

We have to calculate $CaCl_2$ wt from $CaCO_3 = \frac{111}{100}\times 1.7125 = 1.900g$

$\%\text{ of } CaCl_2 = \frac{1.9}{4.22}\times 100 = 45.04$

81.(b)

82.(d)

83.(a)

84.(d)

85.(b)

$$\Delta C_P = 2C_P(NH_3) - \lfloor C_{PN_2} + 3C_PH_2 \rfloor$$

$$= 2\times 43 - [30 + 3\times 29]$$

$$= -31$$

$$\Delta H_2 - \Delta H_1 = \Delta C_P (T_2 - T_1) \text{ Kirchoffs equation}$$

$$\Delta H_2 + 92.4 = \frac{-31}{1000}(800-300)$$

$$\Delta H_2 = -107.9\ kJ\ mol^{-1}$$

86.(c)

$$\frac{d_{Nacl}}{d_{Kcl}} = \frac{FW_{Nacl}}{FW_{Kcl}} \text{ x} \left[\frac{\sqrt{2}(r_{k^+} + r_{cl^-})}{\sqrt{2}(r_{Na^+} + r_{cl^-})}\right]^3$$

87.(d)

88.(b)

$$r = k[A][B]^2$$

89.(a)

$$k = \frac{2.303}{t_2 - t_1} log \frac{a - x_1}{a - x_2}$$

90.(c)

91- d

92- c

93- a

94- a

95- c

96.- a

97- a

98- b

99- c

100 -d

101- d

102- d,.

103- b

104- a

105- d

106- a

107- c

108- c

109- b

110- b

111- b

112- d

113- b

114- b

115- a

116- d

117- d

118- c

119- a

120- d

121- c

122- b

123- b

124- b

125- b

126- c

127- d

128- a,

129- b

130- d

131- b

132- c

133- b

134- a

135- b

136- a

137- b

138- c

139- d

140- d

141- b

142- a

143- d

144- d
145- d
146- b
147- d
148- a
149- a
150- c
151- b
152- d
153- a
154- a
155- b
156- a
157- c
158- d
159- d
160- b
161- c
162- d
163- c
164- c
165- d
166- d
167- c
168- b
169- a
170- c
171- a,
172- a
173- c
174- c
175- b
176- c
177- b
178- b
179- b
180- d