

PACE-IIT & MEDICAL

ANDHERI / BORIVALI / DADAR / CHEMBUR / THANE / NERUL / KHARGHAR / POWAI

FOR 2018 ASPIRANTS

Medical Droppers - Part Test - 02

DATE: 11-2-2018

ANSWER KEY

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

**SOLUTIONS
PHYSICS**

1. (4)

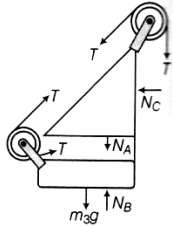
From triangular block b,

$$T - N_C = 5a_0 \quad \dots(i)$$

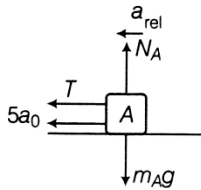
$$N_B = N_A + T + m_B g$$

$$\text{or } N_B = m_a g + T + m_B g$$

$$\therefore N_B = 100 + T \quad \dots(ii)$$

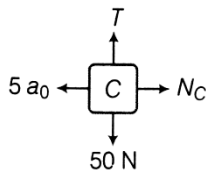


From free body diagram of block A in frame of block B,



$$T + 5a_0 = 5a_{rel} \quad \dots(iii)$$

From free body diagram of block C in the frame of block B



$$N_C = 5a_0 \quad \dots(iv)$$

$$\text{and } 50 - T = 5a_{rel} \quad \dots(v)$$

From Eqs. (i), (iii), (iv) and (v)

$$T - 5a_0 = 5a_0$$

$$\Rightarrow T = 10a_0$$

$$T + 5a_0 = 5a_{rel} \quad (\text{from Eq. (iii)})$$

$$15a_0 = 5a_{rel}$$

$$\Rightarrow a_{rel} = 3a_0$$

$$50 - T = 5a_{rel} \quad (\text{from Eq. (v)})$$

$$50 - 10a_0 = 15a_0$$

$$\Rightarrow 50 = 25a_0$$

$$\therefore a_0 = 2 \text{ m/s}^2$$

$$\therefore T = 10 \times 2 = 20 \text{ N}$$

$$a_{rel} = 3a_0 = 6 \text{ m/s}^2$$

$$N_B = 100 + T = 100 + 20 = 120 \text{ N}$$

2. (3)

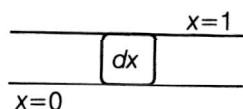
$$m_D g = (m_B + m_C + m_D) a \Rightarrow a = 5 \text{ m/s}^2$$

$$T_{BC} = m_B a = 1 \times 5 = 5 \text{ N and}$$

$$m_D g - T_{CD} = 2 \times 5$$

$$\therefore T_{CD} = 20 - 10 = 10 \text{ N}$$

3. (1)



The linear mass density of the rod at distance x is $\lambda = 1 + x$

$$m = \int dm = \int_0^1 \lambda dx = \int_0^1 (1 + x) dx = 1 + \frac{1}{2} = 1.5 \text{ kg}$$

Thus, friction is $f = \mu_k mg = 1.5 \times 0.5 \times 10 = 7.5 \text{ N}$

$$\therefore a = \frac{F - 7.5}{m} = \frac{15 - 7.5}{\frac{3}{2}} = \frac{2 \times 7.5}{3} = 5 \text{ m/s}^2$$

4. (4)

Concept If $F \leq \mu_s mg$, applied force F is balanced static friction. Thus, tension in string is zero.

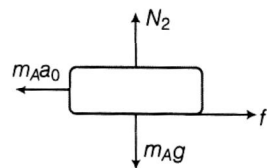
If $F > \mu_s mg$, friction is limiting friction. Thus, $F = T + f_{max}$,

$$\therefore T = F - \mu_s mg.$$

5. (3)

$$(1) \text{ Common acceleration } (a_0) = \frac{F}{m_A + mb} = \frac{9}{3} = 3 \text{ m/s}^2$$

Free body diagram of block A in the frame of block B is shown below,



$$(f_s)_{max} = \mu_s N_2 = 0.5 \times 1 \times 10 = 5 \text{ N} \quad \text{Also,} \quad m_A a_0 = 1 \times 3 = 3 \text{ N}$$

$\therefore m_A a_0 < (f_s)_{max}$, the blocks will move forward with common acceleration and static friction exists between A and B.

$$f = m_A a_0 = 3 \text{ N}$$

$$(2) a_0 = \frac{16}{3} = 5.33 \text{ m/s}^2$$

$$m_A a_0 = 1 \times \frac{16}{3} = 5.33 \text{ N}$$

$\therefore (m_A a_0) > (f_s)_{max}$, there will be relative between the blocks and kinetic friction acts between A and B.

Free body diagram of block B is shown,

$$F - f_k = m_B a_B$$

$$\text{Or } F - \mu_k N_2 = m_B a_B \quad \dots(i)$$

Also,

$$N_2 = m_a g \quad \dots(ii)$$

From, Eqs. (i) and (ii), we get

$$a_B = \frac{F - \mu_k m_A g}{m_B}$$

$$\text{or } a_B = \frac{16 - 0.4 \times 1 \times 10}{2} = 6 \text{ m/s}^2$$

free body diagram of A in the frame of ground.

$$f_k - m_A a_A$$

$$\text{or } a_A = \frac{f_k}{m_A} = 4 \text{ m/s}^2$$

$$(4) \frac{F - \mu_k m_A g}{m_B} = a_B \quad \dots(i)$$

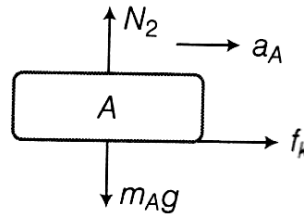
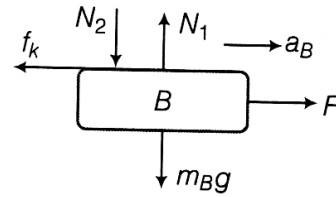
$$\text{Also, } f = \mu_k m_A g = m_A a_A$$

$$\text{Or } a_A = \mu_k g \quad \dots(ii)$$

Combining Eqs. (i) and (ii),

$$\text{Consider, } a_B > a_A \Rightarrow \frac{F - \mu_k m_A g}{m_b} > \mu_k g \quad \text{Or} \quad F > \mu_k g (m_A + m_B)$$

Hence, $a_B > a_A$ for $F > \mu_k g (m_A + m_B)$



6. (1)
7. (4)
8. (2)
9. (2)
10. (2)
11. (4)
12. (2)
13. (1)
14. (4)
15. (2)
16. (4)
17. (3)
18. (1)

Torque $\tau = I\alpha$

$$\omega_o = 2\pi f = 2\pi \times 20 = 40\pi; \quad |\alpha| = \frac{\omega_o - \omega}{t} = \frac{40\pi - 0}{10} = 4\pi$$

$$\therefore \tau = 5 \times 10^{-3} \times 4\pi = 20\pi \times 10^{-3} = 2\pi \times 10^{-2} \text{ Nm}$$

19. (2)

$$f = \frac{K_{\text{Rot}}}{K_{\text{Tot}}} = \frac{\frac{1}{2} I_{\text{CM}} \omega^2}{\frac{1}{2} M V_{\text{CM}}^2 + \frac{1}{2} I_{\text{CM}} \omega^2}$$

For a solid sphere, $I = \frac{2}{5} M R^2$

$$\therefore \frac{1}{2} I_{\text{CM}} \omega^2 = \frac{1}{2} \times \frac{2}{5} M R^2 \omega^2 = \frac{1}{5} M V_{\text{CM}}^2 \quad \therefore f = \frac{\frac{1}{5} M V_{\text{CM}}^2}{\frac{1}{2} M V_{\text{CM}}^2 + \frac{1}{5} M V_{\text{CM}}^2} = \frac{\frac{1}{5}}{\frac{1}{2} + \frac{1}{5}} = \frac{2}{7}$$

20. (2)

According to given problem $\frac{1}{2} m v^2 = a s^2 \Rightarrow v = s \sqrt{\frac{2a}{m}}$

$$\text{So } a_R = \frac{v^2}{R} = \frac{2as^2}{mR} \quad \dots(i)$$

$$\text{Further more as } a_t = \frac{dv}{dt} = \frac{dv}{ds} \cdot \frac{ds}{dt} = v \frac{dv}{ds} \quad \dots(ii)$$

(By chain rule)

Which in light of equation (i) i.e. $v = s \sqrt{\frac{2a}{m}}$ yields

$$a_t = \left[s \sqrt{\frac{2a}{m}} \right] \left[\sqrt{\frac{2a}{m}} \right] = \frac{2as}{m} \quad \dots(iii)$$

$$\text{So that } a = \sqrt{a_R^2 + a_t^2} = \sqrt{\left[\frac{2as^2}{mR} \right]^2 + \left[\frac{2as}{m} \right]^2}$$

$$\text{Hence } a = \frac{2as}{m} \sqrt{1 + [s/R]^2}$$

$$\therefore F = ma = 2as \sqrt{1 + [s/R]^2}$$

21. (1)

When driver applies brakes and the car covers distance x before coming to rest, under the effect of retarding force F

$$\text{then } \frac{1}{2} m v^2 = Fx \Rightarrow x = \frac{m v^2}{2F}$$

$$\text{But when he takes turn then } \frac{m v^2}{r} = F \Rightarrow r = \frac{m v^2}{F}$$

It is clear that $x = r/2$

i.e. by the same retarding force the car can be stopped in a less distance if the driver apply breaks. This retarding force is actually a friction force.

22. (1) $T_1 = m(g + a) = 1 \times \left(g + \frac{g}{2} \right) = \frac{3g}{2}$

$$T_2 = m(g - a) = 1 \times \left(g - \frac{g}{2} \right) = \frac{g}{2} \quad \therefore \frac{T_1}{T_2} = \frac{3}{1}$$

23. (3)

We know that in the given condition $s \propto \frac{1}{m^2}$

$$\therefore \frac{s_2}{s_1} = \left(\frac{m_1}{m_2}\right)^2 \Rightarrow s_2 = \left(\frac{m_1}{m_2}\right)^2 \times s_1$$

24. (1)

For exerted by ball on wall

$$= \text{rate of change in momentum of ball} = \frac{mv - (-mv)}{t} = \frac{2mv}{t}$$

25. (3)

$$F = \frac{dp}{dt} = v \left(\frac{dM}{dt}\right) = \alpha v^2 \therefore a = \frac{F}{M} = \frac{\alpha v^2}{M}$$

26. (3)

$$\vec{F}\Delta t = m\Delta\vec{v} \Rightarrow F = \frac{m\Delta v}{t}$$

By doing so time of change in momentum increases and impulsive force on knees decreases.

27. (3)

$$T = \frac{T_0}{[1 - (v^2/c^2)]^{1/2}}$$

By substituting $T_0 = 1$ day and $T = 2$ days we get

$$v = 2.6 \times 10^8 \text{ ms}^{-1}$$

28. (4)

$$\text{Force acting on plate, } F = \frac{dp}{dt} = v \left(\frac{dm}{dt}\right)$$

$$\text{Mass of water reaching the plate per sec} = \frac{dm}{dt}$$

$$= Av\rho = A(v_1 + v_2)\rho = \frac{V}{v_2}(v_1 + v_2)\rho$$

($v = v_1 + v_2 =$ velocity of water coming out of jet w.r.t. plate)

$$(A = \text{Area of cross section of jet} = \frac{V}{v_2})$$

$$\therefore F = \frac{dm}{dt}v = \frac{V}{v_2}(v_1 + v_2)\rho \times (v_1 + v_2) = \rho \left[\frac{V}{v_2}\right](v_1 + v_2)^2$$

29. (2)

When particle moves away from the origin then at position $x = x_1$ force is zero and at $x > x_1$, force is positive (repulsive in nature) so particle moves further and does not return back to original position. *i.e.* the equilibrium is not stable.

Similarly at position $x = x_2$ force is zero and at $x > x_2$, force is negative (attractive in nature)

So particle return back to original position *i.e.* the equilibrium is stable.

30. (4)

Work done = change in kinetic energy

$$W = \frac{1}{2}mv^2 \therefore W \propto v^2 \text{ graph will be parabolic in nature}$$

31. (3)

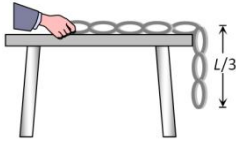
$$P = Fv = mav = m \left(\frac{dv}{dt}\right)v \Rightarrow \frac{P}{m} dt = v dv$$

$$\Rightarrow \frac{P}{m} \times t = \frac{v^2}{2} \Rightarrow v = \left(\frac{2P}{m}\right)^{1/2} (t)^{1/2}$$

Now $s = \int v dt = \int \left(\frac{2P}{m}\right)^{1/2} t^{1/2} dt$

$$\therefore s = \left(\frac{2P}{m}\right)^{1/2} \left[\frac{2t^{3/2}}{3}\right] \Rightarrow s \propto t^{3/2}$$

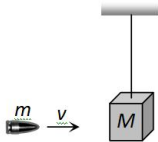
32. (4)



$$W = \frac{MgL}{2n^2} = \frac{MgL}{2(3)^2} = \frac{MgL}{18} \quad (n = 3 \text{ given})$$

33. (2)

34. (4)



Initial momentum = mv

Final momentum = $(m + M)V$

By conservation of momentum $mv = (m + M)V$

$$\therefore \text{Velocity of (bag + bullet) system } V = \frac{mv}{M + m}$$

$$\therefore \text{Kinetic energy} = \frac{1}{2}(m + M)V^2 = \frac{1}{2}(m + M)\left(\frac{mv}{M + m}\right)^2 = \frac{1}{2} \frac{m^2 v^2}{M + m}$$

35. (1)

Path of C. M. Will be followed

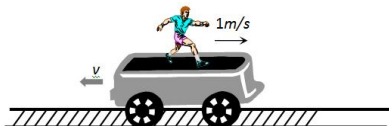
36. (1)

For an isolated system external force on the body is zero

$$\vec{F} = M \frac{d}{dt} \left(\vec{v}_{cm} \right) = 0 \quad \square \quad \vec{v}_{cm} = \text{constant.}$$

37. (3)

If the man starts walking on the trolley in the forward direction then whole system will move in backward direction with same momentum.



Momentum of man in forward direction = Momentum of system (man + trolley) in backward direction

$$\Rightarrow 80 \times 1 = (80 + 320) \times v \Rightarrow v = 0.2 \text{ m/s}$$

So the velocity of man w.r.t. ground $1.0 - 0.2 = 0.8 \text{ m/s}$

38. (2)

$$v = \sqrt{3gr} \text{ and } a = \frac{v^2}{r} = \frac{3gr}{r} = 3g$$

39. (3)
40. (3)
41. (2)

Time of descent \propto moment of inertia $\propto \frac{k^2}{R^2}$

$$\left(\frac{k^2}{R^2}\right)_{sphere} = 0.4, \left(\frac{k^2}{R^2}\right)_{disc} = 0.5, \left(\frac{k^2}{R^2}\right)_{ring} = 1 \therefore t_{sphere} < t_{disc} < t_{ring}$$

42. (2)

Speed of the bottommost point is zero but acceleration is not zero. Friction force may be there if it is an accelerated motion but work done by friction is always zero.

43. (1)
44. (1)
45. (4)

CHEMISTRY

46. (2) $u_{AV}(O_2) = \sqrt{\frac{8RT}{\pi \times 32}}$; $u_{rms}(N_2) = \sqrt{\frac{3RT}{28}}$
 $\therefore \frac{u_{AV}(O_2)}{u_{rms}(N_2)} = \sqrt{\frac{8 \times 28}{\pi \times 32 \times 3}} = \sqrt{\frac{7}{3\pi}}$

47. (1) $w = 22$ g; $V = 1$ litre, $T = 298$ K

using $PV = \frac{w}{m}RT$ (for CO_2)

$$P \times 1 = \frac{22}{44} \times 0.0821 \times 298$$

$$\therefore P_{CO_2} = 12.23 \text{ atm}$$

$$\therefore P_{in\ bottle} = P_{CO_2} + \text{atm. pressure} \\ = 12.23 + 1 = 13.23 \text{ atm}$$

48. (1) The mole diffused per unit area in first case $\propto \pi r^2$.
The mole diffused per unit area in second case $\propto r^2$,

$$\text{Thus, } \frac{r_1}{r_2} = \frac{a_1}{t_1} \times \frac{t_2}{a_2} = \frac{\pi r^2}{r^2} = \pi \quad (\because t_1 = t_2)$$

49. (3) $P' = \text{mole fraction} \times P_M$

The gas having higher mole fraction has high partial pressure.

50. (2)

$$\text{The volume of the balloon} = \frac{4}{3}\pi r^3$$

$$= \frac{4}{3} \times \frac{22}{7} \left(\frac{21}{2}\right)^3 = 4851 \text{ ml}$$

Volume of the cylinder = 2820 ml

$$\text{Volume of H}_2 \text{ at NTP} = \frac{20 \times 2820 \times 273}{300 \times 1} \text{ ml}$$

$$= 51324 \text{ ml}$$

After filling the cylinder will have H₂ equal to its volume = 2820 ml

$$\therefore \text{Volume of H}_2 \text{ for filling balloons} = 51324 - 2820 = 48504 \text{ ml}$$

$$\text{Hence no. of balloon to be filled} = \frac{48504}{4851} = 10$$

51. (3) At $P_1 = 1 \text{ atm}$, $V_1 = 22.4 \text{ L}$; $T_1 = 273 \text{ K}$

$$P_2 = 1 \text{ atm}, V_2 = ?; T_2 = 373 \text{ K}$$

$$\frac{V_1}{V_2} = \frac{T_1}{T_2}$$

$$\frac{22.4}{V_2} = \frac{273}{373}$$

$$\therefore V_2 = 30.6 \text{ L}$$

52. (4) $PV = \frac{W}{M}RT$;

$$\text{If other factors are same, } V \propto \frac{1}{m}$$

53. (2) For 5 moles of gas at temperature T, $PV_1 = 5RT$

$$\text{For 5 moles of gas at temperature } T-2, PV_2 = 5R(T-2)$$

$$\therefore P(V_2 - V_1) = 5RT(T-2-T);$$

$$P\Delta V = -10R$$

$$-P\Delta V = 10R$$

When ΔV is negative, W is +ve.

54. (3) $RT_c / P_c \cdot V_c = 8/3 = 8/3 \times 1 = 8/3 \times \frac{RT}{PV}$

55. (2) Gaseous product if formed;
more positive is Δn , more is entropy.

56. (4) $\left(\frac{\partial H}{\partial T}\right)_p = C_p; \left(\frac{\partial U}{\partial T}\right)_v = C_v$

Also, $(\delta U / \delta V)_T$ for ideal gas = 0

57. (2) $\Delta G = \Delta H - T\Delta S$; at equilibrium,

$$\Delta G = 0, \quad \therefore \Delta H = T\Delta S$$

$$\text{or } \Delta H = 273 \times (60.01 - 38.20) = 5954.13 \text{ J mol}^{-1}$$

58. (3) $PV^\gamma = \text{constant}$

$$P \cdot \gamma V^{\gamma-1} dV + V^\gamma \cdot dP = 0$$

$$\therefore \frac{dP}{P} = -\frac{\gamma \cdot V^{\gamma-1} dV}{V^\gamma} = -\gamma \left(\frac{dV}{V} \right)$$

59. (2) Work done by gas = $-P_{\text{ext.}} \times \text{change in volume}$
 $= -3 \times 2 \text{ litre-atm}$
 $= -6 \times 101.32 \text{ J}$
 $= -607.92 \text{ J}$

60. (2) No doubt (1) and (2) both represent heat of formations but standard heat of formation (ΔH_f°) for CO_2 will be form $\text{C}_{(\text{graphite})} + \text{O}_2 \longrightarrow \text{CO}_2$ as $\text{C}_{(\text{graphite})}$ is most stable form of carbon.

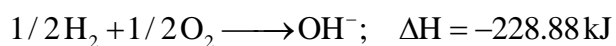
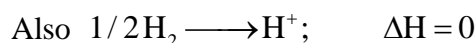
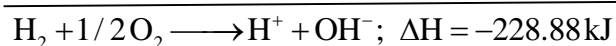
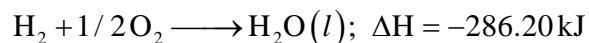
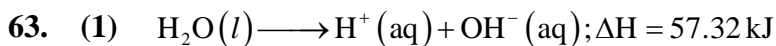
61. (2) $H^\circ = \text{Zero}$ in most stable form of element.
 $H_{\text{Cl}_2(\text{g})}^\circ = 0, H_{\text{Br}_2(\text{l})}^\circ = 0$

62. (2) $\Delta H_{\text{solution}} = \Delta H_i + \Delta H_h$
 or $1 = 180 + \Delta H_h$
 $\Delta H_h = -179 \text{ kcal mol}^{-1}$

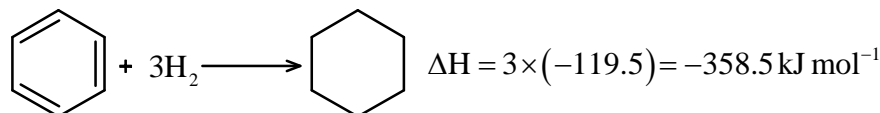
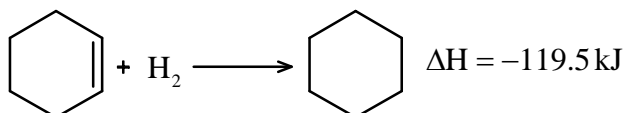
The total $\Delta H_h = \Delta H_{h_{\text{Na}^+}} + \Delta H_{h_{\text{Cl}^-}} = \frac{6a}{11} + \frac{5a}{11} = a$

where a is total heat of hydration (ΔH_h)

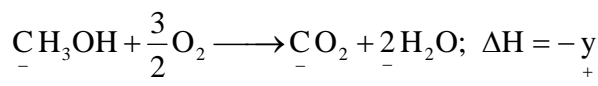
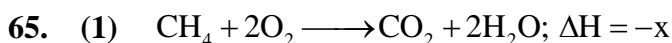
Thus, $\Delta H_{h_{\text{Na}^+}} = -\frac{6 \times 179}{11} = -97.63 \text{ kcal mol}^{-1}$

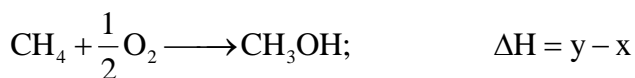


64. (4)



The obs. $\Delta H = \Delta H + \text{Energy needed to disturb resonance}$
 $= -358.5 + 150.4 = -208.1 \text{ kJ mol}^{-1}$





$$\begin{aligned} \therefore y - x &= -ve \\ \therefore x &> y \end{aligned}$$

66. (2) Volume of ice > volume of water and thus, increase in pressure favours forward reaction showing decrease in volume.

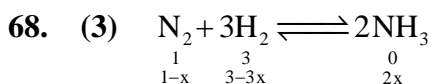
67. (1) In

$$\frac{K_2}{K_1} = \frac{\Delta H}{R} \left[\frac{T_2 - T_1}{T_1 T_2} \right]$$

K increase with $\frac{1}{T}$ or decreases with T it is decided by ΔH . Here, K decrease with T. Thus,

$$\Delta H = -ve$$

At the initial stage if only reactants are taken $Q = 0$, but it goes increasing with time to become equal to K_c .



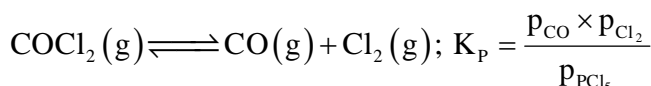
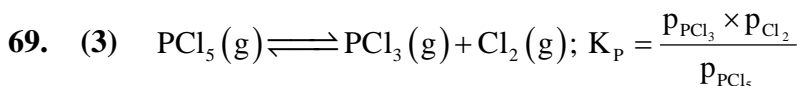
$$\begin{array}{ccc} 1 & 3 & 0 \\ 1-x & 3-3x & 2x \end{array}$$

\therefore 50% mixture reacts

$$\therefore 1 - x + 3 - 3x = \frac{4}{2} = 2$$

$$x = 0.5$$

$$\begin{aligned} \therefore P_{\text{NH}_3}^1 &= P_r \times m f \text{ of } \text{NH}_3 \\ &= \frac{P \times 2 \times 0.5}{(4 - 0.5 \times 2)} = \frac{P}{3} \end{aligned}$$

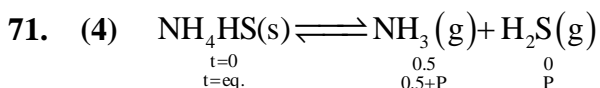


If CO is introduced, the dissociation of COCl_2 will decrease and p_{Cl_2} will decrease. This will favour dissociation of PCl_5 , because both reactions are attained in same vessel.

70. (2)
$$K_{c_1} = \frac{[\text{NO}]^2}{[\text{N}_2][\text{O}_2]} = 4 \times 10^{-4}$$

$$K_{c_2} = \frac{[\text{N}_2]^{1/2} [\text{O}_2]^{1/2}}{[\text{NO}]}$$

$$\therefore K_{c_2} = \sqrt{\frac{1}{K_{c_1}}} = \sqrt{\frac{1}{4 \times 10^{-4}}} = 50$$

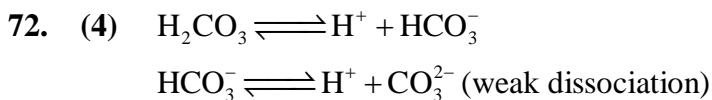


$$\begin{array}{ccc} t=0 & 0.5 & 0 \\ t=\text{eq.} & 0.5+P & P \end{array}$$

$$P_T = 0.5 + P + P = 0.84$$

$$\therefore P = 0.17 \text{ atm}$$

$$K_p = P_{\text{NH}_3} \times P_{\text{H}_2\text{S}} = (0.5 + 0.17) \times 0.17 \\ = 0.11 \text{ atm}$$



73. (4) Ionic product for $\text{M}(\text{OH})_2$

$$= \frac{0.1V}{2V} \times \left[\frac{10^{-6}V}{2V} \right]^2 = \frac{0.1}{8} \times 10^{-12}$$

Thus, only $\text{Fe}(\text{OH})_2$ will be precipitated. Also for AgOH , the product of ionic concentration is (0.1×10^{-6}) lesser than K_{sp} .

74. (1) $\text{pH} = \text{pK}_a + \log \frac{[\text{Conjugate base}]}{[\text{Acid}]}$
 $\text{pH} = \text{pK}_a + \log 1$ (\because 50% neutralization)
 $\therefore \log \text{H}^+ = -\log 2 \times 10^{-4}$
 or $\text{H}^+ = 2 \times 10^{-4}$

75. (2) The reaction shows lower K_{eq} value in forward direction, i.e., more K_{eq} in backward direction or HCN decomposes salt of HNO_2 .

76. (2) meq. of I HCl = meq of II HCl
 $1 \times 10^{-1} = V \times 10^{-2}$
 $\therefore V = 10 \text{ litre}$
 \therefore volume of water added = $(10 - 1) = 9 \text{ L}$

77. (1) $\text{Rate} = K[\text{Ester}][\text{H}^+]$
 For strong acid $[\text{H}^+] = 1 \text{ M}$
 For weak acid $[\text{H}^+] = \sqrt{K_a \cdot C}$

$$\frac{\text{Rate}_1}{\text{Rate}_2} = \frac{[\text{H}^+]_1 \text{ for strong acid}}{[\text{H}^+]_2 \text{ for weak acid}}$$

$$\frac{1}{1/100} = \frac{1}{\sqrt{K_a} \times 1} \quad (C = 1 \text{ M for weak acid})$$

$$K_a = 10^{-4} \text{ M}$$

78. (2) Carbon has negative oxidation no. in Mg_3C_2 and positive oxidation number in C_3O_2 ; O is more electronegative than C. Mg is more electropositive than C.

79. (4) The same species in each reaction is oxidized and reduced as will to give disproportionation reaction.
80. (4) Addition of KI to CuSO_4 makes it dark brown.
81. (4) $\text{S}_2^{2+} \longrightarrow 2\text{S}^{6+} + 8\text{e}$
82. (4) $[\text{Mn}^{7+} + 5\text{e} \longrightarrow \text{Mn}^{2+}] \times 3$
 $[\text{Fe}^{2+}\text{C}_2\text{O}_4 \longrightarrow \text{Fe}^{3+} + 2\text{C}^{4+}\text{O}_2 + 3\text{e}] \times 5$
83. (3) $\text{SO}_2 + \text{H}_2\text{O} \longrightarrow \text{SO}_3 + 2\text{H}$;
 $\text{Cl}_2 + \text{H}_2\text{O} \longrightarrow 2\text{HCl} + \text{O}$
84. (2) $\text{S}^{2-} \longrightarrow \text{S}^{4+} + 6\text{e}$
 $\therefore \text{Eq.} = \text{mole} \times 6$
85. (1) $(\text{N}^0)_2 + 6\text{e} \longrightarrow 2(\text{N}^{3-})$
 $3(\text{H}^0)_2 \longrightarrow 2(\text{H}^{+1})_3 + 6\text{e}$
 $E_{\text{N}_2} = \frac{28}{6}; E_{\text{NH}_3} = \frac{17}{3}$
86. (2) Both are correct
87. (1) Explanation is correct reason for statement.
88. (2) $Q < K_c$ forward reaction
 $Q > K_c$ backward reaction
 $Q = K_c$ if $\Delta G = 0$
89. (3) $K_w = 10^{-13}$ at $60^\circ\text{C} \therefore \text{pH} = 6.5$; but water is neutral because pH scale contracts to 0 to 13.
90. (2) Both statement and explanation are correct but explanation is not reason for statement.

BOVTANY

91. (3)
 92. (3)
 93. (2)
 94. (2)
 95. (4)
 96. (3)
 97. (2)
 98. (1)
 99. (2)
 100. (3)
 101. (2)
 102. (3)

103. (2)
104. (1)
105. (2)
106. (4)
107. (3)
108. (1)
109. (4)
110. (2)
111. (4)
112. (3)
113. (3)
114. (2)
115. (2)
116. (3)
117. (3)
118. (3)
119. (3)
120. (4)
121. (3)
122. (2)
123. (4)
124. (2)
125. (1)
126. (2)
127. (3)
128. (4)
Sol: Salvinia is an aquatic heterosporous pteridophyte
129. (1)
130. (3)
131. (3)
132. (1)
133. (3)
134. (3)
135. (4)