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1. Solution:
   \[ A = 4\pi R^2 \Rightarrow A \propto R^2 \]
   \[ \Rightarrow \frac{\Delta A}{A} = 2\left(\frac{\Delta R}{R}\right) \]
   \[ 4\% = 2\left(\frac{\Delta R}{R}\right) \]
   \[ \frac{\Delta R}{R} = 2\% \]
   \[ V = \frac{4}{3}\pi R^3 \]
   \[ V \propto R^3 \]
   \[ \frac{\Delta V}{V} = 3\left(\frac{\Delta R}{R}\right) = 3(2\%) = 6\% \]
   Correct option is (3)

2. Solution:
   Resultant of two forces always lie in between \((A + B)\) and \((A - B)\)
   So the resultant of two forces 10 N and 6 N should lie in between 16 N and 4 N.
   So the answer is 15 N
   Correct option is (1)

3. Solution:
   \[ u_{rel} = u_1 - u_2 = 0 - (-5) = 5 \text{ ms}^{-1} \]
   \[ t = 3 \text{ s} \]
   \[ a_{rel} = a_1 - a_2 = -g - (-g) = 0 \text{ ms}^{-2} \]
   \[ s_{rel} = u_{rel}t + \frac{1}{2}a_{rel}t^2 \]
   \[ \Rightarrow s_{rel} = 5 \times 3 = 15 \text{ m} \quad (\because a_{rel} = 0) \]
   So, \[ s_{rel} = 15 \text{ m} \]
   Correct option is (3)
4. Correct option is (2)
\[ \theta = 45^\circ, \quad t = 1 \text{ s} \]
\[ \tan \phi = \frac{V_y}{U_y} = \frac{u \sin \theta - gt}{u \cos \theta} \]
\[ \tan 45^\circ = \frac{u \sin \theta - g \times 1}{u \cos \theta} \Rightarrow u \cos \theta = u \sin \theta - g \]
also, \( V_y = 0 \), after 2 seconds
\[ u \sin \theta - g \times 2 = 0 \Rightarrow u \sin \theta = 2g \]
so, \( u \cos \theta = 2g - g \)
\[ u \cos \theta = g \]
so, \( \frac{(i)}{(ii)} = \frac{u \sin \theta}{u \cos \theta} = \frac{2g}{g} \]
\( \tan \theta = 2 \Rightarrow 0 = \tan^{-1}(2) \)

5. Solution:
For 40 kg, \( 400 - T_1 = 40 \) \hspace{1cm} (1)
\[ \Rightarrow T_1 = 360 \text{ N} \]
For 50 kg, \( 500 + T_1 - T_2 = 50 \) \hspace{1cm} (2)
\[ \Rightarrow T_2 = 760 \text{ N} \]
For 60 kg \[ \Rightarrow T_3 - 600 - T_2 = 60 \] \hspace{1cm} (3)
\[ T_3 = 1580 \text{ N} \]
\( T_3 \) will be the tension at the topmost point on the rigid support.
Correct option is (2)

6. Correct option is (3)
Answer (3)
It both are moving together
\[ a = \frac{F}{8} \]
For 3 kg block, \( f = 3 \left( \frac{F}{8} \right) \)
\( 0.5 (3) \) \( g = \frac{3F}{8} \Rightarrow F = 40 \text{ N} \)
So, \( m = 4 \text{ kg} \)

7. Correct option is (4)
Due to internal forces kinetic energy or acceleration of its constituent particle may be non-zero.
8. **Solution:**
Correct option is (1)
\[ u = \sqrt{5gR} = \sqrt{50} \text{ m/s} \]

Speed of the particle when velocity of the particle becomes vertical is
\[ v = \sqrt{3gR} = \sqrt{30} \text{ m/s} \]

At this position, \( a_c = \frac{v^2}{R} = 30 \text{ m/s}^2 = 3g \)
\[ a_t = g \]

Resultant acceleration is
\[ a = \sqrt{a_c^2 + a_t^2} = \left( \sqrt{10} \right) g \]

9. **Solution:**
Correct option (3)
At lesser temperature tape will decrease in length so the reading 30 cm on the tape is lesser than 30 cm in real.

10. **Solution:**
Correct option is (2)
Time intervals to change thickness from 0 to x from x to 2x are in ratio of 1 : 3 : 5 : 7 ……
\[ \therefore \frac{t_1}{t_3} = \frac{1}{3} \]
\[ \frac{24 \text{ hrs}}{t_2} = \frac{1}{3} \]
\[ t_2 = 72 \text{ hrs} \]

11. Correct option is (1)
\[ l_2' - l_1' = l_2 - l_1 \]
\[ \Rightarrow l_2(1 + \alpha_2 \Delta t) - l_1(1 + \alpha_1 \Delta t) = l_2 - l_1 \]
\[ l_2 \alpha_2 = l_1 \alpha_1 \]

12. **Solution:**
Correct option is (2)
\[ Q = \int mSDT = \int \left[ (1)(a T^3) \right]dT = a \left[ \frac{T^4}{4} \right]_1^{\text{15}a} = \frac{15a}{4} \]
13. Solution:
\[
\frac{dQ}{dt} = \frac{dm}{dt} \times L \quad \text{[\(\because Q = mL\)]}
\]
\[
\frac{dQ}{dt} = 0.1 \times 80 = 8 \text{ cal/s}
\]
also, \(Q = ms\Delta t\)
So \(\frac{dQ}{dt} = ms \frac{dT}{dt}\)
\[
8 = 10 \times 1 \times \frac{dT}{dt} \quad \text{[\(\because\) it melts in 100 s so total mass of sphere \(= 0.1 \times 100 = 10 \text{ g}\)]}
\]
\[
8^\circ C/s = \frac{dT}{dt}
\]
\[
\therefore \frac{dT}{dt} = 0.8^\circ C/s
\]

14. Solution:
Correct option is (2)
Let temperature of junction be \(\theta\)
Heat flowing to junction = heat out flowing

\[
\frac{KA}{30} (30 - \theta) = \frac{KA}{20} (\theta - 20) + \frac{KA}{10} (\theta - 10)
\]

\[
\frac{(30 - \theta)}{3} = \frac{(\theta - 20)}{2} + \frac{(\theta - 10)}{1}
\]

\[
\frac{(30 - \theta)}{3} = \frac{\theta - 20 + 2\theta - 20}{2}
\]

\[
60 - 2\theta = 90 - 120
\]

\[
180 = 11 \theta
\]

\[
16.36^\circ C = \theta
\]
15. Solution:
Correct option is (2).
\[
\frac{\theta_1 - \theta_2}{\text{dt}} \propto \left( \frac{\theta_1 + \theta_2}{2} - \theta_i \right)
\]
\[
\frac{20}{10} \propto (70 - 30) \quad \text{(1)}
\]
\[
\frac{60 - 0}{10} \propto \left( \frac{60 + 0}{2} - 30 \right)
\]
\[
\frac{60 - 0}{10} \propto 0 \quad \text{(2)}
\]
\[
\frac{2}{10} \Rightarrow \frac{60 - 0}{20} = \frac{(0/2)}{40}
\]
\[
120 - 20 = \frac{0}{2}
\]
\[
120 = \frac{50}{2}
\]
\[
0 = 48^\circ C
\]

16. Solution:
Correct option is (2)
\[PV = \text{constant}\]
\[P_1 V_1 = P_2 V_2 \quad [P_1 = P_0 \text{ atmospheric pressure}]\]
\[P_0 \times 40 = P_1 \times 60 \quad \text{... (i)}\]
\[P_1 + 20 = P_0 \quad \text{... (ii)}\]

From (i)
\[P_1 = \frac{2P_0}{3}\]

From (ii)
\[\frac{2P_0}{3} + 20 = P_0\]
\[P_0 = 60 \text{ cm of Hg}\]
17. Solution:

\[ P V^n = \text{constant} \]

\[ C = \frac{C_p + C_v}{2} = \frac{(C_v + R) + C_v}{2} = \frac{2C_v + R}{2} \]

\[ C = C_v + \frac{R}{2} \]

\[ C_v + \frac{R}{1-n} = C_v + \frac{R}{2} \]

\( 1 - n = 2 \)

\( n = -1 \)

18. Solution:
Correct option is (4)

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<th>Cylinder A</th>
<th>Cylinder B</th>
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<tr>
<td>Free piston ( i.e., ) at constant pressure</td>
<td>Fixed piston ( i.e., ) at constant volume</td>
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<td>( \Delta Q = \Delta U )</td>
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<td>( nC_p \Delta T = nC_v \Delta T' )</td>
<td>( C_p \Delta T = C_v \Delta T' )</td>
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<td>( C_p T_0 = C_v \Delta T' )</td>
<td>( \Delta T' = \frac{C_p}{C_v} T_0 = \gamma T_0 = \frac{5}{3} T_0 )</td>
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19. Solution:

\( (2) \)

From \( A \rightarrow B \), volume increasing, pressure constant

\( B \rightarrow C \), Pressure \( \propto \frac{1}{\text{Volume}} \) \( \Rightarrow \) Temperature constant

Same for \( D \rightarrow A \)

\( C \rightarrow D \) pressure decreasing, volume constant

So \( P \propto T \)

20. Solution:

Correct option is (2)

Take COM of bigger disc as reference origin.
\[ x_{cm} = \frac{m_{bigger}x_{bigger} + m_{smaller}x_{smaller}}{m_{bigger} + m_{smaller}} \]
\[ = \frac{\left[ \sigma \pi (2R)^2 \right](0) + \left[ \sigma \pi (R)^2 \right](R)}{\left[ \sigma \pi (2R)^2 \right] + \left[ \sigma \pi (R)^2 \right]} \]
\[ = \frac{R}{5} \]

21. Solution:  
Correct option is (3)  
Since there is no external force acting, \( v_{cm} = 0 \)  
Consider \( \Delta x \) is the distance travelled by the plank w.r.t ground in negative ground as man moving to other end of the plank in positive direction.  
\[ M(L - \Delta x) + \frac{M}{3}(-\Delta x) = 0 \]
\[ ML - M\Delta x - \frac{M}{3} \Delta x = 0 \]
\[ ML = \frac{4}{3}M\Delta x \]
\[ \Delta x = \frac{3}{4}L \]
Distance travelled by plank w.r.t ground is \( 3L/4 \)  
Distance travelled by man w.r.t ground = \( L - \Delta x = L - \frac{3L}{4} = \frac{L}{4} \)

22. Solution:  
Correct option is (4)  
As body breaks into pieces due to internal forces and so there will be no shift in centre of mass of the body.

23. Solution:  
Correct option is (4)  
Wall: \( u_2 = v_2 = -1 \text{ m/s}, \) here -ve indicates left side  
Ball: \( u_1 = +4 \text{ m/s}, \) here +ve indicates right side  
coefficient of restitution,
\[ e = \frac{v_2 - v_1}{u_1 - u_2} \]
\[ 1 = \frac{-1 - v_1}{4 - (-1)} \]
\[ -1 - v_1 = 5 \]
\[ v_1 = -6 \text{ m/s} \]  
Therefore, velocity of the ball after collision with the wall is 6 m/s towards left side (away from the wall).
24. Solution:
Correct option is (2)
\[ h_a = e^{2n}h \]
\[ h_1 = e^3h \]

25. Solution:
Applying law of conservation of momentum just before collision and just after collision we get
\[ mv = 2m v_{\text{common}} \]
\[ v_{\text{common}} = \frac{v}{2} \]
According to law of conservation of energy,
\[ \frac{1}{2} (2m) v^2_{\text{common}} = (2m) gh \]
\[ \frac{1}{2} \left( \frac{v}{2} \right)^2 = gh \]
\[ h = \frac{v^2}{8g} \]

26. Solution:
Correct option is (1)
\[ I_{\text{smaller}} = I_{\text{bigger}} n^{5/3} = \frac{1}{(8)^{5/3}} = \frac{1}{32} \]

27. Solution:
Correct option is (1)
\[ I_1 \omega_1 = I_2 \omega_2 \]
\[ \left( \frac{MR^2}{2} \right) \omega = \left( \frac{MR^2}{2} + 2mR^2 \right) \omega' \]
\[ M \omega = (M + 4m) \omega' \]
\[ \omega' = \frac{M \omega}{(M + 4m)} \]
28. **Solution:**
Correct option is (3)

Using mechanical energy conservation

\[ mgh = \frac{1}{2}mv^2 + \frac{1}{2}mr^2 \cdot \frac{v^2}{r^2} \]

\[ mgh = \frac{3}{4}mv^2 \]

\[ v^2 = \frac{4gh}{3} \]

\[ v = \sqrt{\frac{4gh}{3}} \]

29. **Solution:**
Correct option is (3)

Moment of inertia passing through centre O of the semicircular ring is \( I_0 = mr^2 \)

In the case of semicircular ring, centre of mass is at a height of \( \frac{2r}{\pi} \) above the point O.

According to parallel axes theorem,

\[ I = I_{cm} + mr^2 \]

\[ I_0 = I_{cm} + m \left( \frac{2r}{\pi} \right)^2 \]

\[ mr^2 - m \left( \frac{2r}{\pi} \right)^2 = I_{cm} \]

\[ I_{cm} = mr^2 \left( 1 - \frac{4}{\pi^2} \right) \]
30. Correct option is (2)
Solution:
\[ w = w_0 - \alpha t \]
\[ \alpha = \frac{w_0}{t} = \frac{2\pi(240)}{60 \times 60} \]
\[ \alpha = \frac{8\pi}{60} \text{ rad/s}^2 \]
\[ \tau = f \alpha \]
\[ = 4 \frac{8\pi}{60} = \frac{8\pi}{15} \text{ Nm} \]

31. Solution:
Correct option is (4)
In rolling motion, if 40% of the energy is present in the form of rotational kinetic energy then remaining 60% of the energy is present in the form of translational kinetic energy.

\[ KE_{\text{rolling}} = \frac{1}{2} Mv^2 \left( 1 + \frac{k^2}{R^2} \right) \]

\[ KE_{\text{rolling}} = (KE_{\text{translational}}) \left( 1 + \frac{k^2}{R^2} \right) \]

\[ KE_{\text{rolling}} = \frac{60}{100} (KE_{\text{rolling}}) \left( 1 + \frac{k^2}{R^2} \right) \]

\[ \frac{1 + \frac{k^2}{R^2}}{R^2} = \frac{5}{3} \]

\[ \frac{k^2}{R^2} = \frac{2}{3}, \text{ which is hollow sphere} \]

32. Correct option is (1)
Solution:
In the case of solid cylinder, \[ I = \frac{MR^2}{2} = Mk^2 \Rightarrow \frac{k^2}{R^2} = \frac{1}{2} \]

\[ a = \frac{gsin\theta}{1 + \frac{k^2}{R^2}} = \frac{gsin30^\circ}{1 + \frac{1}{2}} = \frac{2 \left( \frac{g}{3} \right)}{3} = \frac{g}{3} \]

33. Correct option is (1)
Solution:
In the case of solid sphere, \[ I = \frac{2}{5} MR^2 = Mk^2 \Rightarrow \frac{R^2}{k^2} = \frac{5}{2} \]
\[ \mu_{\text{min}} = \frac{\tan \theta}{1 + \frac{R^2}{k^2}} = \frac{\tan \theta}{1 + \frac{5}{2}} = \frac{2}{7} \tan \theta \]

34. **Solution:**
Correct option is (2)
\[
\begin{align*}
\nu &= \sqrt{2gh} \\
mgh &= \frac{1}{2}mv^2 + \frac{1}{2}mr^2 \frac{v^2}{r^2} \\
\nu' &= \sqrt{gh} \\
\nu' &= \frac{v}{\sqrt{2}}
\end{align*}
\]

35. **Solution:**
Correct option is (c)
\[
\begin{align*}
\nu &= \frac{u}{1 + \frac{k^2}{R^2}} = \frac{u}{1 + \frac{2}{5}} = \frac{5u}{7}
\end{align*}
\]

36. **Solution:**
Correct option is (4)
According to equation of continuity,
\[
A_1v_1 = A_2v_2 \\
\left( \pi R^2 \right) \nu = \left( n\pi r^2 \right) \nu' \\
\nu' = \frac{v}{n} \left( \frac{R}{r} \right)^2
\]

37. **Solution:**
Correct option is (3)

38. **Solution:**
Correct option is (1)
\[
\begin{align*}
v_{\text{bigger}} &= \left( n \right)^{2/3} \left( v_{\text{smaller}} \right) \\
&= 2^{2/3} \times 5 \text{ cm/s} \\
&= 4^{1/3} \times 5 \text{ cm/s}
\end{align*}
\]

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39. Solution:
Correct option is (1)

Viscous force = weight

\[ \eta A \frac{v}{t} = mg \sin \theta \]

\[ \eta \left( \frac{a^2}{t} \right) \left( \frac{v}{t} \right) = \rho \left( a^3 \right) g \sin \theta \]

\[ \eta = \frac{apgt \sin \theta}{v} \]

40. Solution:
Correct option is (2)
Surface tension is the property always tries to decrease the surface area of liquid free surface.

41. Solution:
Correct option is (1)

Fraction of volume inside the liquid is \( f = \frac{\rho_{\text{body}}}{\rho_{\text{liquid}}} \), which depends upon density of submerged body and density of liquid.

42. Solution:
Correct option is (3)

Time taken by the level to fall from \( h_1 \) to \( h_2 \) is

\[ t = \frac{A}{A_0} \sqrt{\frac{2}{g} \left[ \sqrt{h_1} - \sqrt{h_2} \right]} \]

Time taken for the level to fall from \( h \) to \( h/2 \) is

\[ t_1 = \frac{A}{A_0} \sqrt{\frac{2}{g} \left[ \sqrt{h} - \frac{h}{2} \right]} = \frac{A}{A_0} \sqrt{\frac{2}{g} \left( \sqrt{\frac{2}{2}} - 1 \right)} \]

Time taken for the level to fall from \( h/2 \) to zero is

\[ t_2 = \frac{A}{A_0} \sqrt{\frac{2}{g} \left[ \frac{h}{2} - 0 \right]} = \frac{A}{A_0} \sqrt{\frac{2}{g} \left( \sqrt{\frac{2}{2}} \right)} \]

Therefore,

\[ \frac{t_1}{t_2} = \sqrt{2} - 1 \]

43. Solution:
Correct option is (1)

\[ F_{\text{upthrust}} = \rho_{\text{liquid}} V_{\text{submerged}} \left( g - a \right) \]

In the case of freely falling body under gravity, \( a = g \) then \( F_{\text{upthrust}} = 0 \)

44. Solution:
Correct option is (3)

Net force (Reaction) is

\[ F = F_B - F_A \]

\[ = p a v_B^2 - p a v_A^2 \]

\[ = p a \left( v_B^2 - v_A^2 \right) \] 

---------- (1)

According to Bernoulli’s equation,
Therefore, from equation (1) we get \( F = (\rho a)(2gh) = 2\rho ah \)

45. **Solution:**
   Correct option is (3)
   \[ Av_1 = Av_2 + (1.5A)(v) \]
   \[ (A)(3 \text{ m/s}) = (A)(1.5 \text{ m/s}) + (1.5A)(v) \]
   \[ 3 = 1.5 + 1.5v \]
   \[ v = 1 \text{ m/s} \]

46. The +R affect of the –OH group statilices the carbocation
47. The conjugate base obtained after the removal of H\(_C\) has the highest stability with maximum delocalization of the –ve charge removal of Ha would give the least stable conjugate base due to localized charge
Stability of alkenes is governed by hyperconjugative effects and steric repulsions.

In the given compound the \( \text{CH}_3 \) \( \text{C}^\text{C} \) group shows -I and -R effect. The \( \text{CH}_3 \) group shows hyperconjugation with \( \text{C}^\text{C} \).

More the acidic strength lower will be the value of pKa.

The enol form of (I) has no stabilizing effects present.
58. (2) and (3) are position isomers

60. Enolic forms are not possible in (1) and (2)
61. (2).

\[ \text{PH} = 2.4 \]

\[ [H^+] = 4 \times 10^{-3} \quad \text{[H\textsuperscript{+}]} = 10^{-4} \]

\[ M_1Y_1 = M_2 \cdot Y_2 \]

\[ 4 \times 10^{-3} \times 1 = 10^{-4} \times Y_2 \]

\[ Y_2 = 40 L \]

\[ \text{Water added } = Y_2 - V_1 \]

\[ = 40 - 1 = 39 L \]

62. (4)

Calculation:

\[ \text{Ca}^2+ + 2e^- \]

\[ \text{K}_{sp} = (5 \times 10^{-3})^2 \]

\[ = 4 \times 10^{-5} \]

\[ = 4 \times (2 \times 10^{-4})^3 \]

\[ = 3.2 \times 10^{-11} \]

63. (3).

\[ [H^+] = \sqrt{K_a \cdot C_2 \text{K}_a} \]

\[ = \frac{0.02}{2} = 0.01 \; \; \; C_2 = \frac{0.2}{2} = 0.1 \]

\[ [H^+] = \sqrt{(0.01) \times 2 \times 10^{-4} + (0.1) \times 2 \times 10^{-8}} \]

\[ = \sqrt{4 \times 10^{-6}} \]

\[ = 2 \times 10^{-3} \]

\[ \text{PH} = 3 - \log \text{pH} \]

\[ = 2.7 \]

64. (2)

\[ \text{pH} = 2.5 \]

\[ [H^+] = 4 \times 10^{-4} \quad \text{[H\textsuperscript{+}]} = 10^{-4} \]

\[ \gamma_2 = 8 \times \text{C}_2 \text{K}_a \]

\[ = \frac{3 \times 10^{-8}}{4 \times 10^{-10}} = 9 \times 10^{-5} \]

\[ \lambda_1 = \frac{V}{2 \lambda_2} = \frac{3 \times 10^{-6}}{1.75 \times 10^{-10}} = 1.7 \times 10^{-4} \]

\[ \text{Buffer capacity} = \frac{(0.2 \times 10^{-6}) \times 1000}{250} \]

\[ = 0.4 \]

65. (4)

\[ \text{Buffer capacity} = \frac{(0.2 \times 10^{-6}) \times 1000}{250} \]

\[ = 0.4 \]

66. (4)

\[ \text{Buffer capacity} = \frac{(0.2 \times 10^{-6}) \times 1000}{250} \]

\[ = 0.4 \]

67. (2)

\[ [H^+]_{\text{total}} = [H^+]_{\text{water}} + [H^+]_{\text{acid}} \]

\[ [H^+]_{\text{total}} = \frac{c + \sqrt{c^2 + 4Kw}}{2} \]

\[ = \frac{10^{-5} + \sqrt{10^{-10} + 4 \times 10^{-10}}}{2} \]

\[ = (\frac{10^{-5} + 4 \times 10^{-10}}{2}) \times 10^{-5} \]

\[ \text{pH} = -\log [H^+] = 4.8 \]

68. (2)

Cationic hydrolysis because Al\textsubscript{3+} is a salt of strong acid weak base.

\[ \text{Al}^{3+} + 3\text{H}_2\text{O} \rightarrow \text{Al(OH)}_3 + 3\text{H}^+ \]
69 (3)

$$\text{Na}_2\text{HPO}_4 + \text{HCl} \quad \text{H} \quad \text{H} \quad \text{Amphoteric + Acid can't exists together.}$$

70 (6)

$$\text{Y} \quad \text{ mol} \quad \text{, it means then reaction should proceed in backward direction, hence any < 0}$$

$$\text{a} + \text{m} - \text{b} < 0 \quad \text{a = b+m}$$

71. (1)

$$\Delta H = -80\text{kcal} \quad \text{and any} \quad \text{< 0}$$

Hence High Pressure and low T will give highest yield of product.

72 (1)

$$\text{A}(g) \rightarrow 2\text{B}(g) + \text{C}(g)$$

$$2P + 2P \quad P_1$$

$$\text{B}(g) \rightarrow 2\text{D}(g)$$

$$2P + 2P \quad P_2$$

Total Pressure ($P_t$) = 3$P_1$ + 5$P_2$

$$k_P = \frac{[\text{P}_\text{B}_2][\text{P}_\text{C}]}{[\text{P}_\text{A}][\text{P}_\text{D}]} \quad \text{P_1}$$

$$200 = 4(P_1 + P_2)^2$$

$$k_P = \frac{[\text{P}_\text{B}_2][\text{P}_\text{C}]}{[\text{P}_\text{A}][\text{P}_\text{D}]} \quad \text{P_2}$$

$$300 = 4(P_1 + P_2)^2$$

$$0 + 2 \quad 500 = 4(P_1 + P_2)^3$$

73 (3)

$$\text{P}_\text{B}_2(\text{g}) \leftrightarrow \text{P}_\text{B}_2(\text{g}) + \text{C}_2(\text{g})$$

$$k_P = \frac{\text{P}_\text{B}_2 \times \text{P}_\text{C}_2}{\text{P}_\text{B}_2(\text{g})}$$

$$= \frac{b}{a+b+c} \times \frac{c}{a+b+c} \times \frac{a}{a+b+c} \quad \text{P}$$

$$= \frac{bcP}{a(a+b+c)}$$

74 (1)

$$k_P = \frac{1}{k_f} = \frac{1}{100} = 0.01$$

75 (1)

$$M = \frac{6\text{mol} \times 10 \times 1000}{M_b} = \frac{36.5 \times 10 \times 122}{36.5} = 12$$

$$m = \frac{M \times 1000}{10000M_b-M_b} = \frac{12 \times 1000}{12000 - 12 	imes 36.5} = 15.7$$
76. (1)

\[ 0 = 1s^2 \, 2s^2 \, 2p^4 \]

Total unpaired \( e^- = 2 \)

Total spin \( = \sigma x (\pm \frac{1}{2}) \]

\[ M = \sqrt{\sigma (\sigma + 1)} = \sqrt{2} \, \text{B.M.} \]

77. (8)

\[ U_{\text{m}} = \frac{3RT}{M} \]

\[ 60\sqrt{R} = \frac{3 \times 8 \times 300}{M} \]

\[ M = \frac{900}{3600} \, \text{kg/mol} \]

\[ M = 260 \, \text{g/mol} \]

78. (3)

\[ H - O - S - O - H \]

\[ \text{(+) direction} \]

\[ \text{Proximity leakage} \]

79. (4)

80. (17)

81. (3) \( \Delta U = 9 \, \text{kW} \)

\[ = 100 - 1.5 \times (2 - 8) \times 10^{-3} \]

\[ = 10 \, \text{J} \]

82. (17)

\[ \text{In } Cu^4 \]

\[ 4 \times E_c - H = 320 \]

\[ E_c - H = 80 \, \text{cal} \]

83. (17)

\[ \text{In } C_2H_6 \]

\[ 1 \times E_c - C + 6 \times E_c - H = 520 \]

\[ E_c - C + 6 \times 80 = 520 \]

\[ E_c = 40 \, \text{cal} \]

84. (c)

\[ \Delta G = \frac{\Delta H_{\text{m}}}{T_{\text{m.p.}}} = \frac{37.8 \times 10^3}{373} = 100 \, \text{J/mol} \cdot \text{K} \]

85. (4)

\[ \text{B} + \text{D} \rightarrow \text{E} + 2 \text{C} \Rightarrow 2 \times (\text{(ii)} - \text{(iii)} \]

\[ = 2 \times 150 - 125 = 250 \]

\[ = -175 \, \text{kJ/mol} \]

86. (2)

\[ \text{PU}^4_+ \quad \text{PO}_2^2- \quad \text{PO}_5^3- \]

\[ \begin{bmatrix} u_1 & u_2 \\ u_2 & u_1 \\ u_3 & u_3 \\ u_4 & u_4 \\ u_5 & u_5 \end{bmatrix} \begin{bmatrix} 1 \end{bmatrix} \]

\[ \text{Tetrahedral} \quad \text{Octahedral} \quad \text{Trigonal} \quad \text{Bipyramidal} \]
Q. No. | Hint/Solution
---|---
136. | --
137. | NCERT, XI, Chapter Pg. # 312, 4th para
138. | NCERT, XI, Pg. # 297, section 19.5, 3rd para
139. | NCERT, XI, Pg. # 308, Fig. 20.5
140. | NCERT, XI, Pg. # 49, Section 4.2.1
141. | NCERT, XI, Pg. # 294-296, Sections 19.3 and 19.4
142. | --
143. | NCERT, XI, Pg. # 114, 4th para
144. | Based on Breathing and Exchange of gases & Circulation chapters
145. | NCERT, XI, Pg. # 279, Section 18.1.2, 3rd para
146. | NCERT, XI, Pg. # 311, Fig. 20.9
147. | NCERT, XI, Pg. # 284, 285, Based on Section 18.3.2
148. | NCERT, XI, Pg. # 285, 286, Section 18.3.3
149. | NCERT, XI, Pg. # 286, Section 18.3.3
150. | NCERT, XI, Pg. # 297, Section 19.5, 3rd para
151. | --
152. | NCERT, XI, Pg. # 274, Based on section 17.4.1
153. | NCERT, XI, Pg. # 282, Based on section 18.2
154. | NCERT, XI, Pg. # 287, Section 18.5
155. | NCERT, XI, Pg. # 287, Section 18.5
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