Solutions of the test Unit-2 paper-1,held on 11-01-2010

Chemistry :

1 Ans. : A

Sol. Enthalpy change is constant for strong acid and strong base neutralization.

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2. Ans. : B

Sol. Q = 500 x 20 x 4.18 J

No. of ice cubes = Q / 6.02 x 1000 = 7

3 Ans. : A

Sol. after 15 min concentration of A = 4B /8 = B/2

after 15 min concentration of B = B/2

4. Ans. : B

Sol. $\Delta C = \Delta P/RT = 0.8 / 0.082 \times 298 = 0.0327$ mole/L

Rate = $\Delta C / t = 0.032 / 3000 = 1.09 \times 10^{-5}$

5. Ans. : A

6. Ans. : C

Sol. for $Ag_2CrO_4$ : $[Ag^+] = 2s$ where $s = \sqrt[3]{\frac{K_{sp}}{4}}$ ; $[Ag^+]=$

7. Ans. : B

8. Ans. : D

Sol. use conductance = conductivity / cell constant ; y = x / G ;

z = K/ G ; K = z x/y ;

$$\lambda_m = \frac{K \times 1000}{C} = \frac{z\ {}^{x}\!/\!_{y} \times 1000}{0.1}$$

9. Ans. : B, C,

Sol. $[B] : [C] : [D] = 2\,k_1 : k_2 : 3\,k_3$

$1/k = 1/k_1 + 1/k_2 + 1/k_3$ ; $t_{1/2} = 0.693/k = 198$ sec

$[A_0] = [A] + [B]/2 + [C] + [D]/3$

10. Ans. : ABCD

11. Ans. : B,C

Sol. for $\Delta H = \Delta E$; $\Delta n = 0$

12. Ans. : AB

Sol. The metals deposited at the cathode must have positive reduction potential

13. Ans. : : B

14. Ans. ; D

Sol. solution is acidic so , $E_0 = 1.229 - (-0.447) = 1.676$ V

15. Ans. : D

16. Ans.. B

17. Ans. : D

18. Ans. : A

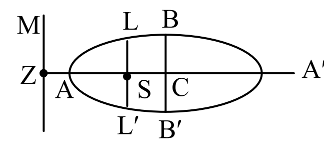
19. A – R, B – S, C – P , D – Q

20. A – PRS; B – QT; C – QT, D – PRS

MATHEMATICS

21. Ans. : B

Sol. Let S be the given focus and ZM be the given line.




Then SZ = a/e – ae.

= a/e $(1 - e^2) = b^2/ae$ = k (say)

as $b^2 = a^2(1 - e^2)$

Now, take SC as x-axis and LSL as y-axis.

Let (x, y) be the co-ordinates of B w.r.t. these axes.

Then x = SC = ae, y = CB = b.

Hence $y^2/x = b^2/ae$ = SZ, which is constant.

$\therefore\ y^2 = kx$ is the required locus which is a parabola.

22. Ans. : B

Sol. The normal to an ellipse at P must pass through the centre (3, 0) of the circle is

$$\frac{ax}{\cos\theta} - \frac{by}{\sin\theta} = a^2 - b^2$$

$$\rightarrow \quad \frac{5x}{\cos\theta} - \frac{4y}{\sin\theta} = 9 \qquad \left[\because \theta = 0 \text{ or } \frac{\pi}{2}\right]$$

$$\rightarrow \quad \frac{15}{\cos\theta} - 0 = 9 \rightarrow \cos\theta = \frac{15}{9}$$

→ Which is not possible.

→ $\theta = 0$ or $\pi/2$

But $\theta \neq \pi/2 \ \rightarrow\ \theta = 0$

Hence, p ≡ (5, 0) i.e., end of major axis.

23. Ans. : C

Sol. We have, $\sqrt{px} + \sqrt{qy} = 1$

$\rightarrow \left(\sqrt{px} + \sqrt{qy}\right)^2 = 1$

$\rightarrow px + qy + 2\sqrt{pqxy} = 1$

$\rightarrow (px + qy - 1)^2 = 4pqxy$

$\rightarrow p^2x^2 - 2pqxy + q^2y^2 - 2px - 2qy + 1 = 0$

On comparing this equation with the equation

$$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$$

We get $a = p^2$, $b = q^2$, $c = 1$, $g = -p$, $f = -q$ and $h = -pq$.

$\therefore\ \Delta = abc + 2fgh - af^2 - bg^2 - ch^2$

$= p^2q^2 - 2p^2q^2 - p^2q^2 - p^2q^2 - p^2q^2$

$= -4p^2q^2 \neq 0$ and $b^2 - ab = p^2q^2 - p^2q^2 = 0$

Thus, we have $\Delta \neq 0$ and $h^2 = ab$.

So the given equation represents a parabola.

24. Ans. : D

Sol. Let the coordinates of P be $(\alpha, \beta)$

Then, $PQ = 2\beta$ $\quad OP = \sqrt{\alpha^2 + \beta^2}$

Since, OPQ is an equilateral triangle OP = PQ

$\rightarrow \alpha^2 + \beta^2 = 4\beta^2 \rightarrow \alpha^2 = 3\beta^2$

$\rightarrow \alpha = \pm\sqrt{3\beta}$

Also, since $(\alpha, \beta)$ lies on the given hyperbola

$$\frac{\alpha^2}{a^2} - \frac{\beta^2}{b^2} = 1$$

$$\rightarrow \frac{3\beta^2}{a^2} - \frac{\beta^2}{b^2} = 1 \rightarrow \frac{3}{a^2} - \frac{1}{b^2} = \frac{1}{\beta^2} > 0 = \frac{b^2}{a^2} > \frac{1}{3}$$

$e^2 - 1 > 1/3 \rightarrow e^2 > 4/3 \rightarrow e > \dfrac{2}{\sqrt{3}}$.

25. Ans. C

Sol. Equation of the normal of the parabola $y^2 = 4ax$ with slope m is

$$y = mx - 2am - am^2$$

It touches $x^2 - y^2 = a^2$ if

$(-2am - am^3)^2 = a^2m^2 - a^2$.

$$\left[\because\ y = mx + c \text{ touches } \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \text{ if } c^2 = a^2m^2 - b^2\right]$$

$\rightarrow a^2m^2(2 + m^2)^2 = a^2(m^2 - 1)$

$\rightarrow m^2(m^4 + 4m^2 + 4) = m^2 - 1$

$\rightarrow m^6 + 4m^4 + 3m^2 + 1 = 0$

26. Ans. : C

Sol. Any tangent to the parabola $y^2 = 4ax$ is $y = mx + \frac{1}{m}$ ……. (1)

It is a tangent to the circle $(x - 3)^2 + y^2 = 9$ if the length of the $\perp$ from the centre (3, 0) upon (1) is equal to radius of the circle i.e., 3.

$$\therefore \frac{\left|3m + \frac{1}{m} - 0\right|}{\sqrt{1+m^2}} = 3$$

$\rightarrow am^2 + \frac{1}{m^2} + 6 = 9(1 + m^2) = 9 + 9m^2$

$\rightarrow \frac{1}{m^2} + 6 = 9 \rightarrow \frac{1}{m^2} = 3 \quad \therefore\ m^2 = \frac{1}{3}$

$\rightarrow m = \pm\frac{1}{\sqrt{3}}$ But $m > 0$

[$\because$ Parabola is above x-axis]

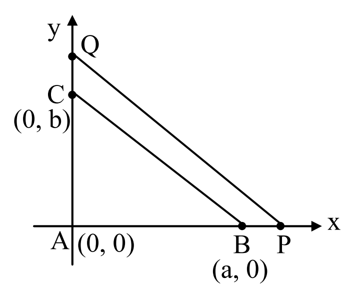
$\therefore$ required line is $y = \frac{1}{\sqrt{3}}x + \sqrt{3} \rightarrow \sqrt{3}y = x + 3$

27. Ans. : A

Sol. Take A as origin and AB, AC as x-axis, y-axis respectively.

Let AB = a, AC = b

$\therefore$ B is (a, 0), C is (0, b). Since BC || PQ




$\therefore \frac{AP}{AB} = \frac{AQ}{AC} = k$

$\therefore AP = KAB = Ka$

$AQ = KAC = Kb$

Equation of BQ is $\frac{x}{a} + \frac{y}{b} = 1$ ……. (1)

Equation of PC is $\frac{x}{Ka} + \frac{y}{b} = 1$ …….(2)

(1) – (2) gives

$$\frac{x}{a}\left(1 - \frac{1}{K}\right) + \frac{y}{b}\left(\frac{1}{K} - 1\right) = 0$$

$\rightarrow \frac{x}{a} - \frac{y}{b} = 0 \rightarrow bx - ay = 0$

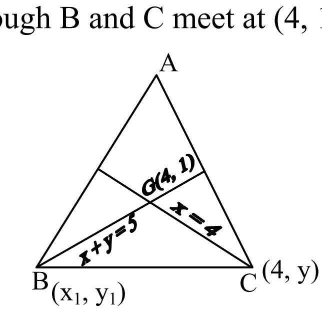
Which is a straight line passing through A(0, 0).

This is required locus.

28. Ans. : B

Sol. Let B be (x, y) and the C be (4, y). Since medians through B and C meet at (4, 1)

$\therefore$ centroid G of $\Delta ABC$ is (4, 1)




$\therefore \frac{x_1 + 4 + 1}{3} = 4 \rightarrow x_1 = 7$

Since $B(x_1, y_1)$ lies on $x + y = 5$

$\therefore y_1 = 5 - x_1 = 5 - 7 = -2.$

$\therefore$ B is (7, – 2).

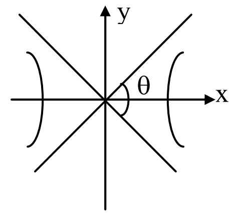
Also $\frac{y_1 + y + 2}{3} = 1 \rightarrow y = 3 - 1 - y$

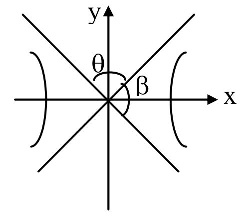
$= 3 - 2 + 2 = 3$

$\therefore$ C is (4, 3)

29. Ans. : AC

Sol. $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1.$




$\therefore \cos\frac{\theta}{2} = \frac{a}{\sqrt{a^2+b^2}} = \frac{a}{\sqrt{a^2e^2}} = \frac{1}{e}$

$\therefore \cos\frac{\theta}{2} = \sin\frac{\beta}{2} = \frac{\sqrt{e^2-1}}{e}$

30. Ans. : BD

Sol. Let the line $\lambda x - y + 1 = 0$ intersect the x-axis at A and y-axis at B.

$\therefore$ $\frac{\text{At A}}{A\left(\frac{1}{\lambda}, 0\right)}$ $\frac{\text{At B}}{(0, 1)}$

Now let $x - 2y + 3 = 0$ intersect the x-axis at C and y-axis at D

$\frac{\text{At C}}{C(-3, 0)}$ $\frac{\text{At D}}{(0, 3/2)}$

$OA = 1/\lambda$

$OC = -3$  $\frac{3}{2} - \frac{3}{\lambda} = 0$

$OB = 1$  $\lambda = 2$

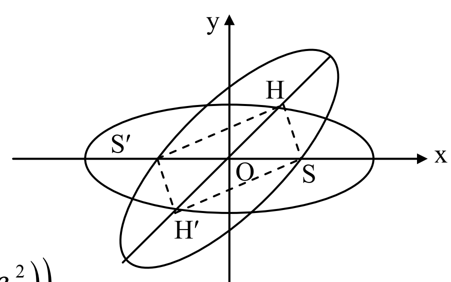
$OD = 3/2.$

31. Ans. : ABC

Sol. Cleary O is the mid point of SS′ and HH′

$\rightarrow$ diagonals of quadrilateral HSH′S′ bisect each other so it is a parallelogram.

Let $H'OH = 2r \rightarrow OH = r = ae_2$




H lies on $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (suppose)

$\therefore \frac{r^2\cos^2\theta}{a^2} + \frac{r^2\sin^2\theta}{b^2} = 1$

$E_2^2\cos^2\theta + \frac{e_2^2\sin^2\theta}{1-e_1^2} = 1$  $\left(\because b^2 = a^2\left(1-e_1^2\right)\right)$

$\rightarrow e_2^2\cos^2\theta + \frac{e_2^2\cos^2\theta}{1-e_1^2} = 1 - \frac{e_2^2}{1-e_1^2}$

$\rightarrow \cos^2\theta = \frac{1}{e_1^2} + \frac{1}{e_2^2} - \frac{1}{e_1^2e_2^2}$

$\rightarrow \cos\theta = \sqrt{\frac{1}{e_1^2} + \frac{1}{e_2^2} - \frac{1}{e_1^2e_2^2}}$

Now, if $e_1^2 + e_2^2 = 1$ (given) so, from eqn. (1) $\cos\theta = 0$

$\rightarrow \theta = 90^\circ$.

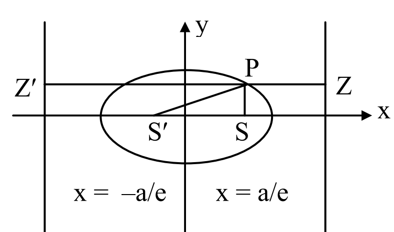
32. Ans. : ABC

Sol. $PS + PS' = e\,PZ + e\,PZ'$

$= e(ZZ') = e \cdot 2a/e$

$= 2a$ if $a > b$.

$= 2b$ if $a < b$




$PS + PS' + SS' = 2a + 2ae = 2a(1 + e)$

Semi-perimeter of $\Delta$ PSS′, $S = a(1 + e)$

$\tan\frac{\alpha}{2}\tan\frac{\beta}{2} = \sqrt{\frac{(S-c_1)(S-a_1)(S-a_1)(S-b_1)}{S(S-b_1)S(S-c_1)}} = \frac{S-a_1}{S}$

Now $S - a_1 = SS' = a(1 + e) - 2ac = a(1 - e)$

$\therefore \tan\frac{\alpha}{2}\tan\frac{\beta}{2} = \frac{1-e}{1+e}$

33. Ans. A

Sol. $\tan^2\theta_1 + ta^2\,\theta_2 = k \rightarrow m_1 + m_2^2 = k$

$(m_1 + m_2)^2 - 2m_1m_2 = k.$

34. Ans. : C

Sol. $\frac{1}{\tan\theta_1} + \frac{1}{\tan\theta_2} = k \rightarrow \frac{m_2 + m_1}{m_1 m_2} = k$

35. Ans. : A

Sol. $\theta_1 - \theta_2 = \alpha \rightarrow \frac{\tan\theta_1 - \tan\theta_2}{1 + \tan\theta_1 \tan\theta_2} = \tan\alpha$

$\rightarrow m_1 - m_2 = (1 + m_1m_2)\tan\alpha$

$\rightarrow (m_1 - m_2)^2 = (1 + m_1m_2)^2 \tan^2\alpha$

$\rightarrow (m_1 + m_2)^2 - 4m_1m_2 = (1 + m_1m_2)^2 \tan^2\alpha.$

36. Ans. : D

Sol. Let the asymptotes be $2x + 3y + \lambda = 0$ and $3x + 2y + \mu = 0$, it passes through (1, 2)

$\lambda = -8,\ \mu = -7$

Equation of hyperbola is $(2x + 3y - 8)(3x + 2y - 7) + \gamma = 0$ ...... (1)

It passes through $(5, 3)\gamma = -154$.

Putting the value of $\lambda$ in (1), we get $(2x + 3y - 8)(3x + 2y - 7) - 154 = 0$ is the equation of required hyperbola.

37. Ans. : B

Sol. $2\tan^{-1}\left(\frac{b}{a}\right) = \frac{\pi}{3} \rightarrow a = b\sqrt{3}$

$a^2 = b^2(e^2 - 1) \rightarrow e = 2.$

38. Ans. : C

Sol. $\frac{3x - 4y - 1}{5} = \pm\frac{4x - 3y - 6}{5}$

$\rightarrow x + y - 5 = 0$ and $x - y - 1 = 0.$

39. Ans. : A – R, B – Q, C – P, D – S

Sol. $\frac{(x + y - 5)^2}{2} + \frac{(x - y + 7)^2}{3} = 1$

$\frac{\left(\frac{x + y - 5}{\sqrt{5}}\right)^2}{1} + \frac{\left(\frac{x - y + 7}{\sqrt{2}}\right)^2}{3/2} = 1$

$x + y - 5 = 0$ is major axis

$x - y + 7 = 0$ is minor axis.

A. $x + y = 5$

$x - y = -7$

centre = (–1, 6)

B. $1^2 = \frac{3}{2}(1 - e^2)$

$e = \frac{1}{\sqrt{3}},\ ae = \frac{\sqrt{3}}{\sqrt{2}} \cdot \frac{1}{\sqrt{3}} = \frac{1}{\sqrt{2}}$

Focus $\frac{1}{2}$ distance away from (–1, 6)

$\left(-1 + \frac{1}{\sqrt{2}}\left(-\frac{1}{\sqrt{2}}\right)\right),\ \left(6 + \frac{1}{\sqrt{2}}\left(\frac{1}{\sqrt{2}}\right)\right) = \left(-\frac{1}{3}, \frac{13}{2}\right).$

C. Vertex is $\frac{\sqrt{3}}{2}$ distance away from (–1, 6)

$= \left(-1 + \frac{\sqrt{3}}{\sqrt{2}}\left(-\frac{1}{\sqrt{2}}\right), 6 + \frac{\sqrt{3}}{\sqrt{2}} \cdot \frac{1}{\sqrt{2}}\right)$

$= \left(-1 + \frac{\sqrt{3}}{\sqrt{2}}, 6 + \frac{\sqrt{3}}{\sqrt{2}}\right).$

D. $\frac{a}{e}$ distance away from centre

$$\frac{a}{e} = \frac{\sqrt{3}}{2}\times\sqrt{3} = \frac{3}{2}$$

$$= \left(-1+\frac{3}{2}\left(-\frac{1}{\sqrt{2}}\right), 6+\frac{3}{2}\left(\frac{1}{\sqrt{2}}\right)\right)$$

$$= \left(-1-\frac{3}{\sqrt{2}}, 6+\frac{3}{2\sqrt{2}}\right)$$

40. Ans. : A – Q, B – P, C – S, D – R

Sol. A. Any tangent of parabola will be of the form $ty = x + at^2$ at the point $(at^2, 2at)$. If this is normal to circle, then this will pass through centre of the circle which is (a, 2a)

$2at = a + at^2$

$\rightarrow t^2 - 2t + 1 = 0$

$\rightarrow t = 1, 1$ for any value of a, so the condition is satisfied for all real values of 'a'.

B. For the point (k + 3, k), the chord of contact $yk - 2x = 2k + 6$

Solving with the equation of parabola $\left(\frac{2x+2k+6}{k}\right)^2 - 4x$

$\rightarrow x^2 + (2k + 6 - k^2)x + (k + 3)^2 = 0$

$\rightarrow (2k + 6 - k^2)^2 - 4(k + 3)^2 > 0$ $\quad (\because D > 0)$

$\rightarrow k^2(k - 6)(k + 2) > 0$

$\therefore k \in (-\infty, -2) \cup (6, \infty)$

C. Let the tangents by $y = mx + \frac{1}{m}$ and $(y + \alpha) = m(x - 1) + 4\sqrt{1+m^2}$

Distance between tangent $= \dfrac{4\sqrt{1+m^2} - m - 2 - 1/m}{\sqrt{1+m^2}}$

$= 4 - \dfrac{2}{\sqrt{1+m^2}} - \dfrac{\sqrt{m^2+1}}{m}$

As $m > 0$ $\rightarrow \alpha < 4$.

D. Any tangent to $\frac{x^2}{a^2}+\frac{y^2}{b^2} = 1$ is

$y = mx \pm \sqrt{a^2m^2+b^2}$ ……. (i)

Any tangent to the parabola $y^2 = 4ax$ is

$y = mx - \frac{a}{m}$ …….. (ii)

Eqs. (i) and (ii) are same line

$\therefore \sqrt{a^2m^2+b^2} = \pm\frac{a}{m}$

$\rightarrow a^2m^2 + b^2 = \frac{a^2}{m^2}$

$\rightarrow a^2\left(\frac{1}{m^2} - m^2\right) = b^2$

$\rightarrow \frac{1}{m^2} - m^2 > 0$ and $\frac{1}{m^2} - m^2 \neq 1$

$\rightarrow m \in (-1, 1) - \{0\}, \sqrt{\frac{\sqrt{5}-1}{2}}$

PHYSICS – SOLUTIONS

41) D; 42) D; 43) A; 44) A; 45) C; 46) C; 47) A; 48) D; 49) ABC; 50) ABCD; 51) ACD; 52) ACD; 53) C; 54) A; 55) B; 56) B; 57) D; 58) D; 59) A – Q, B – PR, C – PS, D – PQ; 60) A – PQ, B – QR, C – PQ, D – PS.

41. Ans. : D

Sol. $\rho = \frac{5NRT_0}{2} \frac{SRT}{M_0}$ As $\rho T$ = constant; $\rho$ = constant.

42. Ans. : D

Sol. $dV = V\gamma\, dT$ $\gamma$, dT are same

$\therefore dV \propto V$ $\therefore \frac{(dV)_A}{(dV)_B} = \frac{9}{8}$.

43. Ans. A

Sol. $TV^{\gamma-1}$ = constant $\gamma > 1$ $\therefore = \frac{dT}{dV} = -k(\gamma-1)V^{-\gamma}$

44. Ans. A

Sol. $nc(T_i - T) = \frac{nc(T_i - T_0)}{4}$ $T_i - T = \frac{T_i - T_0}{4}$

$\ln\left(\frac{T - T_0}{T_i - T_0}\right) = -kt$ $\therefore t = \frac{\ln(4/3)}{k}$

45. Ans. : C

Sol. $Q = nC_v\,\Delta T = 2P_0V_0$ $\therefore \Delta T = \frac{4T_0}{5}$

$\therefore T_2 - T_1 = \frac{4T_0}{5}$ $T_2 = \frac{4T_0}{5} + T_0 = \frac{9T_0}{5}$

46. Ans. : C

Sol. $U_3 - U_1 = NC_v(T_3 - T_1) = 3P_0V_0$

$W_{123} = 3P_0V_0$ $\therefore Q_{123} = 6P_0V_0$

47. Ans. : A

Sol. 1 – 2 is isobaric process $Q_{12} = \frac{7NRT_0}{2}$

2 – 3 is isochoric process $Q_{23} = \frac{5NRT_0}{2}$

$\therefore Q_{123} = 6NRT_0$

$\therefore C = \frac{Q_{123}}{N(3T_0 - T_0)} = 3R$

48. Ans. : D

Sol. $W_{net} < 0$ $\therefore Q_{cycle} < 0$.

49. Ans. : ABC

Sol. $U_b - U_a = n\left(\frac{3R}{2}\right)(2T_0 - T_0) = \frac{3nRT_0}{2}$

V decreases $\therefore W < 0$

$\rho = \frac{nRT}{V}$. $\rho$ increases.

50. Ans. : ABCD

Sol. $W_{ab} = Q_{ab} = -nRT_0 \ln 2$ $W_{bc} = 0$

$W_{cd} = Q_{cd} = nR(3T_0) \ln 2$.

$\eta = \frac{2\ln 2}{3\ln 2 + \frac{2}{\gamma - 1}}$.

51. Ans. : ACD

Sol. $W_{12} = \frac{1}{2}(P_0 + P_1)(V_2 - V_0)$

$W_{12} - W_{13} < 0$ $\qquad Q_{12} - Q_{13} = W_{12} - W_{13}$.

52. Ans. : ACD

Sol. $Q' = $ Heat transfer rate $= 8\pi k r_0 T_0$

$T_p = \dfrac{5T_0}{3}$.

53. Ans. : C

54. Ans. : A

55. Ans. : B

Sols. At A $U = \dfrac{3nRT_A}{2}$ $\qquad \therefore T_A = 401.6$ K.

As CA in U – V graph passes through the origin $U \propto V$ $\qquad \therefore$ CA is isobaric process.

$W_{cycle} = nR(T_A - T_C) + nRT_A \ln 2$

$= -2058.4$ J

56. Ans. : B

57. Ans. : D

58. Ans. : D

Sols. $Q' = -KA\dfrac{dT}{dx}$ $\qquad \dfrac{Q'dx}{AK_0\left(1-\dfrac{x}{3a}\right)} = -dT.$

$$\frac{Q'}{AK_0}(-3a)\left[\ln\left(1-\frac{x}{3a}\right)\right]_{-a}^{+a} = -\int_{T_1}^{T_2} dT$$

$$\frac{3Q'a}{AK_0}\ln(2) = T_1 - T_2$$

$$\frac{Q'}{AK_0}(-3a)\left[\ln\left(1-\frac{x}{3a}\right)\right]_{-a}^{0} = -\int_{T_1}^{T_0} dT = T_1 - T_0$$

$$-\frac{3Q'a}{AK_0}\left[0-\ln\left(\frac{4}{3}\right)\right] = T_1 - T_0.$$

$\therefore T_0 = T_1 - (\ln 4/3)(3Q'a/AK_0)$

$= T_1 - (\ln 4/3)(T_1 - T_2/\ln 2)$

$= T_1 - (T_1 - T_2)\dfrac{\ln 4 - \ln 3}{\ln 2}$

$= T_1 - (T_1 - T_2)\left(2 - \dfrac{\ln 3}{\ln 2}\right)$

$$\frac{dT}{dx} = -\frac{Q'}{kA} = -\frac{Q'}{k_0\left(\pi R^2\right)} = -\frac{\left(T_1 - T_2\right)}{3a\ln 2}$$

$$\frac{\left(T_1 - T_2\right)AK_0}{3a\ln 2} = \frac{K_{eq.}A(T_1 - T_2)}{2a}$$

$$\therefore K_{eq.} = K_0\left(\frac{2}{3\ln 2}\right)$$

59. Ans. : A – Q, B – PR, C – PS, D – PQ

Sol. For a process $PV^x = $ constant $(x \neq 1)$

$\Delta V = nC_V(T_2 - T_1)$

$W_{12} = \dfrac{nR(T_1 - T_2)}{x-1}$

$Q_{12} = \dfrac{nR(T_2 - T_1)(x-\gamma)}{(x-1)(\gamma-1)}$

Monoatomic gas $\gamma = 5/3$

The process is $TV^{x-1} = $ constant.

When $x = \gamma$ $\quad Q = 0$, when $x > 1$ and $< \gamma$ $\quad x = 1.5$

$Q < 0$

When $x < 1$ and $< \gamma$ $\quad x = 0.75$ $\quad Q > 0$

60. Ans. : A – PQ, B – QR, C – PQ, D – PS

Sol. A : $PV^{-1} = $ constant; $\qquad$ B. : $P\gamma^2 = $ constant

C. : $PV^{0.5} = $ constant; $\qquad$ D. : V = constant. $\qquad \gamma = 7/5$.