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Kinetics

(62) $\log k = \log A - \frac{Ea}{2.303R}\left(\frac{1}{T}\right)$

$2.9 = \log A - \frac{Ea}{2.303R} \times 1.3 \times 10^{-3}$

(63) $\ln \frac{k_2}{k_1} = \frac{Ea}{R}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]$

$k_1 = \frac{\ln 2}{20} \qquad k_2 = \frac{\ln 2}{5}$

(64) $e^{-Ea/RT} \times 100$

$= 3.8 \times 10^{-16}$

slope $= -\frac{Ea}{R}$

$= -\frac{8.3 \times 1000}{8.3}$

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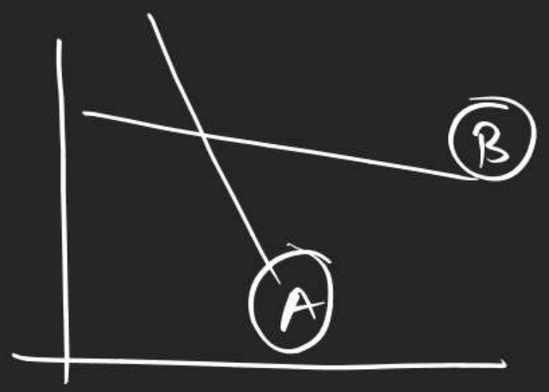
(65) Ea



(1) (2) (3) (4)

(A) E_a for $E + S \rightarrow ES$

(B)

(C)

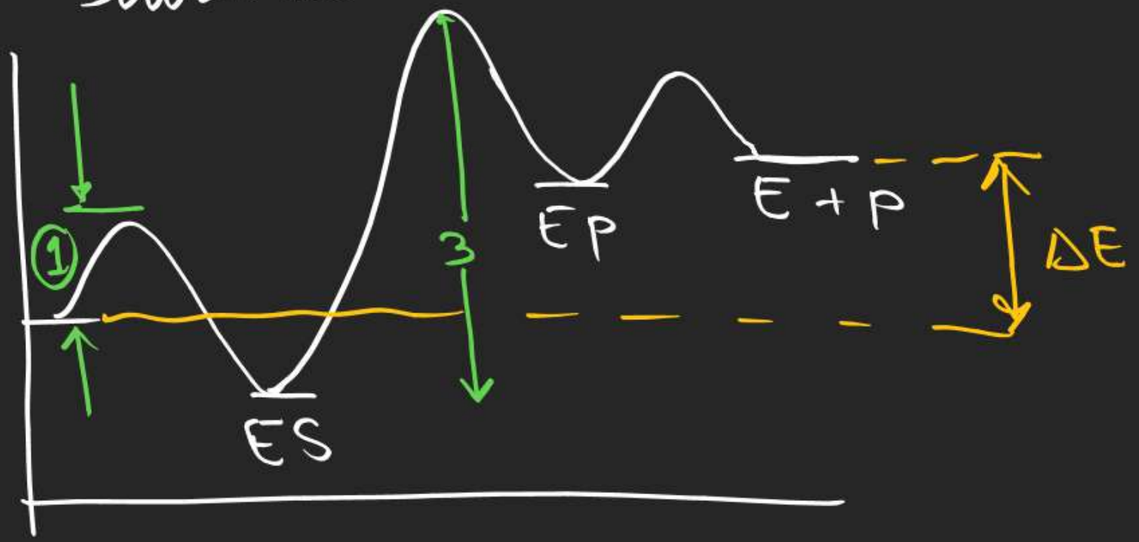
(D)

(72) $A + B \underset{}{\overset{\text{fast}}{\rightleftharpoons}} I_{AB} \xrightarrow{\text{slow}} AB + E \longrightarrow P + A$

$k_1 << k_2$

(73) $E + S \longrightarrow \underline{ES} \longrightarrow \underline{EP} \longrightarrow E + P$

↑ Substrate



$$\frac{d[C]}{dt} = 2k_1[A][B]$$

$$-\frac{d[C]}{dt} = k_2[C][B] + k_3[C][A] - 2k_1[A][B]$$

(48) μ = temperature coefficient

$$\frac{k_{T+10}}{k_T} = 1.75 = \frac{k_{310}}{k_{300}}$$

$$\ln 1.75 = \frac{E_a}{R}\left[\frac{1}{300} - \frac{1}{310}\right]$$

$e^{x/RT} = 1.718$

$E_a - x = 6.05$

$E_a = 6.05 + x$

slope $= \frac{E_a}{R}$

50

(A) $y + z$

(B) z

(C) $x + y + z$

(D) x

(E) $x + y$

(F) $-y$

$e^{-E_a/RT} \times 100$

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TD-1 JEE-Adv

⑤ He

C_V

$\eta_{tr} = 3$

H_2

$\eta_{tr} = 3$

$\eta_{Rot} = 2$

$\eta_{vib} = 1$

③ $\Delta H = \Delta U + (P_2V_2 - P_1V_1)$

⑥ $W = -100(-1)$

$W = 100$ bar. ml

$\Delta U = W$

$\Delta H = \Delta U + (P_2V_2 - P_1V_1)$

(10) $C = C_V - \frac{R}{x-1}$

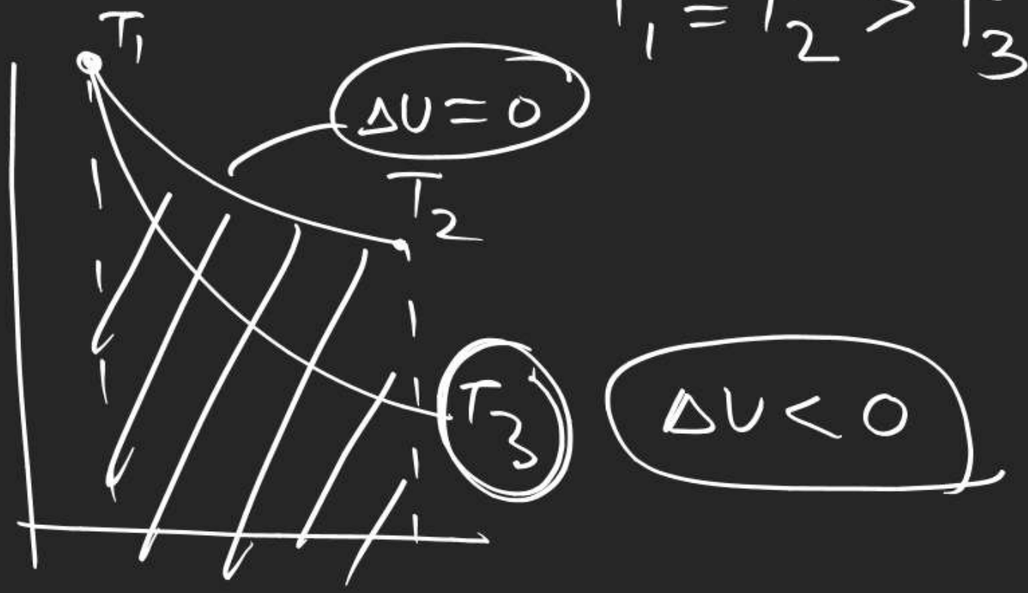
$\frac{P}{V} = \text{Const}$

$PV^{-1} = \text{Const}$

$x = -1$

(13) hold

(14)



$T_1 = T_2 > T_3$

✓ AD $W = -500$

ACD $W = -200$

$Q = 0$

$W = 0$

$\Delta U = 0 = nC_v \Delta T$

$\Delta T = 0$

$T_1 = T_2$

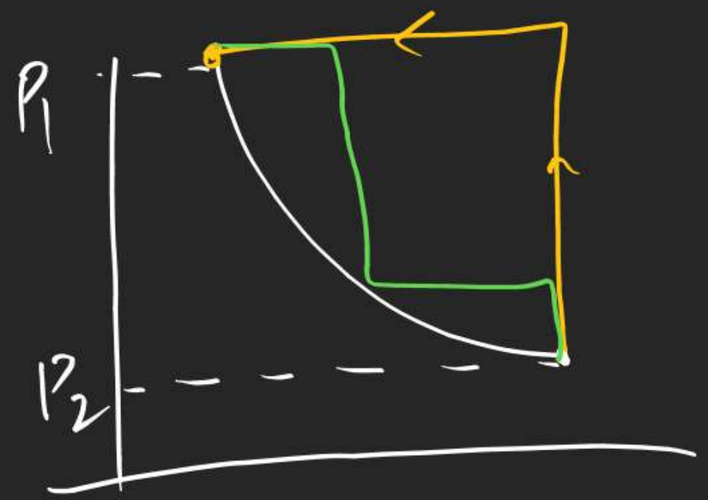
(18) (D)

$W = 0$ (18) $\Delta U = 0$

$\Delta U < 0$

$Q = 0$

$\Delta U = 0$ (18) A



irrev

$$P_{ext} = P = \frac{RT}{V-b} - \frac{a}{V^2}$$

$P_{ext}(V_2 - V_1)$

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(5)

$[A] \rightleftharpoons [P]$

$T\uparrow \quad [P]\downarrow \quad [A]\uparrow$

$K_{eq} > 1$

- exo $T\uparrow$ backward
- endo $T\uparrow$ forward

$\Delta G^\circ = -RT \ln K_{eq}$

$\Delta G^\circ < 0$

$\Delta H^\circ < 0$

$$\frac{\ln k_{T_1}}{\ln k_{T_2}} > \frac{T_2}{T_1}$$

$$RT_1 \ln k_{T_1} > RT_2 \ln k_{T_2}$$

$$-RT_1 \ln k_{T_1} < -RT_2 \ln k_{T_2}$$

$$\Delta G^\circ_{T_1} < \Delta G^\circ_{T_2}$$

$$\Delta H^\circ - T_1 \Delta S^\circ < \Delta H^\circ - T_2 \Delta S^\circ$$

1% mol $H_2O(g)$

$1\,atm \times \frac{1}{100} = P_{H_2O}$

(7) $(Ea)_b - (Ea)_f = 2RT$

$$\frac{k_f}{k_b} = \frac{A_f}{A_b} e^{\left((Ea)_b - (Ea)_f\right)/RT}$$

$$K_{eq} = 4e^2$$

$$\Delta G^\circ = -RT \ln(4e^2)$$

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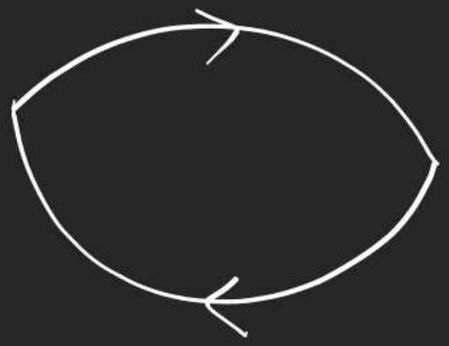
$Q = 0 = W = \Delta U = \Delta H$

(13) (D)



(A) $l \longrightarrow S$ ex 0

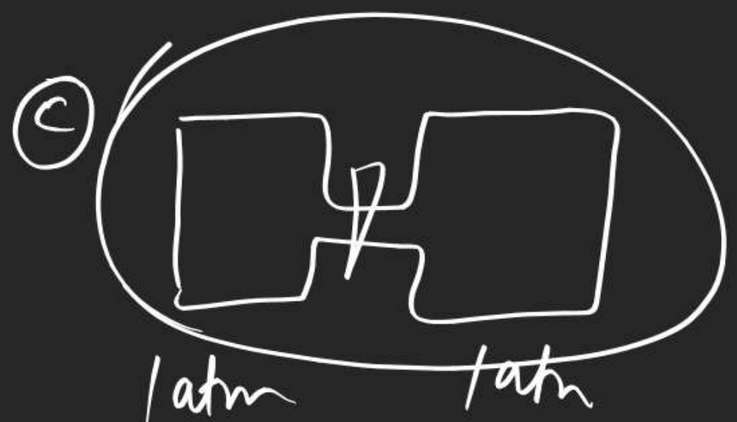
$\Delta U = \Delta H < 0$

$Q < 0$

$W < 0$

$\Delta S_{sys} < 0$

$\Delta G = 0$



$\Delta U = 0$

$Q = 0$

$W = 0$

$\Delta S_{sys} > 0$

$\Delta S_{surr} = 0$

$\Delta G < 0$

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(14) $H_2O(\ell) \longrightarrow H_2O(g)$

$Q_{sys} > 0$

$\Delta S_{sys} > 0$

$q_{surr} < 0$

$\Delta S_{surr} = \dfrac{q_{surr}}{T} < 0$

(11) $\Delta G^\circ > 0$

$\Delta G^\circ = -RT \ln K_{eq}$

$K_{eq} < 1$

$K_p = K_c (RT)^{\Delta n_g}$

$X_2 \longrightarrow 2X$

$1-\beta/2 \qquad \beta$

$K_p = \dfrac{(\beta)^2}{(1-\beta/2)} \times \left(\dfrac{2}{1+\beta/2}\right)$

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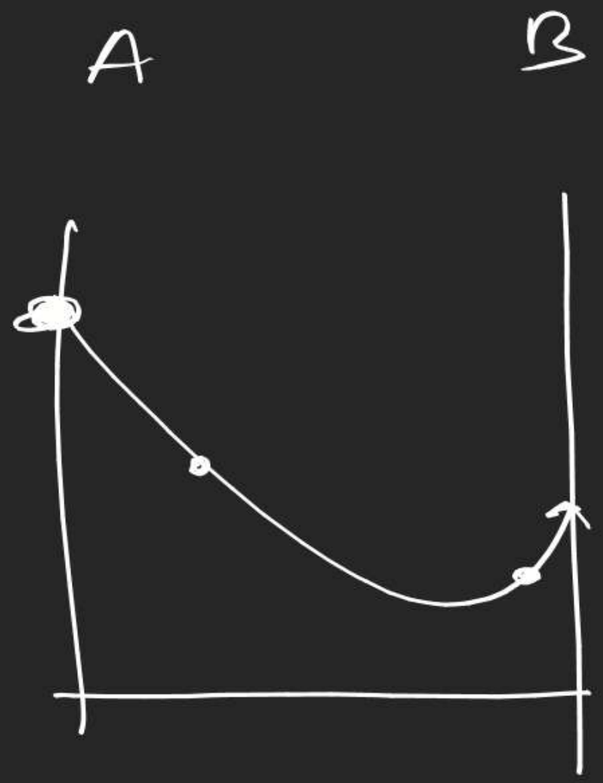

$\Delta G^\circ > 0$

$X_2 \longrightarrow 2X$

1bar 1bar