

PYQSide

JEE MAIN THERMODYNAMICS — GIBBS ENERGY CHANGE AND EQUILIBRIUM — PYQS

Max. Marks: 28

Questions: 7

Section A (MCQ)

- Q.1** Consider the following data for the reaction $X_2(g) + Y_2(g) \rightleftharpoons 2XY(g)$ at 600 K. The $\Delta_r G^\ominus$ (in kJ mol^{-1}) for the reaction is :

Compound	$\Delta_f H_{600\text{K}}^\ominus$ (kJ mol^{-1})	$S_{600\text{K}}^\ominus$ ($\text{J mol}^{-1} \text{K}^{-1}$)
$XY(g)$	42	200
$X_2(g)$	8	140
$Y_2(g)$	80	250

[JEE Main 2026 (Online) 5th April Evening Shift]

- (1) -21000 (2) -10 (3) -1000 (4) -9.012

Scan or tap for the full solution



- Q.2** The plot of $\log_{10} K$ vs $\frac{1}{T}$ gives a straight line. The intercept and slope respectively are (where K is the equilibrium constant).

[JEE Main 2026 (Online) 28th January Evening Shift]

- (1) $-\frac{\Delta S^\ominus R}{2.303}, \frac{\Delta H^\ominus R}{2.303}$ (2) $-\frac{\Delta H^\ominus}{2.303R}, \frac{\Delta S^\ominus}{2.303R}$
 (3) $\frac{\Delta S^\ominus}{2.303R}, -\frac{\Delta H^\ominus}{2.303R}$ (4) $\frac{2.303R}{\Delta H^\ominus}, \frac{2.303R}{\Delta S^\ominus}$

Scan or tap for the full solution



- Q.3** Let us consider a reversible reaction at temperature, T. In this reaction, both ΔH and ΔS were observed to have positive values. If the equilibrium temperature is T_e , then the reaction becomes spontaneous at:

[JEE Main 2025 (Online) 4th April Morning Shift]

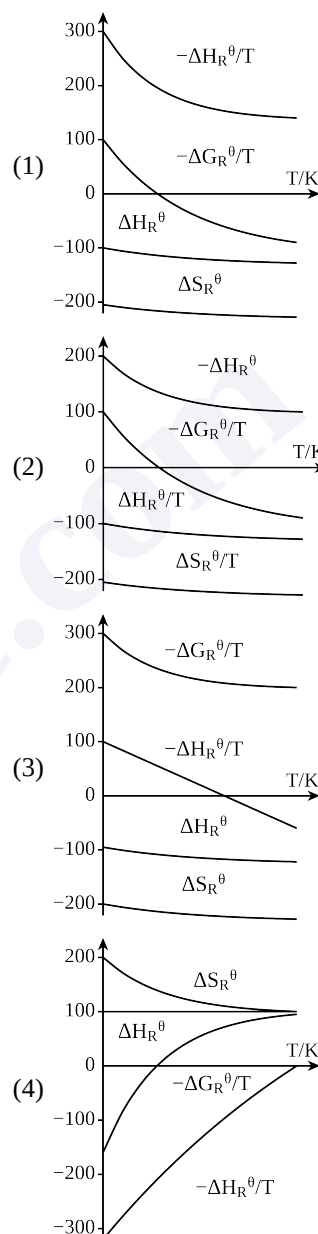
- (1)
- $T_e > T$
- (2)
- $T > T_e$
- (3)
- $T = T_e$
- (4)
- $T_e = 5T$

Scan or tap for the full solution



- Q.4** Which of the following graphs correctly represents the variation of thermodynamic properties of Haber's process?

[JEE Main 2025 (Online) 2nd April Evening Shift]



Scan or tap for the full solution



Section B (Numerical)

- Q.5** Consider the reaction $X \rightleftharpoons Y$ at 300 K. If $\Delta H^\ominus$ and K are $28.40 \text{ kJ mol}^{-1}$ and 1.8×10^{-7} at the same temperature, then the magnitude of $\Delta S^\ominus$ for the reaction in $\text{J K}^{-1} \text{ mol}^{-1}$ is _____. (Nearest integer) (Given : $R = 8.3 \text{ J K}^{-1} \text{ mol}^{-1}$, $\ln 10 = 2.3$, $\log 3 = 0.48$, $\log 2 = 0.30$)

[JEE Main 2026 (Online) 6th April Morning Shift]

Scan or tap for the
full solution



- Q.6** At the transition temperature T , $A \rightleftharpoons B$ and $\Delta G^\circ = 105 - 35 \log T$ where A and B are two states of substance X . The transition temperature in $^\circ\text{C}$ when pressure is 1 atm is _____. (Nearest integer)

[JEE Main 2026 (Online) 2nd April Morning Shift]

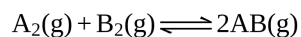
Scan or tap for the
full solution



- Q.7** Use the following data :

Substance	$\Delta_f H^\ominus(500 \text{ K})$ kJ mol^{-1}	$S^\ominus(500 \text{ K})$ $\text{J K}^{-1} \text{mol}^{-1}$
AB(g)	32	222
$\text{A}_2(\text{g})$	6	146
$\text{B}_2(\text{g})$	x	280

One mole each of $\text{A}_2(\text{g})$ and $\text{B}_2(\text{g})$ are taken in a 1 L closed flask and allowed to establish the equilibrium at 500 K.



The value of x (in kJ mol^{-1}) is _____. (Nearest integer)

(Given : $\log K = 2.2$, $R = 8.3 \text{ J K}^{-1} \text{mol}^{-1}$)

[JEE Main 2026 (Online) 21st January Morning Shift]

Scan or tap for the
full solution



ANSWER KEY

Section A (MCQ)

Ques.	1	2	3	4							
Ans.	2	3	2	1							

Section B (Numerical)

Ques.	5	6	7				
Ans.	34	727	70				