

PYQSide

JEE MAIN THERMODYNAMICS — ENTHALPY CHANGE OF A REACTION, ENTHALPY OF FORMATION, COMBUSTION, ATOMISATION AND BOND ENTHALPY — PYQS

Max. Marks: 32

Questions: 8

Section A (MCQ)

- Q.1** The heats of atomisation of methane and ethane are 'x' kJ mol⁻¹ and 'y' kJ mol⁻¹ respectively. The longest wavelength (λ) of light capable of breaking the C–C bond can be expressed in SI unit as :

[JEE Main 2026 (Online) 24th January Evening Shift]

- (1) $\frac{N_A hc}{250(y-6x)}$ (2) $N_A hc \left(y - \frac{6x}{4}\right)^{-1}$
 (3) $\frac{hc}{1000} \left(\frac{y-6x}{4}\right)^{-1}$ (4) $\frac{N_A hc}{250(4y-6x)}$

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- Q.2** Consider the following data :
 $\Delta_f H^\circ$ (methane, g) = $-X$ kJ mol⁻¹
 Enthalpy of sublimation of graphite = Y kJ mol⁻¹
 Dissociation enthalpy of H_2 = Z kJ mol⁻¹
 The bond enthalpy of C–H bond is given by :

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

- (1) $\frac{X+Y+2Z}{4}$ (2) $\frac{X+Y+4Z}{2}$
 (3) $\frac{-X+Y+Z}{4}$ (4) $X+Y+Z$

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- Q.3** The correct statement amongst the following is :

[JEE Main 2025 (Online) 7th April Evening Shift]

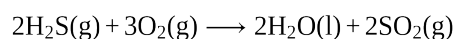
- (1) The standard state of a pure gas is the pure gas at a pressure of 1 bar and temperature 273 K.
 (2) $\Delta_f H^\circ_{500}$ is zero for $O_2(g)$.
 (3) $\Delta_f H^\circ_{298}$ is zero for $O(g)$.
 (4) The term 'standard state' implies that the temperature is 0°C.

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Section B (Numerical)

- Q.4** Consider the reaction



The magnitude of enthalpy change for the reaction in kJ mol⁻¹ is _____. (Nearest integer)

Given : $\Delta_f H^\circ(H_2S) = -20.1$ kJ mol⁻¹

$\Delta_f H^\circ(H_2O) = -286.0$ kJ mol⁻¹

$\Delta_f H^\circ(SO_2) = -297.0$ kJ mol⁻¹

[JEE Main 2026 (Online) 8th April Evening Shift]

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- Q.5** Resonance in X_2Y can be represented as



The enthalpy of formation of X_2Y

$\left(X \equiv X(g) + \frac{1}{2}Y = Y(g) \longrightarrow X_2Y(g)\right)$ is 80 kJ mol⁻¹.

The magnitude of resonance energy of X_2Y is _____ kJ mol⁻¹ (nearest integer value).

Given: Bond energies of $X \equiv X$, $X = X$, $Y = Y$ and $X = Y$ are 940, 410, 500, and 602 kJ mol⁻¹ respectively.

Valence X: 3, Y: 2

[JEE Main 2025 (Online) 8th April Evening Shift]

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- Q.6** Given :

$\Delta_{\text{sub}} H^\circ[C(\text{graphite})] = 710$ kJ mol⁻¹

$\Delta_{C-H} H^\circ = 414$ kJ mol⁻¹

$\Delta_{H-H} H^\circ = 436$ kJ mol⁻¹

$\Delta_{C=C} H^\circ = 611$ kJ mol⁻¹

The $\Delta_f H^\circ$ for $CH_2=CH_2$ is _____ kJ mol⁻¹ (nearest integer value)

[JEE Main 2025 (Online) 3rd April Morning Shift]

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- Q.7** The formation enthalpies, $\Delta H_f^\ominus$ for $H_{(g)}$ and $O_{(g)}$ are 220.0 and 250.0 kJ mol^{-1} , respectively, at 298.15 K, and $\Delta H_f^\ominus$ for $H_2O_{(g)}$ is $-242.0 \text{ kJ mol}^{-1}$ at the same temperature. The average bond enthalpy of the O–H bond in water at 298.15 K is _____ kJ mol^{-1} (nearest integer).

[JEE Main 2025 (Online) 28th January Morning Shift]

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- Q.8** Consider the following data:
Heat of formation of $CO_2(g) = -393.5 \text{ kJ mol}^{-1}$
Heat of formation of $H_2O(l) = -286.0 \text{ kJ mol}^{-1}$
Heat of combustion of benzene = $-3267.0 \text{ kJ mol}^{-1}$
The heat of formation of benzene is _____ kJ mol^{-1} . (Nearest integer)

[JEE Main 2025 (Online) 28th January Evening Shift]

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ANSWER KEY

Section A (MCQ)

Ques.	1	2	3								
Ans.	4	1	2								

Section B (Numerical)

Ques.	4	5	6	7	8		
Ans.	1126	98	25	466	48		