

NEET THERMODYNAMICS — PYQS

Max. Marks: 312

Questions: 78

Section A (MCQ) — 78 questions

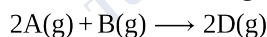
Q.1 At a certain temperature, $T(K)$, during a process, 500 J is absorbed by the system and work of 200 J is done by the system. Then change in internal energy of the system is : [NEET (UG) 2026]

- (1) 700 J (2) 400 J (3) 300 J (4) 500 J

Scan or tap for the
full solution



Q.2 Consider the following reaction :



$\Delta U^\ominus = -10 \text{ kJ mol}^{-1}$ and $\Delta S^\ominus = -44 \text{ J K}^{-1}$ at 298 K.

Identify the correct option with $\Delta G^\ominus$ for the reaction and spontaneity of the reaction at 298 K.

(Given : $R = 8.31 \text{ J mol}^{-1} \text{ K}^{-1}$) [NEET (UG) 2026]

- (1) $+0.63568 \text{ kJ mol}^{-1}$, non-spontaneous
 (2) $-0.63568 \text{ kJ mol}^{-1}$, spontaneous
 (3) $-1.635 \text{ kJ mol}^{-1}$, spontaneous
 (4) $+1.635 \text{ kJ mol}^{-1}$, non-spontaneous

Scan or tap for the
full solution



Q.3 Two moles of an ideal gas undergo free expansion from 10 L to 100 L at 300 K. The values of ΔS_{system} and $\Delta S_{\text{surroundings}}$ are

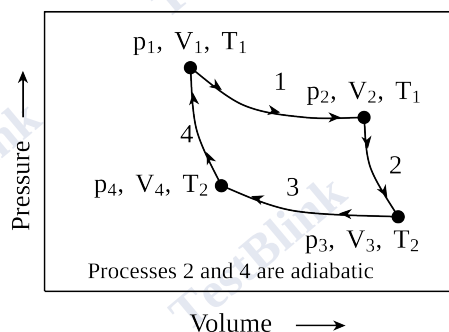
(R is universal gas constant) [RE-NEET (UG) 2026]

- (1) $\Delta S_{\text{system}} = 4.606R$; $\Delta S_{\text{surroundings}} = 0$
 (2) $\Delta S_{\text{system}} = 0$; $\Delta S_{\text{surroundings}} = 0$
 (3) $\Delta S_{\text{system}} = 4.606R$; $\Delta S_{\text{surroundings}} = -4.606R$
 (4) $\Delta S_{\text{system}} = 0$; $\Delta S_{\text{surroundings}} = 4.606R$

Scan or tap for the
full solution



Q.4 Consider the reversible processes for 1.0 mol of an ideal gas as shown in the figure.



w_1 , w_2 , w_3 and w_4 represent work done (in calories) in the processes 1, 2, 3 and 4, respectively; ΔU_2 and ΔU_4 are changes in the internal energy for the processes 2 and 4, respectively.

[use $R = 2 \text{ cal K}^{-1} \text{ mol}^{-1}$]

The correct option is

[RE-NEET (UG) 2026]

- (1) $w_1 + w_2 + w_3 + w_4 = 0$
 (2) $w_1 + w_3 = -2T_1 \ln \frac{V_2}{V_1} - 2T_2 \ln \frac{V_4}{V_3}$
 (3) $w_2 + w_4 = \Delta U_2 - \Delta U_4$
 (4) $w_1 + w_2 = 2T_1 \ln \frac{V_2}{V_1}$

Scan or tap for the
full solution



Q.5 A protein undergoes reversible thermal denaturation from its initial state N to denatured state D according to $N \rightleftharpoons D$. At 60°C , the concentrations of both N and D are equal at equilibrium, and the standard enthalpy change of denaturation is 666 kJ mol^{-1} . The standard entropy change ($\Delta S^\ominus$ in $\text{kJ K}^{-1} \text{ mol}^{-1}$) of the protein upon denaturation at 60°C is closest to

[RE-NEET (UG) 2026]

- (1) 11.1 (2) 2.0 (3) 2000.0 (4) 333.0

Scan or tap for the
full solution



Q.6 The standard heat of formation, in kcal/mol of Ba^{2+} is : [Given : standard heat of formation of SO_4^{2-} ion (aq) = -216 kcal/mol , standard heat of crystallisation of $\text{BaSO}_4(\text{s}) = -4.5 \text{ kcal/mol}$, standard heat of formation of $\text{BaSO}_4(\text{s}) = -349 \text{ kcal/mol}$] [NEET (UG) 2025]

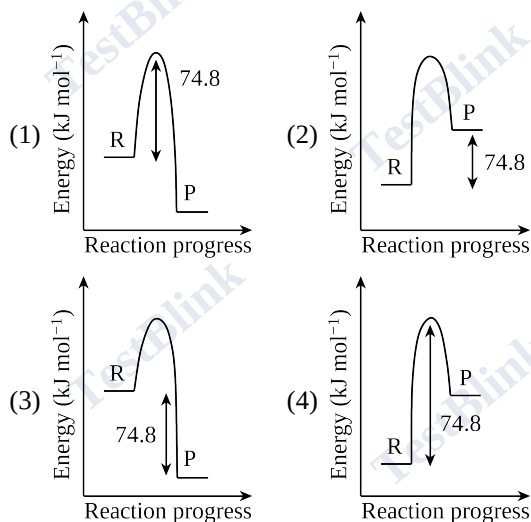
- (1) $+133.0$ (2) $+220.5$ (3) -128.5 (4) -133.0

Scan or tap for the
full solution



Q.7 $\text{C}(\text{s}) + 2\text{H}_2(\text{g}) \longrightarrow \text{CH}_4(\text{g})$; $\Delta H = -74.8 \text{ kJ mol}^{-1}$.

Which of the following diagrams gives an accurate representation of the above reaction? [R $\longrightarrow$ reactants; P $\longrightarrow$ products] [NEET (UG) 2025]



Scan or tap for the full solution

Q.8 In which of the following processes entropy increases?

- A liquid evaporates to vapour.
- Temperature of a crystalline solid lowered from 130 K to 0 K.
- $2\text{NaHCO}_3(\text{s}) \longrightarrow \text{Na}_2\text{CO}_3(\text{s}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{g})$
- $\text{Cl}_{2(\text{g})} \longrightarrow 2\text{Cl}_{(\text{g})}$

Choose the correct answer from the options given below:

[NEET (UG) 2024]

- (1) A and C
- (2) A, B and D
- (3) A, C and D
- (4) C and D

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Q.9 Match List I with List II.

List I (Process)		List II (Conditions)	
A.	Isothermal process	I.	No heat exchange
B.	Isochoric process	II.	Carried out at constant temperature
C.	Isobaric process	III.	Carried out at constant volume
D.	Adiabatic process	IV.	Carried out at constant pressure

Choose the correct answer from the options given below:

[NEET (UG) 2024]

- (1) A-IV, B-III, C-II, D-I
- (2) A-IV, B-II, C-III, D-I
- (3) A-I, B-II, C-III, D-IV
- (4) A-II, B-III, C-IV, D-I

Scan or tap for the full solution

Q.10 The work done during reversible isothermal expansion of one mole of hydrogen gas at 25°C from pressure of 20 atmosphere to 10 atmosphere is (Given $R = 2.0 \text{ cal K}^{-1} \text{ mol}^{-1}$)

[NEET (UG) 2024]

- (1) 0 calorie
- (2) -413.14 calories
- (3) 413.14 calories
- (4) 100 calories

Scan or tap for the full solution



Q.11 Choose the correct statement for the work done in the expansion and heat absorbed or released when 5 litres of an ideal gas at 10 atmospheric pressure isothermally expands into vacuum until volume is 15 litres :

[RE-NEET (UG) 2024]

- (1) Both the heat and work done will be greater than zero
- (2) Heat absorbed will be less than zero and work done will be positive
- (3) Work done will be zero and heat will also be zero
- (4) Work done will be greater than zero and heat will remain zero

Scan or tap for the full solution



Q.12 For an endothermic reaction:

- q_p is negative.
- $\Delta_r H$ is positive.
- $\Delta_r H$ is negative.
- q_p is positive.

Choose the correct answer from the options given below:

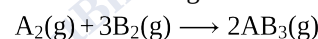
[RE-NEET (UG) 2024]

- (1) B and D
- (2) C and D
- (3) A and B
- (4) A and C

Scan or tap for the full solution



Q.13 For the following reaction at 300 K



the enthalpy change is +15 kJ, then the internal energy change is :

[RE-NEET (UG) 2024]

- (1) 19988.4 J
- (2) 200 J
- (3) 1999 J
- (4) 1.9988 kJ

Scan or tap for the full solution



Q.14 Which amongst the following options is the correct relation between change in enthalpy and change in internal energy?

[NEET (UG) 2023]

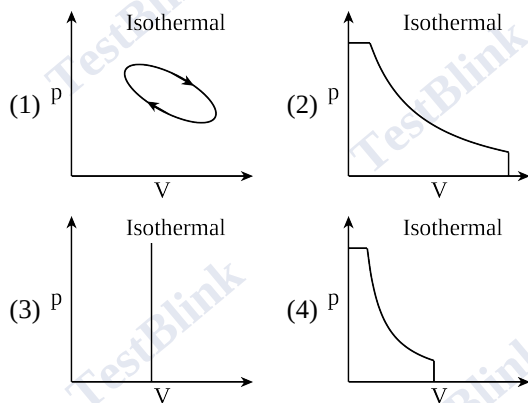
- (1) $\Delta H = \Delta U + \Delta n_g RT$
- (2) $\Delta H - \Delta U = -\Delta n_g RT$
- (3) $\Delta H + \Delta U = \Delta n_g RT$
- (4) $\Delta H = \Delta U - \Delta n_g RT$

Scan or tap for the full solution



Q.15 Which of the following p-V curve represents maximum work done?

[NEET (UG) 2022]



Scan or tap for the full solution



Q.16 One mole of an ideal gas at 300 K is expanded isothermally from 1 L to 10 L volume. ΔU for this process is :
(Use $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$)

[NEET (UG) 2022 (Phase 2)]

- (1) 0 J (2) 1260 J (3) 2520 J (4) 5040 J

Scan or tap for the full solution



Q.17 Which one among the following is the correct option for right relationship between C_p and C_v for one mole of ideal gas?

[NEET (UG) 2021]

- (1) $C_v = RC_p$ (2) $C_p + C_v = R$
(3) $C_p - C_v = R$ (4) $C_p = RC_v$

Scan or tap for the full solution



Q.18 For irreversible expansion of an ideal gas under isothermal condition, the correct option is :

[NEET (UG) 2021]

- (1) $\Delta U \neq 0, \Delta S_{\text{total}} = 0$ (2) $\Delta U = 0, \Delta S_{\text{total}} = 0$
(3) $\Delta U \neq 0, \Delta S_{\text{total}} \neq 0$ (4) $\Delta U = 0, \Delta S_{\text{total}} \neq 0$

Scan or tap for the full solution



Q.19 For the reaction, $2\text{Cl(g)} \longrightarrow \text{Cl}_2(\text{g})$, the correct option is :

[NEET (UG) 2020]

- (1) $\Delta_r H > 0$ and $\Delta_r S < 0$ (2) $\Delta_r H < 0$ and $\Delta_r S > 0$
(3) $\Delta_r H < 0$ and $\Delta_r S < 0$ (4) $\Delta_r H > 0$ and $\Delta_r S > 0$

Scan or tap for the full solution



Q.20 The correct option for free expansion of an ideal gas under adiabatic condition is :

[NEET (UG) 2020]

- (1) $q = 0, \Delta T < 0$ and $w > 0$
(2) $q < 0, \Delta T = 0$ and $w = 0$
(3) $q > 0, \Delta T > 0$ and $w > 0$
(4) $q = 0, \Delta T = 0$ and $w = 0$

Scan or tap for the full solution



Q.21 In which case change in entropy is negative?

[NEET (UG) 2019]

- (1) Sublimation of solid to gas
(2) $2\text{H(g)} \longrightarrow \text{H}_2(\text{g})$
(3) Evaporation of water
(4) Expansion of a gas at constant temperature

Scan or tap for the full solution



Q.22 Under isothermal condition, a gas at 300 K expands from 0.1 L to 0.25 L against a constant external pressure of 2 bar. The work done by the gas is [Given that 1 L bar = 100 J]

[NEET (UG) 2019]

- (1) 25 J (2) 30 J (3) -30 J (4) 5 kJ

Scan or tap for the full solution



Q.23 The bond dissociation energies of X_2 , Y_2 and XY are in the ratio of 1 : 0.5 : 1. ΔH for the formation of XY is -200 kJ mol^{-1} . The bond dissociation energy of X_2 will be

[NEET 2018]

- (1) 800 kJ mol^{-1} (2) 200 kJ mol^{-1}
(3) 400 kJ mol^{-1} (4) 100 kJ mol^{-1}

Scan or tap for the full solution



Q.24 For a given reaction, $\Delta H = 35.5 \text{ kJ mol}^{-1}$ and $\Delta S = 83.6 \text{ J K}^{-1} \text{ mol}^{-1}$. The reaction is spontaneous at (Assume that ΔH and ΔS do not vary with temperature.)

[NEET 2017]

- (1) $T > 425 \text{ K}$ (2) all temperatures
(3) $T > 298 \text{ K}$ (4) $T < 425 \text{ K}$

Scan or tap for the full solution



Q.25 A gas is allowed to expand in a well insulated container against a constant external pressure of 2.5 atm from an initial volume of 2.50 L to a final volume of 4.50 L. The change in internal energy ΔU of the gas in joules will be

[NEET 2017]

- (1) -500 J (2) -505 J (3) +505 J (4) 1136.25 J

Scan or tap for the full solution



Q.26 The correct thermodynamic conditions for the spontaneous reaction at all temperatures is

[NEET 2016 (Phase 1)]

- (1) $\Delta H < 0$ and $\Delta S > 0$ (2) $\Delta H < 0$ and $\Delta S < 0$
(3) $\Delta H < 0$ and $\Delta S = 0$ (4) $\Delta H > 0$ and $\Delta S < 0$

Scan or tap for the full solution



Q.27 For a sample of perfect gas when its pressure is changed isothermally from p_i to p_f , the entropy change is given by

[NEET 2016 (Phase 2)]

$$(1) \Delta S = nR \ln \left(\frac{P_f}{P_i} \right) \quad (2) \Delta S = nR \ln \left(\frac{P_i}{P_f} \right)$$

$$(3) \Delta S = nRT \ln \left(\frac{P_f}{P_i} \right) \quad (4) \Delta S = RT \ln \left(\frac{P_i}{P_f} \right)$$

Scan or tap for the full solution 

Q.28 The heat of combustion of carbon to CO_2 is -393.5 kJ/mol . The heat released upon formation of 35.2 g of CO_2 from carbon and oxygen gas is

[AIPMT 2015]

- (1) $+315 \text{ kJ}$ (2) -630 kJ (3) -3.15 kJ (4) -315 kJ

Scan or tap for the full solution 

Q.29 Which of the following statements is correct for a reversible process in a state of equilibrium?

[AIPMT 2015 (Cancelled)]

- (1) $\Delta G^\circ = -2.30 RT \log K$
 (2) $\Delta G^\circ = 2.30 RT \log K$
 (3) $\Delta G = -2.30 RT \log K$
 (4) $\Delta G = 2.30 RT \log K$

Scan or tap for the full solution 

Q.30 For the reaction, $\text{X}_2\text{O}_{4(l)} \longrightarrow 2\text{XO}_{2(g)}$
 $\Delta U = 2.1 \text{ kcal}$, $\Delta S = 20 \text{ cal K}^{-1}$ at 300 K

Hence, ΔG is

[AIPMT 2014]

- (1) 2.7 kcal (2) -2.7 kcal
 (3) 9.3 kcal (4) -9.3 kcal

Scan or tap for the full solution 

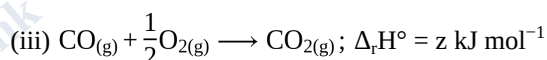
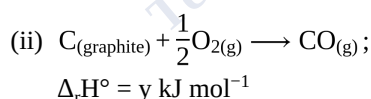
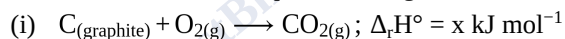
Q.31 When 5 litres of a gas mixture of methane and propane is perfectly combusted at 0°C and 1 atmosphere , 16 litres of oxygen at the same temperature and pressure is consumed. The amount of heat released from this combustion in kJ ($\Delta H_{\text{comb.}}(\text{CH}_4) = 890 \text{ kJ mol}^{-1}$, $\Delta H_{\text{comb.}}(\text{C}_3\text{H}_8) = 2220 \text{ kJ mol}^{-1}$) is

[NEET 2013 (Karnataka)]

- (1) 38 (2) 317 (3) 477 (4) 32

Scan or tap for the full solution 

Q.32 Three thermochemical equations are given below



Based on the above equations, find out which of the relationship given below is correct.

[NEET 2013 (Karnataka)]

$$(1) z = x + y \quad (2) x = y + z$$

$$(3) y = 2z - x \quad (4) x = y - z$$

Scan or tap for the full solution 

Q.33 Equal volumes of two monoatomic gases, A and B at same temperature and pressure are mixed. The ratio of specific heats (C_p/C_v) of the mixture will be

[AIPMT 2012 (Mains)]

- (1) 0.83 (2) 1.50 (3) 3.3 (4) 1.67

Scan or tap for the full solution 

Q.34 In which of the following reactions, standard reaction entropy change (ΔS°) is positive and standard Gibbs energy change (ΔG°) decreases sharply with increasing temperature?

[AIPMT 2012 (Prelims)]

- (1) $\text{C}_{(\text{graphite})} + \frac{1}{2}\text{O}_{2(g)} \longrightarrow \text{CO}_{(g)}$
 (2) $\text{CO}_{(g)} + \frac{1}{2}\text{O}_{2(g)} \longrightarrow \text{CO}_{2(g)}$
 (3) $\text{Mg}_{(s)} + \frac{1}{2}\text{O}_{2(g)} \longrightarrow \text{MgO}_{(s)}$
 (4) $\frac{1}{2}\text{C}_{(\text{graphite})} + \frac{1}{2}\text{O}_{2(g)} \longrightarrow \frac{1}{2}\text{CO}_{2(g)}$

Scan or tap for the full solution 

Q.35 The enthalpy of fusion of water is 1.435 kcal/mol . The molar entropy change for the melting of ice at 0°C is

[AIPMT 2012 (Prelims)]

- (1) $10.52 \text{ cal/(mol K)}$ (2) $21.04 \text{ cal/(mol K)}$
 (3) $5.260 \text{ cal/(mol K)}$ (4) $0.526 \text{ cal/(mol K)}$

Scan or tap for the full solution 

Q.36 Standard enthalpy of vaporisation $\Delta_{\text{vap}} H^\circ$ for water at 100°C is $40.66 \text{ kJ mol}^{-1}$. The internal energy of vaporisation of water at 100°C (in kJ mol^{-1}) is

[AIPMT 2012 (Prelims)]

- (1) $+37.56$ (2) -43.76 (3) $+43.76$ (4) $+40.66$

Scan or tap for the full solution 

Q.37 Consider the following processes :

	$\Delta H \text{ (kJ/mol)}$
$\frac{1}{2}\text{A} \longrightarrow \text{B}$	$+150$
$3\text{B} \longrightarrow 2\text{C} + \text{D}$	-125
$\text{E} + \text{A} \longrightarrow 2\text{D}$	$+350$

For $\text{B} + \text{D} \longrightarrow \text{E} + 2\text{C}$, ΔH will be

[AIPMT 2011 (Mains)]

- (1) 525 kJ/mol (2) -175 kJ/mol
 (3) -325 kJ/mol (4) 325 kJ/mol

Scan or tap for the full solution 

- Q.38** If the enthalpy change for the transition of liquid water to steam is 30 kJ mol^{-1} at 27°C , the entropy change for the process would be

[AIPMT 2011 (Prelims)]

- (1) $10 \text{ J mol}^{-1} \text{ K}^{-1}$ (2) $1.0 \text{ J mol}^{-1} \text{ K}^{-1}$
(3) $0.1 \text{ J mol}^{-1} \text{ K}^{-1}$ (4) $100 \text{ J mol}^{-1} \text{ K}^{-1}$

Scan or tap for the full solution



- Q.39** Enthalpy change for the reaction,
 $4\text{H(g)} \longrightarrow 2\text{H}_2\text{(g)}$ is -869.6 kJ
The dissociation energy of H–H bond is

[AIPMT 2011 (Prelims)]

- (1) -434.8 kJ (2) -869.6 kJ
(3) $+434.8 \text{ kJ}$ (4) $+217.4 \text{ kJ}$

Scan or tap for the full solution



- Q.40** Which of the following is correct option for free expansion of an ideal gas under adiabatic condition ?

[AIPMT 2011 (Prelims)]

- (1) $q = 0, \Delta T \neq 0, w = 0$ (2) $q \neq 0, \Delta T = 0, w = 0$
(3) $q = 0, \Delta T = 0, w = 0$ (4) $q = 0, \Delta T < 0, w \neq 0$

Scan or tap for the full solution



- Q.41** Match **List I** (Equations) with **List II** (Type of processes) and select the correct option.

[AIPMT 2010 (Mains)]

List I Equations		List II Type of processes	
A.	$K_p > Q$	i.	Non-spontaneous
B.	$\Delta G^\circ > -RT \ln Q$	ii.	Equilibrium
C.	$K_p = Q$	iii.	Spontaneous and endothermic
D.	$T > \frac{\Delta H}{\Delta S}$	iv.	Spontaneous

- (1) A - (i), B - (ii), C - (iii), D - (iv)
(2) A - (iii), B - (iv), C - (ii), D - (i)
(3) A - (iv), B - (i), C - (ii), D - (iii)
(4) A - (ii), B - (i), C - (iv), D - (iii)

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- Q.42** Three moles of an ideal gas expanded spontaneously into vacuum. The work done will be

[AIPMT 2010 (Mains)]

- (1) infinite (2) 3 Joules (3) 9 Joules (4) zero

Scan or tap for the full solution



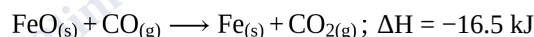
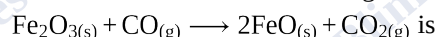
- Q.43** For vaporization of water at 1 atmospheric pressure, the values of ΔH and ΔS are $40.63 \text{ kJ mol}^{-1}$ and $108.8 \text{ J K}^{-1} \text{ mol}^{-1}$, respectively. The temperature when Gibbs energy change (ΔG) for this transformation will be zero, is

Scan or tap for the full solution



- (1) 273.4 K (2) 393.4 K (3) 373.4 K (4) 293.4 K

- Q.44** The following two reactions are known
 $\text{Fe}_2\text{O}_{3(s)} + 3\text{CO}_{(g)} \longrightarrow 2\text{Fe}_{(s)} + 3\text{CO}_{2(g)}$;
 $\Delta H = -26.8 \text{ kJ}$

The value of ΔH for the following reaction

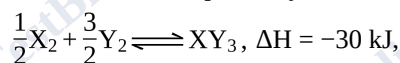
[AIPMT 2010 (Mains)]

- (1) $+10.3 \text{ kJ}$ (2) -43.3 kJ (3) -10.3 kJ (4) $+6.2 \text{ kJ}$

Scan or tap for the full solution



- Q.45** Standard entropies of X_2 , Y_2 and XY_3 are 60, 40 and $50 \text{ J K}^{-1} \text{ mol}^{-1}$ respectively. For the reaction



to be at equilibrium, the temperature should be

[AIPMT 2010 (Prelims)]

- (1) 750 K (2) 1000 K (3) 1250 K (4) 500 K

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- Q.46** The values of ΔH and ΔS for the reaction,
 $\text{C}_{(\text{graphite})} + \text{CO}_{2(g)} \longrightarrow 2\text{CO}_{(g)}$

are 170 kJ and 170 J K^{-1} , respectively. This reaction will be spontaneous at

[AIPMT 2009]

- (1) 910 K (2) 1110 K (3) 510 K (4) 710 K

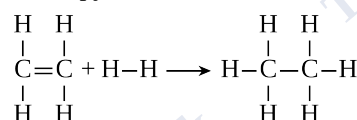
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- Q.47** From the following bond energies :

H – H bond energy : $431.37 \text{ kJ mol}^{-1}$ C = C bond energy : $606.10 \text{ kJ mol}^{-1}$ C – C bond energy : $336.49 \text{ kJ mol}^{-1}$ C – H bond energy : $410.50 \text{ kJ mol}^{-1}$

Enthalpy for the reaction,



will be

[AIPMT 2009]

- (1) $-243.6 \text{ kJ mol}^{-1}$ (2) $-120.0 \text{ kJ mol}^{-1}$
(3) $553.0 \text{ kJ mol}^{-1}$ (4) $1523.6 \text{ kJ mol}^{-1}$

Scan or tap for the full solution



Q.48 Bond dissociation enthalpies of H_2 , Cl_2 and HCl are 434, 242 and 431 kJ mol^{-1} respectively. Enthalpy of formation of HCl is [AIPMT 2008]

- (1) -93 kJ mol^{-1} (2) 245 kJ mol^{-1}
(3) 93 kJ mol^{-1} (4) -245 kJ mol^{-1}

Scan or tap for the full solution



Q.49 For the gas phase reaction,
 $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$
which of the following conditions are correct?

[AIPMT 2008]

- (1) $\Delta H < 0$ and $\Delta S < 0$ (2) $\Delta H > 0$ and $\Delta S < 0$
(3) $\Delta H = 0$ and $\Delta S < 0$ (4) $\Delta H > 0$ and $\Delta S > 0$

Scan or tap for the full solution



Q.50 Which of the following are not state functions?

- (I) $q + w$ (II) q
(III) w (IV) $H - TS$

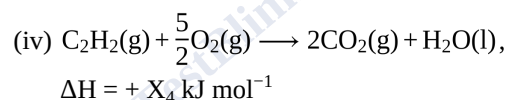
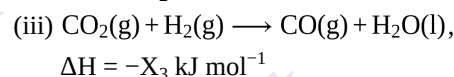
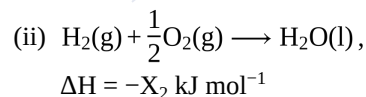
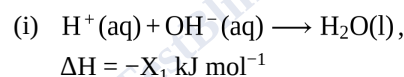
[AIPMT 2008]

- (1) (I), (II) and (III) (2) (II) and (III)
(3) (I) and (IV) (4) (II), (III) and (IV)

Scan or tap for the full solution



Q.51 Consider the following reactions:



Enthalpy of formation of $\text{H}_2\text{O}(\text{l})$ is [AIPMT 2007]

- (1) $+X_3 \text{ kJ mol}^{-1}$ (2) $-X_4 \text{ kJ mol}^{-1}$
(3) $+X_1 \text{ kJ mol}^{-1}$ (4) $-X_2 \text{ kJ mol}^{-1}$

Scan or tap for the full solution



Q.52 Given that bond energies of H-H and Cl-Cl are 430 kJ mol^{-1} and 240 kJ mol^{-1} respectively and ΔH_f for HCl is -90 kJ mol^{-1} , bond enthalpy of HCl is [AIPMT 2007]

- (1) 380 kJ mol^{-1} (2) 425 kJ mol^{-1}
(3) 245 kJ mol^{-1} (4) 290 kJ mol^{-1}

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Q.53 Identify the correct statement for change of Gibbs energy for a system (ΔG_{system}) at constant temperature and pressure. [AIPMT 2006]

- (1) If $\Delta G_{\text{system}} < 0$, the process is not spontaneous.
(2) If $\Delta G_{\text{system}} > 0$, the process is spontaneous.
(3) If $\Delta G_{\text{system}} = 0$, the system has attained equilibrium.
(4) If $\Delta G_{\text{system}} = 0$, the system is still moving in a particular direction.

Scan or tap for the full solution



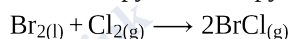
Q.54 Assume each reaction is carried out in an open container. For which reaction will $\Delta H = \Delta E$? [AIPMT 2006]

- (1) $2\text{CO}(\text{g}) + \text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g})$
(2) $\text{H}_2(\text{g}) + \text{Br}_2(\text{g}) \longrightarrow 2\text{HBr}(\text{g})$
(3) $\text{C}(\text{s}) + 2\text{H}_2\text{O}(\text{g}) \longrightarrow 2\text{H}_2(\text{g}) + \text{CO}_2(\text{g})$
(4) $\text{PCl}_5(\text{g}) \longrightarrow \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$

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Q.55 The enthalpy and entropy change for the reaction:



are 30 kJ mol^{-1} and 105 $\text{J K}^{-1} \text{ mol}^{-1}$ respectively.

The temperature at which the reaction will be in equilibrium is [AIPMT 2006]

- (1) 300 K (2) 285.7 K (3) 273 K (4) 450 K

Scan or tap for the full solution



Q.56 The enthalpy of hydrogenation of cyclohexene is $-119.5 \text{ kJ mol}^{-1}$. If resonance energy of benzene is $-150.4 \text{ kJ mol}^{-1}$, its enthalpy of hydrogenation would be [AIPMT 2006]

- (1) $-358.5 \text{ kJ mol}^{-1}$ (2) $-508.9 \text{ kJ mol}^{-1}$
(3) $-208.1 \text{ kJ mol}^{-1}$ (4) $-269.9 \text{ kJ mol}^{-1}$

Scan or tap for the full solution



Q.57 Which of the following pairs of a chemical reaction is certain to result in a spontaneous reaction? [AIPMT 2005]

- (1) Exothermic and increasing disorder
(2) Exothermic and decreasing disorder
(3) Endothermic and increasing disorder
(4) Endothermic and decreasing disorder

Scan or tap for the full solution



Q.58 A reaction occurs spontaneously if [AIPMT 2005]

- (1) $T\Delta S < \Delta H$ and both ΔH and ΔS are +ve
(2) $T\Delta S > \Delta H$ and ΔH is +ve and ΔS is -ve
(3) $T\Delta S > \Delta H$ and both ΔH and ΔS are +ve
(4) $T\Delta S = \Delta H$ and both ΔH and ΔS are +ve

Scan or tap for the full solution



Q.59 The absolute enthalpy of neutralisation of the reaction :



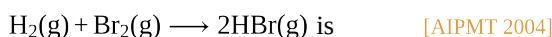
[AIPMT 2005]

- (1) $-57.33 \text{ kJ mol}^{-1}$
- (2) greater than $-57.33 \text{ kJ mol}^{-1}$
- (3) less than $-57.33 \text{ kJ mol}^{-1}$
- (4) $57.33 \text{ kJ mol}^{-1}$

Scan or tap for the full solution



Q.60 If the bond energies of H–H, Br–Br, and H–Br are 433, 192 and 364 kJ mol^{-1} respectively, the ΔH° for the reaction



[AIPMT 2004]

- (1) -261 kJ (2) $+103 \text{ kJ}$ (3) $+261 \text{ kJ}$ (4) -103 kJ

Scan or tap for the full solution



Q.61 Standard enthalpy and standard entropy changes for the oxidation of ammonia at 298 K are $-382.64 \text{ kJ mol}^{-1}$ and $-145.6 \text{ J K}^{-1} \text{ mol}^{-1}$, respectively. Standard Gibbs energy change for the same reaction at 298 K is

[AIPMT 2004]

- (1) $-221.1 \text{ kJ mol}^{-1}$ (2) $-339.3 \text{ kJ mol}^{-1}$
- (3) $-439.3 \text{ kJ mol}^{-1}$ (4) $-523.2 \text{ kJ mol}^{-1}$

Scan or tap for the full solution



Q.62 Considering entropy (S) as a thermodynamic parameter, the criterion for the spontaneity of any process is

[AIPMT 2004]

- (1) $\Delta S_{\text{system}} + \Delta S_{\text{surroundings}} > 0$
- (2) $\Delta S_{\text{system}} - \Delta S_{\text{surroundings}} > 0$
- (3) $\Delta S_{\text{system}} > 0$ only
- (4) $\Delta S_{\text{surroundings}} > 0$ only

Scan or tap for the full solution



Q.63 The work done during the expansion of a gas from a volume of 4 dm^3 to 6 dm^3 against a constant external pressure of 3 atm is ($1 \text{ L atm} = 101.32 \text{ J}$)

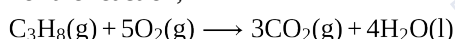
[AIPMT 2004]

- (1) -6 J (2) -608 J (3) $+304 \text{ J}$ (4) -304 J

Scan or tap for the full solution



Q.64 For the reaction,

at constant temperature, $\Delta H - \Delta E$ is [AIPMT 2003]

- (1) $+RT$ (2) $-3RT$ (3) $+3RT$ (4) $-RT$

Scan or tap for the full solution



Q.65 The densities of graphite and diamond at 298 K are 2.25 and 3.31 g cm^{-3} , respectively. If the standard free energy difference (ΔG°) is equal to 1895 J mol^{-1} , the pressure at which graphite will be transformed into diamond at 298 K is [AIPMT 2003]

- (1) $11.14 \times 10^8 \text{ Pa}$ (2) $11.14 \times 10^7 \text{ Pa}$
- (3) $11.14 \times 10^6 \text{ Pa}$ (4) $11.14 \times 10^5 \text{ Pa}$

Scan or tap for the full solution



Q.66 What is the entropy change (in $\text{J K}^{-1} \text{ mol}^{-1}$) when one mole of ice is converted into water at 0°C ? (The enthalpy change for the conversion of ice to liquid water is 6.0 kJ mol^{-1} at 0°C). [AIPMT 2003]

- (1) 20.13 (2) 2.013 (3) 2.198 (4) 21.98

Scan or tap for the full solution



Q.67 For which one of the following equations is $\Delta H^\circ_{\text{react}}$ equal to $\Delta H^\circ_{\text{f}}$ for the product? [AIPMT 2003]

- (1) $\text{Xe}(\text{g}) + 2\text{F}_2(\text{g}) \longrightarrow \text{XeF}_4(\text{g})$
- (2) $2\text{CO}(\text{g}) + \text{O}_2(\text{g}) \longrightarrow 2\text{CO}_2(\text{g})$
- (3) $\text{N}_2(\text{g}) + \text{O}_3(\text{g}) \longrightarrow \text{N}_2\text{O}_3(\text{g})$
- (4) $\text{CH}_4(\text{g}) + 2\text{Cl}_2(\text{g}) \longrightarrow \text{CH}_2\text{Cl}_2(\text{l}) + 2\text{HCl}(\text{g})$

Scan or tap for the full solution



Q.68 The molar heat capacity of water at constant pressure, C_p , is $75 \text{ J K}^{-1} \text{ mol}^{-1}$. When 1.0 kJ of heat is supplied to 100 g of water which is free to expand, the increase in temperature of water is

[AIPMT 2003]

- (1) 1.2 K (2) 2.4 K (3) 4.8 K (4) 6.6 K

Scan or tap for the full solution



Q.69 Unit of entropy is [AIPMT 2002]

- (1) $\text{J K}^{-1} \text{ mol}^{-1}$ (2) J mol^{-1}
- (3) $\text{J}^{-1} \text{ K}^{-1} \text{ mol}^{-1}$ (4) J K mol^{-1}

Scan or tap for the full solution



Q.70 In a closed insulated container a liquid is stirred with a paddle to increase the temperature. Which of the following is true? [AIPMT 2002]

- (1) $\Delta E = W \neq 0, q = 0$ (2) $\Delta E = W = q \neq 0$
- (3) $\Delta E = 0, W = q \neq 0$ (4) $W = 0, \Delta E = q \neq 0$

Scan or tap for the full solution



Q.71 2 moles of an ideal gas at 27°C temperature is expanded reversibly from 2 lit. to 20 lit. Find entropy change. ($R = 2 \text{ cal/mol K}$) [AIPMT 2002]

- (1) 92.1 (2) 0 (3) 4 (4) 9.2

Scan or tap for the full solution



Q.72 Heat of combustion ΔH° for $C_{(s)}$, $H_{2(g)}$ and $CH_{4(g)}$ are -94 , -68 and -213 kcal/mol, then ΔH° for $C_{(s)} + 2H_{2(g)} \longrightarrow CH_{4(g)}$ is [AIPMT 2002]

- (1) -17 kcal (2) -111 kcal
(3) -170 kcal (4) -85 kcal

Scan or tap for the full solution



Q.73 Change in enthalpy for reaction, $2H_2O_2(l) \longrightarrow 2H_2O(l) + O_2(g)$ if heat of formation of $H_2O_2(l)$ and $H_2O(l)$ are -188 and -286 kJ/mol respectively, is [AIPMT 2001]

- (1) -196 kJ/mol (2) $+196$ kJ/mol
(3) $+948$ kJ/mol (4) -948 kJ/mol

Scan or tap for the full solution



Q.74 When 1 mol of gas is heated at constant volume temperature is raised from 298 to 308 K. Heat supplied to the gas is 500 J. Then which statement is correct? [AIPMT 2001]

- (1) $q = w = 500$ J, $\Delta E = 0$
(2) $q = \Delta E = 500$ J, $w = 0$
(3) $q = -w = 500$ J, $\Delta E = 0$
(4) $\Delta E = 0$, $q = w = -500$ J

Scan or tap for the full solution



Q.75 Enthalpy of $CH_4 + \frac{1}{2}O_2 \longrightarrow CH_3OH$ is negative. If enthalpy of combustion of CH_4 and CH_3OH are x and y respectively. Then which relation is correct? [AIPMT 2001]

- (1) $x > y$ (2) $x < y$ (3) $x = y$ (4) $x \geq y$

Scan or tap for the full solution



Q.76 $2Zn + O_2 \longrightarrow 2ZnO$; $\Delta G^\circ = -616$ J
 $2Zn + S_2 \longrightarrow 2ZnS$; $\Delta G^\circ = -293$ J
 $S_2 + 2O_2 \longrightarrow 2SO_2$; $\Delta G^\circ = -408$ J
 ΔG° for the following reaction $2ZnS + 3O_2 \longrightarrow 2ZnO + 2SO_2$ is [AIPMT 2000]

- (1) -731 J (2) -1317 J (3) -501 J (4) $+731$ J

Scan or tap for the full solution



Q.77 The entropy change in the fusion of one mole of a solid melting at 27°C (latent heat of fusion is 2930 J mol^{-1}) is : [AIPMT 2000]

- (1) 9.77 J/mol $-K$ (2) 10.77 J/mol $-K$
(3) 9.07 J/mol $-K$ (4) 0.977 J/mol $-K$

Scan or tap for the full solution



Q.78 For the reaction, $C_2H_5OH(l) + 3O_2(g) \longrightarrow 2CO_2(g) + 3H_2O(l)$ which one is true [AIPMT 2000]

- (1) $\Delta H = \Delta E - RT$ (2) $\Delta H = \Delta E + RT$
(3) $\Delta H = \Delta E + 2RT$ (4) $\Delta H = \Delta E - 2RT$

Scan or tap for the full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7
Ans.	3	1	1	2	2	3	3
Ques.	8	9	10	11	12	13	14
Ans.	3	4	2	3	1	1	1
Ques.	15	16	17	18	19	20	21
Ans.	2	1	3	4	3	4	2
Ques.	22	23	24	25	26	27	28
Ans.	3	1	1	2	1, 3	2	4
Ques.	29	30	31	32	33	34	35
Ans.	1	2	2	2	4	1	3
Ques.	36	37	38	39	40	41	42
Ans.	1	2	4	3	3	3	4
Ques.	43	44	45	46	47	48	49
Ans.	3	4	1	2	2	1	4
Ques.	50	51	52	53	54	55	56
Ans.	2	4	2	3	2	2	3
Ques.	57	58	59	60	61	62	63
Ans.	1	3	3	4	2	1	2
Ques.	64	65	66	67	68	69	70
Ans.	2	1	4	1	2	1	1
Ques.	71	72	73	74	75	76	77
Ans.	4	1	1	2	2	1	1
Ques.	78						
Ans.	1						