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NEET THERMODYNAMICS — GIBBS ENERGY CHANGE AND EQUILIBRIUM — PYQS

Max. Marks: 64 **Questions:** 16

Section A (MCQ) — 16 questions

Q.1 Consider the following reaction :

$2A(g) + B(g) \longrightarrow 2D(g)$

$\Delta U^{\ominus} = -10$ kJ mol^{-1} and $\Delta S^{\ominus} = -44$ 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 J mol^{-1} K^{-1}) [NEET (UG) 2026]

(1) +0.63568 kJ mol^{-1}, non-spontaneous

(2) −0.63568 kJ mol^{-1}, spontaneous

(3) −1.635 kJ mol^{-1}, spontaneous

(4) +1.635 kJ mol^{-1}, non-spontaneous

Scan or tap for the full solution

Q.2 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 ($\Delta S°$ in kJ K^{-1} 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

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Q.3 For a given reaction, ΔH = 35.5 kJ mol^{-1} and ΔS = 83.6 J K^{-1} mol^{-1}. The reaction is spontaneous at (Assume that ΔH and ΔS do not vary with temperature.) [NEET 2017]

(1) T > 425 K (2) all temperatures

(3) T > 298 K (4) T < 425 K

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Q.4 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 $\Delta S < 0$

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Q.5 Which of the following statements is correct for a reversible process in a state of equilibrium?

[AIPMT 2015 (Cancelled)]

(1) $\Delta G° = -2.30\ RT\log K$

(2) $\Delta G° = 2.30\ RT\log K$

(3) $\Delta G = -2.30\ RT\log K$

(4) $\Delta G = 2.30\ RT\log K$

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Q.6 For the reaction, $X_2O_{4(l)} \longrightarrow 2XO_{2(g)}$

ΔU = 2.1 kcal, ΔS = 20 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

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Q.7 In which of the following reactions, standard reaction entropy change ($\Delta S°$) is positive and standard Gibb's energy change ($\Delta G°$) decreases sharply with increasing temperature ?

[AIPMT 2012 (Prelims)]

(1) $C_{(graphite)} + \frac{1}{2}O_{2(g)} \longrightarrow CO_{(g)}$

(2) $CO_{(g)} + \frac{1}{2}O_{2(g)} \longrightarrow CO_{2(g)}$

(3) $Mg_{(s)} + \frac{1}{2}O_{2(g)} \longrightarrow MgO_{(s)}$

(4) $\frac{1}{2}C_{(graphite)} + \frac{1}{2}O_{2(g)} \longrightarrow \frac{1}{2}CO_{2(g)}$

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Q.8 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.	$\Delta G° > -RT\ln Q$	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.9 For vaporization of water at 1 atmospheric pressure, the values of ΔH and ΔS are 40.63 kJ mol^{-1} and 108.8 J K^{-1} mol^{-1}, respectively. The temperature when Gibbs energy change (ΔG) for this transformation will be zero, is [AIPMT 2010 (Mains)]
(1) 273.4 K (2) 393.4 K (3) 373.4 K (4) 293.4 K

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Q.10 Standard entropies of X_2, Y_2 and XY_3 are 60, 40 and 50 J K^{-1} mol^{-1} respectively. For the reaction

$$\frac{1}{2}X_2 + \frac{3}{2}Y_2 \rightleftharpoons XY_3,\ \Delta H = -30\text{ kJ},$$

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.11 The values of ΔH and ΔS for the reaction,

$$C_{(graphite)} + CO_2(g) \longrightarrow 2CO_{(g)}$$

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

Scan or tap for the full solution

Q.12 Identify the correct statement for change of Gibbs energy for a system (ΔG_{system}) at constant temperature and pressure. [AIPMT 2006]
(1) If $\Delta G_{system} < 0$, the process is not spontaneous.
(2) If $\Delta G_{system} > 0$, the process is spontaneous.
(3) If $\Delta G_{system} = 0$, the system has attained equilibrium.
(4) If $\Delta G_{system} = 0$, the system is still moving in a particular direction.

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Q.13 The enthalpy and entropy change for the reaction:

$$Br_{2(l)} + Cl_{2(g)} \longrightarrow 2BrCl_{(g)}$$

are 30 kJ mol^{-1} and 105 J K^{-1} 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

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Q.14 A reaction occurs spontaneously if [AIPMT 2005]
(1) TΔS < ΔH and both ΔH and ΔS are +ve
(2) TΔS > ΔH and ΔH is +ve and ΔS is −ve
(3) TΔS > ΔH and both ΔH and ΔS are +ve
(4) TΔS = ΔH and both ΔH and ΔS are +ve

Scan or tap for the full solution

Q.15 Standard enthalpy and standard entropy changes for the oxidation of ammonia at 298 K are −382.64 kJ mol^{-1} and −145.6 J K^{-1} mol^{-1}, respectively. Standard Gibbs energy change for the same reaction at 298 K is [AIPMT 2004]
(1) −221.1 kJ mol^{-1} (2) −339.3 kJ mol^{-1}
(3) −439.3 kJ mol^{-1} (4) −523.2 kJ mol^{-1}

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Q.16 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) 11.14×10^8 Pa (2) 11.14×10^7 Pa
(3) 11.14×10^6 Pa (4) 11.14×10^5 Pa

Scan or tap for the full solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7
Ans.	**1**	**2**	**1**	**1, 3**	**1**	**2**	**1**
Ques.	8	9	10	11	12	13	14
Ans.	**3**	**3**	**1**	**2**	**3**	**2**	**3**
Ques.	15	16					
Ans.	**2**	**1**					