

PYQSide

NEET THERMODYNAMICS — GIBBS ENERGY CHANGE AND EQUILIBRIUM — PYQS

Max. Marks: 64

Questions: 16

Section A (MCQ)

- Q.1** Consider the following reaction :
 $2A(g) + B(g) \longrightarrow 2D(g)$
 $\Delta U^\ominus = -10 \text{ kJ mol}^{-1}$ 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.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 ($\Delta S^\ominus$ 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.3** 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.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 $\Delta S < 0$

Scan or tap for the full solution



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

[AIPMT 2015 (Cancelled)]

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

Scan or tap for the full solution



- Q.6** For the reaction, $X_2O_4(l) \longrightarrow 2XO_2(g)$
 $\Delta U = 2.1 \text{ kcal}$, $\Delta S = 20 \text{ cal K}^{-1}$ 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.7** In which of the following reactions, standard reaction entropy change ($\Delta S^\ominus$) is positive and standard Gibbs energy change ($\Delta G^\ominus$) decreases sharply with increasing temperature?

[AIPMT 2012 (Prelims)]

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

Scan or tap for the full solution



- 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.	$\Delta G^\ominus > -RT \ln Q$	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)

Scan or tap for the
full solution



- Q.9** 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 [AIPMT 2010 (Mains)]
 (1) 273.4 K (2) 393.4 K (3) 373.4 K (4) 293.4 K

Scan or tap for the
full solution



- Q.10** 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

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

 to be at equilibrium, the temperature should be [AIPMT 2010 (Prelims)]
 (1) 750 K (2) 1000 K (3) 1250 K (4) 500 K

Scan or tap for the
full solution



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

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

 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 $\Delta G_{\text{system}} < 0$, 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.13** The enthalpy and entropy change for the reaction:

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

 are 30 kJ mol^{-1} and $105 \text{ J K}^{-1} \text{ mol}^{-1}$ 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.14** 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.15** 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.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) $11.14 \times 10^8 \text{ Pa}$ (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



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					