

Yakeen NEET 2.0 2026

Practice Sheet

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Thermodynamics and Thermochemistry

Q1 The species which by definition has zero standard molar enthalpy of formation at 298 K is:

- (A) $\text{Br}_2(\text{g})$ (B) $\text{Cl}_2(\text{g})$
(C) $\text{H}_2\text{O}(\text{g})$ (D) $\text{CH}_4(\text{g})$

Q2 Which of the following is a state function?

- (A) q (B) $q - w$
(C) $\frac{q}{w}$ (D) $q + w$

Q3 Select the path function among the following:

- (A) temperature
(B) entropy
(C) work
(D) enthalpy

Q4 For a process to be in equilibrium, it is necessary that:

- (A) $\Delta S_{\text{system}} = \Delta S_{\text{surr.}}$
(B) $\Delta S_{\text{system}} = -\Delta S_{\text{surr.}}$
(C) $\Delta S_{\text{system}} = 0$
(D) $\Delta S_{\text{surr.}} = 0$

Q5 Entropy change in reversible adiabatic process is:

- (A) Infinite
(B) Zero
(C) Equal to $C_V \Delta T$
(D) Equal to $nR \ln \left(\frac{V_2}{V_1} \right)$

Q6 The enthalpy of a reaction does not depend upon:

- (A) the intermediate reaction steps
(B) the temperature of initial and final state of the reaction
(C) the physical states of reactants and products
(D) use of different reactants for the formation of the same product

Q7 $(\Delta H - \Delta U)$ for the formation of carbon monoxide (CO) from its element at 298 K is: ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$).

- (A) $-1238.78 \text{ J mol}^{-1}$
(B) $1238.78 \text{ J mol}^{-1}$
(C) $-2477.57 \text{ J mol}^{-1}$
(D) $2477.57 \text{ J mol}^{-1}$

Q8 Match the physical changes in List-I with their relations given in List-II:

List-I		List II	
A.	ΔG	(i)	$\Delta U + P \Delta V$
B.	ΔH	(ii)	$-nFE$
C.	ΔS°	(iii)	$-RT \log_e K$
D.	ΔG°	(iv)	$nR \log_e \left(\frac{V_1}{V_2} \right)$

- (A) A-(ii), B-(i), C-(iv), D-(iii)
(B) A-(i), B-(ii), C-(iii), D-(iv)
(C) A-(iv), B-(iii), C-(ii), D-(i)
(D) A-(i), B-(ii), C-(iv), D-(iii)

Q9 4.48 L of an ideal gas at S.T.P requires 12 calories to raise its temperature by 15°C at constant volume. The C_p of the gas is:

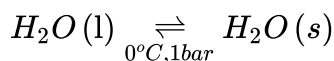
- (A) 3 cal (B) 4 cal
(C) 7 cal (D) 6 cal

Q10 In which of the following pairs, both properties are intensive?

- (A) Internal energy, temperature
(B) Density, volume
(C) Temperature, density
(D) Pressure, volume

Q11 For a phase change;





- (A) $\Delta G = 0$ (B) $\Delta S = 0$
 (C) $\Delta H = 0$ (D) $\Delta U = 0$

Q12 $A \rightarrow B$; $\Delta U = 40 \text{ kJ mol}^{-1}$

If the system goes from A to B by a reversible path and returns to state A by an irreversible path, what would be the net change in internal energy?

- (A) More than 40 kJ
 (B) Zero
 (C) Less than 40 kJ
 (D) 40 kJ

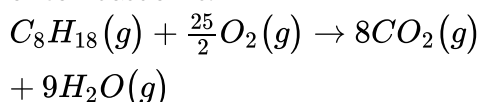
Q13 Although the dissolution of ammonium chloride (NH_4Cl) in water is an endothermic reaction, even then it is spontaneous because:

- (A) $\Delta S = -ve$
 (B) $\Delta S = \text{zero}$
 (C) $T \Delta S < \Delta H$
 (D) $\Delta S = +ve$ and $\Delta H < T \Delta S$

Q14 Given that, bond energies of $\text{H}-\text{H}$ and $\text{Cl}-\text{Cl}$ are 430 kJ/mol and 240 kJ/mol respectively. ΔH_f for HCl is -90 kJ/mol. Bond enthalpy of HCl is:

- (A) 380 kJ mol⁻¹ (B) 425 kJ mol⁻¹
 (C) 245 kJ mol⁻¹ (D) 290 kJ mol⁻¹

Q15 Combustion of octane takes place in an automobile engine. The homogeneous equation of combustion is:



The signs of ΔH , ΔS and ΔG for the reaction will be:

- (A) +ve, -ve, +ve (B) -ve, +ve, -ve
 (C) -ve, +ve, +ve (D) +ve, +ve, -ve

Q16 The amount of heat released, when 20 mL of 0.5 M NaOH is mixed with 100 mL of 0.1 M HCl , is x kJ. The heat of neutralization (in kJ mol⁻¹) is:

- (A) -100 x (B) -50 x
 (C) +100 x (D) +50 x

Q17 The entropy of a perfectly crystalline substance at absolute zero on the basis of third law of thermodynamics should be taken as:

- (A) 100
 (B) 50
 (C) Zero
 (D) different for different substances

Q18 A process in which the system does not exchange heat with the surroundings is known as:

- (A) isothermal (B) isobaric
 (C) isochoric (D) adiabatic

Q19 Assertion (A): The enthalpy of formation of gaseous oxygen molecules at 298 K and under a pressure of one atm is zero.

Reason (R): The entropy of formation of gaseous oxygen molecules under the same condition is zero.

- (A) If both (A) and (R) are correct and (R) is the correct reason for (A).
 (B) If both (A) and (R) are correct but (R) is not the correct explanation for (A).
 (C) If (A) is true but (R) is false.
 (D) If both (A) and (R) are false.

Q20 In which reaction, there will be increase in entropy?

- (A) $\text{Na}(s) + \text{H}_2\text{O}(l) \rightarrow \text{NaOH}(aq) + \frac{1}{2} \text{H}_2(g) \uparrow$
 (B) $\text{Ag}^+(aq) + \text{Cl}^-(aq) \rightarrow \text{AgCl}(s)$
 (C) $\text{H}_2(g) + \frac{1}{2} \text{O}_2(g) \rightarrow \text{H}_2\text{O}(l)$
 (D) $\text{Cu}^{2+}(aq) + 4\text{NH}_3(g) \rightarrow [\text{Cu}(\text{NH}_3)_4]^{2+}(aq)$

Q21 If the internal energy of an ideal gas decreases by the same amount as the work done by the system, the process is:

- (A) Cyclic (B) Isothermal
 (C) Adiabatic (D) Isolated

Q22 For which of these processes is the value of ΔS negative?



- I. Sugar is dissolved in water.
 II. Steam condenses on a surface.
 III. CaCO_3 is decomposed into CaO and CO_2 .
 (A) I only
 (B) II only
 (C) I and III only
 (D) II and III only

- Q23 Assertion (A):** For a particular reaction, heat of combustion at constant pressure (q_p) is always greater than that at constant volume (q_v).
Assertion (R): Combustion reactions are invariably accomplished by increase in number of moles.
 (A) If both (A) and (R) are correct and (R) is the correct reason for (A).
 (B) If both (A) and (R) are correct but (R) is not the correct explanation for (A).
 (C) If (A) is true but (R) is false.
 (D) If both (A) and (R) are false.

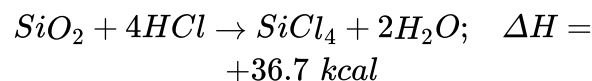
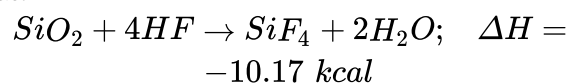
- Q24** The lattice energy of solid NaCl is 180 kcal per mol. The dissolution of the solid in water in the form of ions is endothermic to the extent of 1 kcal per mol. If the solvation energies of Na^+ and Cl^- ions are in the ratio 6 : 5, what is the enthalpy of hydration of sodium ion?
 (A) - 85.6 kcal/mol
 (B) - 97.5 kcal/mol
 (C) 82.6 kcal/mol
 (D) +100 kcal/mol

- Q25** An ideal gas expands in volume from $1 \times 10^{-3} \text{ m}^3$ to $1 \times 10^{-2} \text{ m}^3$ at 300 K against a constant pressure of $1 \times 10^5 \text{ Nm}^{-2}$. The work done is:
 (A) -900 J (B) -900 kJ
 (C) 270 kJ (D) +900 kJ

- Q26** The standard enthalpy of formation of NH_3 is -46 kJ mol^{-1} . If the enthalpy of formation of H_2 from its atoms is -436 kJ mol^{-1} and that of N_2 is -712 kJ mol^{-1} , the average bond enthalpy of N—H bond in NH_3 is:
 (A) + 1056 kJ mol^{-1}
 (B) - 1102 kJ mol^{-1}

- (C) - 964 kJ mol^{-1}
 (D) + 352 kJ mol^{-1}

- Q27** Reaction of silica with mineral acids may be given as:



Which among the following is correct?

- (A) HF and HCl both will react with silica
 (B) Only HF will react with silica
 (C) Only HCl will react with silica
 (D) Neither HF nor HCl will react with silica

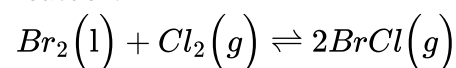
- Q28** For vaporisation of water at 1 atmospheric pressure, the values of ΔH and ΔS are 40.63 kJ mol^{-1} and 108.8 J $\text{K}^{-1} \text{mol}^{-1}$ respectively. The temperature when gibbs free energy change (ΔG) for transformation will be zero, is:
 (A) 273.4 K (B) 393.4 K
 (C) 373.4 K (D) 293.4 K

- Q29** Predict the sign of ΔS for each of the following processes, which occur at constant temperature:
 I. The volume of 2 mol of $\text{O}_2(\text{g})$ increases from 44L to 54L.
 II. The pressure of 2 mol of $\text{O}_2(\text{g})$ increases from 1 atm to 1.2 atm.

	I	II
(1)	$\Delta S = -ve$	$\Delta S = -ve$
(2)	$\Delta S = -ve$	$\Delta S = +ve$
(3)	$\Delta S = +ve$	$\Delta S = -ve$
(4)	$\Delta S = +ve$	$\Delta S = +ve$

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

- Q30** The enthalpy and entropy changes 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:

- (A) 285.7 K (B) 273 K
(C) 450 K (D) 300 K

Q31 Assertion (A): Enthalpy of graphite is lower than that of diamond.

Reason (R): Entropy of graphite is lower than that of diamond.

- (A) If both (A) and (R) are correct and (R) is the correct reason for (A).
(B) If both (A) and (R) are correct but (R) is not the correct explanation for (A).
(C) If (A) is true but (R) is false.
(D) If both (A) and (R) are false.

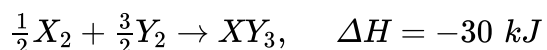
Q32 A 1 g sample of substance A at 100°C is added to 100 mL of H_2O at 25°C . Using separate 100 mL portion of H_2O , the procedure is repeated with substance B and then with substance C. How will the final temperatures of the water compare?

Substance	Specific heat
A	$0.6 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$
B	$0.4 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$
C	$0.2 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$

- (A) $T_C > T_B > T_A$
(B) $T_B > T_A > T_C$
(C) $T_A > T_B > T_C$
(D) $T_A = T_B = T_C$

Q33 Standard entropy of X_2 , Y_2 and XY_3 are 60, 40 and $50 \text{ JK}^{-1} \text{ mol}^{-1}$ respectively.

For the reaction :



to be at equilibrium, the temperature will be :

- (A) 1000 K (B) 1250 K
(C) 500 K (D) 750 K

Q34 Statement-1: There is no exchange in internal energy in a cyclic process.

Statement-2: In a cyclic process, the system returns to original state in a number of steps.

- (A) Statement-1 is true; statement-2 is true; statement-2 is a correct explanation for

statement-1.

- (B) Statement-1 is true; statement-2 is true; statement-2 is not a correct explanation for statement-1.
(C) Statement-1 is true; statement-2 is false.
(D) Statement-1 is false; statement-2 is true.

Q35 Two mole of an ideal gas is expanded isothermally and reversibly from 1 litre to 10 litre at 300 K. The enthalpy change (in kJ) for the process is:

- (A) 11.4 kJ (B) -11.4 kJ
(C) 0 kJ (D) 4.8 kJ

Q36 Which among the following represents the standard reaction of formation of the product?

- (A) $\text{C}_{(\text{diamond})} + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$
(B) $\text{S}_{(\text{monoclinic})} + \text{O}_2(\text{g}) \rightarrow \text{SO}_2(\text{g})$
(C) $2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{N}_2\text{O}(\text{g})$
(D) None of the above

Q37 Assertion (A): Decrease in free energy causes spontaneous reaction.

Reason (R): Spontaneous reactions are invariably exothermic.

- (A) If both (A) and (R) are correct and (R) is the correct reason for (A).
(B) If both (A) and (R) are correct but (R) is not the correct explanation for (A).
(C) If (A) is true but (R) is false.
(D) If both (A) and (R) are false.

Q38 Considering entropy(s) as a thermodynamic parameter, the criterion for the spontaneity of any process is:

- (A) $\Delta S_{\text{system}} + \Delta S_{\text{surrounding}} > 0$
(B) $\Delta S_{\text{system}} - \Delta S_{\text{surrounding}} > 0$
(C) $\Delta S_{\text{system}} > 0$ only
(D) $\Delta S_{\text{surrounding}} > 0$ only

Q39 Statement-1: Most of the combustion reactions are exothermic.

Statement 2: Products are more stable than reactants in exothermic process.

- (A)

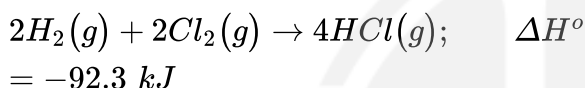


Statement-1 is true; statement-2 is true;
statement-2 is a correct explanation for
statement-1.

- (B) Statement-1 is true; statement-2 is true;
statement-2 is not a correct explanation for
statement-1.
(C) Statement-1 is true; statement-2 is false.
(D) Statement-1 is false; statement-2 is true.

- Q40** Which one of the following statements is false?
(A) Work is a state function.
(B) Temperature is a state function.
(C) Work appears at the boundary of the system.
(D) Change in the state is completely defined
when the initial and final states are specified

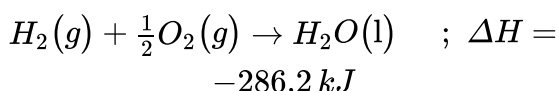
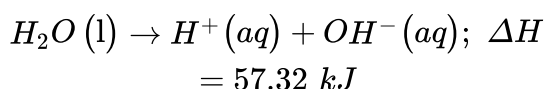
- Q41** Consider this equation and the associated value
for ΔH° :



Which statement about this information is
incorrect?

- (A) If the equation is reversed, the ΔH° value
equals + 92.3 kJ
(B) The four HCl bonds are stronger than four
bonds in H_2 and Cl_2
(C) The ΔH° value will be - 92.3 kJ if HCl is
produced as a liquid
(D) 23.1 kJ of heat will be evolved when 1 mole of
 $HCl(g)$ is produced

- Q42** On the basis of following thermochemical data :



The value of enthalpy of formation of OH^- ion at
25°C is:

- (A) -22.88 kJ (B) -228.88 kJ
(C) +228.88 kJ (D) -343.52 kJ

- Q43** **Statement-1:** Heat of solution is positive when
 $Na_2SO_4 \cdot 10H_2O$ is dissolved in water but it is
negative when anhydrous $CuSO_4$ is dissolved in

water.

Statement-2: Molar masses of $Na_2SO_4 \cdot 10H_2O$
and $CuSO_4$ are same

- (A) Statement-1 is true; statement-2 is true;
statement-2 is a correct explanation for
statement-1.
(B) Statement-1 is true; statement-2 is true;
statement-2 is not a correct explanation for
statement-1.
(C) Statement-1 is true; statement-2 is false.
(D) Statement-1 is false; statement-2 is true.

- Q44** For the reaction,
 $2H_2(g) + O_2(g) \rightarrow 2H_2O(g); \quad \Delta H^\circ = -573.2 \text{ kJ}$

The heat of decomposition of water per mol is:

- (A) 286.6 kJ (B) 573.2 kJ
(C) -28.66 kJ (D) Zero

- Q45** The value of ΔH and ΔS for the reaction,
 $C(\text{graphite}) + CO_2(g) \rightarrow 2CO(g)$ are
170 kJ and 170 J/K respectively. This reaction will
be spontaneous at :

- (A) 510 K (B) 710 K
(C) 910 K (D) 1110 K



Answer Key

Q1 (B)
Q2 (D)
Q3 (C)
Q4 (B)
Q5 (B)
Q6 (A)
Q7 (B)
Q8 (A)
Q9 (D)
Q10 (C)
Q11 (A)
Q12 (B)
Q13 (D)
Q14 (B)
Q15 (B)
Q16 (A)
Q17 (C)
Q18 (D)
Q19 (C)
Q20 (A)
Q21 (C)
Q22 (B)
Q23 (D)

Q24 (B)
Q25 (A)
Q26 (D)
Q27 (B)
Q28 (C)
Q29 (C)
Q30 (A)
Q31 (C)
Q32 (C)
Q33 (D)
Q34 (A)
Q35 (C)
Q36 (D)
Q37 (C)
Q38 (A)
Q39 (A)
Q40 (A)
Q41 (C)
Q42 (B)
Q43 (C)
Q44 (A)
Q45 (D)



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