Thermodynamics

1. **Assertion (A):** The enthalpy of formation of $H_2O(\lambda)$ is greater than of H_2O (g) in magnitude.
Reason (R): Enthalpy change is negative for the condensation reaction,
H_2O (g) $\rightarrow$ $H_2O(\lambda)$.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Heat of neutralisation of perchloric acid, $HClO_4$, with NaOH is same as that of HCl with NaOH.
Reason (R): Both HCl and $HClO_4$ are strong acids.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** In the following reaction : $C(s) + O_2(g) \rightarrow CO_2(g)$; $\Delta H = \Delta U - RT$
Reason (R): ΔH is related to ΔU by the equation, $\Delta H = \Delta U - \Delta n_g RT$.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Entropy change in reversible adiabatic expansion of an ideal gas is zero.
Reason (R): The increase in entropy due to volume increase just compensate the decrease in entropy due to fall in temperature.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Enthalpy and entropy of any elementary substance in the standard states are taken as zero.
Reason (R): At absolute zero, entropy of the perfectly crystalline substance is not equal to zero.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Decrease of free energy during the process under constant temperature and pressure provides a measure of its spontaneity.
Reason (R): A spontaneous change must have +ve sign of ΔS_{system}.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** A reaction which is spontaneous and accompanied by decrease of randomness must be exothermic.
Reason (R): All exothermic reactions are accompanied by decrease of randomness.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Work is a path function which is expressed in joule.
Reason (R): Work appears only at the boundary of the system.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** The expansion of a gas into an evacuated space takes place spontaneously.
Reason (R): A process in which all steps cannot be retraced by themselves is called a spontaneous process.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** $\Delta G = \Delta G^{\circ} + 2.303RT\log_{10} Q$, where Q is reaction quotient.
REASON (R): Q may be greater or lesser than K otherwise equal to K if $\Delta G = 0$.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **ASSERTION (A):** A **process** is said to be adiabatic if the system does not exchange heat with surroundings.
REASON (R): It does not involve increase or decrease in temperature of the system.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **ASSERTION (A):** For an isothermal expansion dT = 0.
REASON (R): Work done in reversible expansion at constant temperature
$W = -2.303nRT\log\left(\frac{P_1}{P_2}\right)$
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **ASSERTION (A):** T, P and V are state variables or state functions.
REASON (R): Their values depends on the state of the system and how it is reached.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **ASSERTION (A):** The heat absorbed during the isothermal expansion of an ideal gas against vacuum is zero.
REASON (R): The volume occupied by the molecules of an ideal gas is zero.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

ANSWER KEY														
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Ans.	1	1	4	1	4	3	3	2	1	2	3	2	3	2