CHEMISTRY

NCERT - FULL MARKS CHEMISTRY(TAMIL)

THERMODYNAMICS -II

Self Evaluation A Choose The Correct Answer

1. The amount of heat exchanged with the surrounding at constant quantity _____

A. ΔE

B. ΔH

C. ΔS

D. ΔG

Answer:

Watch Video Solution

2. All the naturally occurring processes proceed spontaneously in a direction which leads to

A. decrease of entropy

B. increase in enthalpy

C. increase in free energy

D. decrease of free energy

Answer:

Watch Video Solution

3. In an adiabatic process, which of the following is true ?

A. q = w

B. q = 0

C. $\Delta E = q$

D. $P\Delta V = 0$

Answer:

Watch Video Solution

4. When a liquid boils , there is ___ in entropy.

A. an increase in entropy

B. a decrease in entropy

C. an increase in heat of vapourisation

D. an increase in free energy

Answer:

Watch Video Solution

5. If ΔG for a reaction is negative , the change is ____

A. Spontaneous

B. Non-spontaneous

C. Reversible

D. Equilibrium

Answer:

Watch Video Solution

6. Which of the following does not result in an increase in the entropy ?

A. crystallisation of sucrose from solution

B. rusting of iron

C. conversion of ice to water

D. vaporisation of camphor

Answer:

Watch Video Solution

7. In which of the following process, the process is always non-feasible?

A. $\Delta H > 0, \Delta S > 0$

B. $\Delta H < 0, \Delta > 0$

C. $\Delta H > 0, \Delta S < 0$

D. $\Delta H < 0, \Delta S < 0$

Answer:

Watch Video Solution

8. Change in Gibbs free energy is given by _____

A. $\Delta G = \Delta H + T\Delta S$

B. $\Delta G = \Delta H - T\Delta S$

C. $\Delta G = \Delta H \times T\Delta S$

D. None of the above

Answer:

Watch Video Solution

9. For the reaction $2Cl_{(g)} \rightarrow Cl_{2(g)}$, the signs of ΔH and ΔS respectively are

A. +, –

B. +, +

C. –, –

D. –, +

Answer:

Watch Video Solution

Self Evaluation B Answer In One Or Two Sentences

1. what is the usual definition of entropy ? What is the unit of entropy ?

Watch Video Solution

2. Predict the feasibility of a reaction when (i) both ΔH and ΔS positive (ii) both ΔH and ΔS negative (iii) ΔH decreases but ΔS increases

Watch Video Solution

3. Define Gibb's free energy .

Watch Video Solution

4. Give Kelvin statement of second law of thermodynamics.

Watch Video Solution

5. What is correct about ΔG ?

Watch Video Solution

6. Define order of a chemical reaction.

Watch Video Solution

Self Evaluation C Answer Not Exceeding 60 Words

1. State the various statements of second law of thermodynamics.

Watch Video Solution

2. What are spontaneous reactions? What are the conditions for the spontaneity of a process?

Watch Video Solution

Self Evaluation Exercises

1. Calculate the maximum efficiency % possible from a thermal engine operating between $110^{\circ}C$ and $25^{\circ}C$.

Watch Video Solution

2. What is the entropy change of an engine that operates at $100^{\circ}C$ when 453.6 k.cal of heat is supplied to it?

Watch Video Solution

3. Calculate the entropy increase in the evaporation of 1 mole of a liquid when it boils at $100^{\circ}C$ having heat of vaporisation at $100^{\circ}C$ as 540 cals\gm.

Watch Video Solution

4. In the reaction $N_{2(g)} + O_{2(g)} \rightarrow 2NO_{(g)}, \Delta H^{\circ}$ reaction is $+179.9kJmol^{-1}$ and $\Delta S^{\circ}_{\text{reaction}} = 66.09JK^{-1}mol^{-1}$. Calculate ΔG° reaction at 300K.

Watch Video Solution

5. Calculate the standard free energy change (Δ°) of the following reaction and say whether it is feasible at 373 K or not $\frac{1}{2}H_{2(g)} + \frac{1}{2}I_{2(g)} \rightarrow HI_{(g)}$, ΔH_r° is + 25.95 kJ mole^{-1}. Standard entropies of $HI_{(g)}$. $H_{2(g)}$ and $I_{2(g)}$ are 206.3, 130.6 and $116.7 JK^{-1}\text{mole}^{-1}$.

View Text Solution

6. Calculate standard free energy of formation of $H_2O_{(l)}$. The standard enthalpy of formation of $H_2O_{(l)}$ is 285.85 kJ and standard entropies of

$H_{2(g)}$, $O_{2(g)}$ and $H_2O_{(l)}$ are130.5, 205.0 and 70.3 J.$K^{-1}\text{mole}^{-1}$ respectively.

Watch Video Solution

7. Calculate ΔH_f° for the reaction $CO_2(g) + H_2(g) \rightarrow CO(g) + H_2O(g)$ given that ΔH_f^0 for $CO_2(g), CO(g)$ and $H_2O(g)$ are -393.5 , -111.31 and -242kJ mol^{-1} respectively.

Watch Video Solution

8. Predict whether the reaction $CO_{(g)} + H_2O_{(g)} \rightarrow CO_{2(g)} + H_{2(g)}$ is spontaneous or not. The standard free energies of formation of $CO_{(g)}, H_2O_{(g)}$ and $CO_{2(g)}$ are –137.27, –228.6 and –394.38 kJ $mo \leq ^{-1}$ respectivley.

Watch Video Solution

9. The standard entropy change ΔS_r° for $CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$ is -242.98 JK^{-1} at $25^\circ C$. Calculate the standard reaction enthalpy for the above reaction if standard Gibbs energy of formation of

$CH_{4(g)}$, $CO_{2(g)}$ and $H_2O_{(l)}$ are -50.72, -394.36 and - 237.13 kJ mol^{-1} respectively.

Watch Video Solution

10. The standard heat of formation of $H_2O_{(l)}$ from its elements is –285.83 kJ. mole^{-1} and the standard entropy change for the same reaction is $-327JK^{-1}$ at $25^{\circ}C$. Will the reaction be spontaneous at $25^{\circ}C$?

Watch Video Solution

11. The boiling point of benzene at 1 atm is $80.2^{\circ} C$. Calculate the enthalpy of vaporisation of benzene at its b. pt.

View Text Solution

12. The standard entropy change ΔS_r° for

$$CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$$

is -242.98 JK^{-1} at $25^{\circ} C$. Calculate the standard reaction enthalpy for the above reaction if standard Gibbs energy of formation of $CH_{4(g)}$, $CO_{2(g)}$ and $H_2O_{(l)}$ are -50.72, -394.36 and - 237.13 kJ mol^{-1} respectively.

Watch Video Solution

13. Standard enthalpy change for combustion of methane is –890 kJ mol^{-1} and standard entropy change for the same combustive reaction is -242.98 $J.K^{-1}$ at $25^{\circ}C$. Calculate ΔG° of the reaction.

Watch Video Solution

14. The standard entropy change for the reaction

$$C_3H_{6(g)} + \frac{9}{2}O_{2(g)} \rightarrow 3CO_{2(g)} + 3H_2O_{(l)}$$

is – 339.23 JK-1 at $25^{\circ}C$. Calculate the standard

reaction enthalpy change if the standard Gibbs energy of formation of $C_3H_{6(g)}$, $CO_{2(g)}$ and $H_2O_{(l)}$ are 62.78, – 394.36 and –237.13 kJ.mol^{-1} respectively.

View Text Solution