

## THERMODYNAMICS

Std. XII  
CHEMISTRY

Time : 1 Hr  
Max. Marks: 50

## PART - I

Choose the best answer

(10 × 1 = 10)

- In an adiabatic process which of the following is true?
  - $q = w$
  - $p \Delta v = 0$
  - $\Delta E = q$
  - $q = 0$
- In which of the following process the process is always non-feasible?
  - $\Delta H > 0, \Delta S > 0$
  - $\Delta H < 0, \Delta S > 0$
  - $\Delta H > 0, \Delta S < 0$
  - $\Delta H < 0, \Delta S < 0$
- The relation  $\Delta G = \Delta H - T\Delta S$  was given by
  - Boltzman
  - Faraday
  - Gibbs Helmholtz
  - Thomson.
- For a spontaneous process  $\Delta G$  must be
  - positive
  - negative
  - equal to zero
  - may be positive or negative
- Which of the following is not a state function?
  - $\Delta S$
  - $\Delta q$
  - $q$
  - $T$
- All naturally occurring process proceed spontaneously in a direction which leads to
  - decrease in entropy
  - increase in entropy
  - increase in free energy
  - decrease in free energy
- Standard free energy of formation of elements are taken as
  - zero
  - maximum
  - minimum
  - constant.
- For an Isothermal process the entropy change of the universe during a reversible process is
  - zero
  - maximum
  - minimum
  - Non of these.
- For an exothermic process which of the following is always  $> 0$ 
  - $\Delta S$
  - $\Delta T$
  - $\Delta H$
  - none of these.
- For which of the following process  $\Delta S_{\text{Total}} < 0$ 
  - intermixing of gases
  - melting of ice below  $4^\circ\text{C}$  at 1 atm pressure.
  - evaporation of water above  $100^\circ\text{C}$
  - burning at  $\text{H}_2$  and  $\text{O}_2$

**PART - II**

**(5 × 3 = 15)**

11. What are the limitations of first law of thermodynamic?
12. Define entropy and give the mathematical representation.
13. State Trouton's rule.
14. Define Gibbs free energy.
15. Why liquid helium, liquid acetic acid and water donot obey Trouton's rule.

**PART - III**

**(3 × 5 = 15)**

16. (a) Define standard entropy  
(b) Calculate the enthalphy of vaporisation of benzene. The boiling point of benzene at 1 atm is 80.2°C.
17. Mention the conditions for spontaneous, non spontaneous and equilibrium processes interms of  $\Delta G$ ,  $\Delta H$  and  $\Delta S$ .
18. Derive the relationship between  $\Delta G$  and network.

**PART - IV**

**(1 × 10 = 10)**

19. (a) State the various statements of second law of thermodynamics.  
(b) What are the characteristics of entropy 'S'.