

Model Question Paper
Thermodynamics - II - Part I
12th Standard

Chemistry

Reg.No. :

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I. Answer all the questions.

II. Use blue pen only.

III. Question number 18 is compulsory.

Time : 01:30:00 Hrs

Total Marks : 70

5 x 1 = 5

Part-A

- 1) The amount of heat exchanged with the surrounding at constant temperature and pressure is called
(a) ΔE (b) ΔH (c) ΔS (d) ΔG
- 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
- 3) In an adiabatic process which of the following is true?
(a) $q = w$ (b) $q = 0$ (c) $\Delta E = q$ (d) $P\Delta V = 0$
- 4) When a liquid boils, there is
(a) an increase in entropy (b) a decrease in entropy (c) an increase in heat of vapourisation (d) an increase in free energy
- 5) If ΔG for a reaction is negative, the change is
(a) Spontaneous (b) Non-spontaneous (c) Reversible (d) Equilibrium

Part-B

5 x 3 = 15

- 6) What is entropy? What are the units of entropy?
- 7) Predict the feasibility of a reaction when i) both ΔH and ΔS increase ii) both ΔH and ΔS decrease iii) ΔH decreases but ΔS increases iv) ΔH increases ΔS decreases
- 8) What is Gibbs' free energy?
- 9) Give the Kelvin - Planck statement of second law of thermodynamics.
- 10) How ΔG is related to ΔH and ΔS ? What is the meaning of $\Delta G = 0$?

Part-C

6 x 5 = 30

- 11) The normal boiling point CCl_4 , CHCl_3 and H_2S are 76.7°C , 61.5°C and -59.6°C respectively. Calculate the molar heat of vapourisation of each liquid, assuming ideal behaviour.
- 12) Calculate the entropy change involved in the conversion of 1 mole of ice at 0°C and 1 atm to liquid at 0°C and 1 atm. The enthalpy of fusion per mole of ice is 6008 J mol^{-1} .
- 13) Calculate the change of entropy for the process, water (liq) $\rightarrow$ water (vapour, 373K) involving $\Delta H_{\text{vap}} = 40850 \text{ J mol}^{-1}$ at 373K.
- 14) State the various statements of second law of thermodynamics.
- 15) What are spontaneous reactions? What are the conditions for the spontaneity of a process?
- 16) Write the various statements of second law of thermodynamics.

Part-D

2X10=20

- 17) a) Evaluate the entropy change for the following process possessing $\Delta H_{\text{transition}} = 2090 \text{ J mol}^{-1}$
b) Calculate the entropy changes in the system, and in the surroundings and the total entropy change in the universe when during a process 75 J of heat flow out of the system at 55°C to the surroundings at 20°C .
 - 18) a) Write the characteristics of free energy G .
b) What are the characteristics of entropy?
- (OR)
- b) a) State Trouton's rule? what types of liquid deviate from Trouton's rule.
b) State any three statements of second law of Thermodynamics
