

(i) Printed Pages: 4

Roll No.

(ii) Questions : 9

Sub. Code :

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Exam. Code :

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B.A./B.Sc. (General) 2nd Semester

1059

CHEMISTRY

Paper—VII Physical Chemistry—B

(Same for B.Sc. Microbial & Food Tech.)

Time Allowed : Three Hours]

[Maximum Marks : 22

Note :— (1) Attempt **five** questions in all, with **one** question from each Units I, II, III and IV and Question No. 9 is compulsory.

(2) Use of simple calculator is allowed.

UNIT—I

1. (a) How maximum amount of work during isothermal expansion of a gas can be obtained ? Derive an expression for the maximum work obtainable from the isothermal expansion of n moles of an ideal gas.

(b) Two moles of hydrogen at S.T.P. are compressed adiabatically to a volume of 10 litres. Calculate the final temperature and pressure of the gas. Given that r for hydrogen is 1.41. 2,2

2. (a) Derive expression for w , q , ΔE and ΔH for adiabatic reversible expansion of an ideal gas.
- (b) State first law of thermodynamics in two different ways. Derive the mathematical expression for it. Explain the fact that internal energy is a state function but work and heat are path functions. 2,2

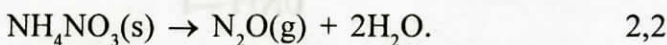
UNIT—II

3. (a) Derive the relationship :

$$\frac{\Delta E_2 - \Delta E_1}{T_2 - T_1} = \Delta C_V.$$

Also name this equation.

- (b) The molar heat of formation of $\text{NH}_4\text{NO}_3(\text{s})$ is -367.54 kJ and those of $\text{N}_2\text{O}(\text{g})$ and H_2O are $+81.46 \text{ kJ}$ and -285.78 kJ , respectively at 25°C and 1 atmospheric pressure. Calculate ΔH and ΔE for the reaction :



4. (a) Calculate the enthalpy change for the transformation of diamond to graphite given that the enthalpy of combustion of diamond and graphite are -395.4 and -393.5 kJ , respectively.
- (b) Define 'Bond energy' for a diatomic molecule and for a polyatomic molecule. How bond energies can be useful in calculating the enthalpy change of a reaction ? 2,2

UNIT—III

5. (a) Explain the terms 'Dialysis' and 'Electro-dialysis'. Briefly describe one important application of dialysis.
- (b) What are lyophilic and lyophobic colloids ? Describe the important points of difference between them. 2,2
6. (a) What are gels ? How are they prepared ? Describe the following properties of gels :
- (i) Syneresis
- (ii) Imbibition
- (iii) Thixotropy.
- (b) Write a note on Tyndall effect. 2,2

UNIT—IV

7. (a) Derive thermodynamically the relation $\Delta T_f = K_f \times m$ (m = molality of the solution).
- (b) A 4 percent solution of sucrose $C_{12}H_{22}O_{11}$ is isotonic with 3 percent solution of an unknown organic substance. Calculate the molecular mass of the unknown substance. 2,2
8. (a) What do you mean by molal elevation constant of a solvent ? How is it related to the latent heat of vaporization of the solvent ? What are its units ?
- (b) Why do we get abnormal molecular masses from colligative properties ? What is Van't Hoff factor ? 2,2

(Compulsory Question)

9. (a) What is the relationship between heat and mechanical work ? Define Joule's mechanical equivalent of heat. What is its value ?
- (b) What do you understand by inversion temperature ?
- (c) Why is the enthalpy of neutralization of a strong acid with a strong base constant ? Explain.
- (d) What is the cause of Brownian movement ?
- (e) Describe Berkeley and Hartley's method for measuring osmotic pressure.
- (f) Briefly explain how lowering of vapour pressure is used in the calculation of molecular masses of solutes ?

6×1