(i) Printed Pages : 4 Roll No. .....

(ii) Questions : 9 Sub. Code : 0153

Exam. Code : 0002

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

(2053)

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 unit I, II, III and IV and Question No. 9 is compulsory.

(2) Use of simple calculator is allowed.

UNIT–I

1. (a) Three moles of a perfect gas with $C_v = 5.0$ cal/mol/degree are to be compressed adiabatically and reversibly from volume 75 litres at 1.0 atmosphere to a pressure of 100 atmospheres. Predict (a) the final volume of the gas (b) the final temperature of the gas. 2

(b) Show that the Joule Thomson coefficient μ is given by :

$$\mu = -\frac{1}{C_p}\left(\frac{\partial H}{\partial P}\right)_T$$ 2

2. (a) Define, with examples, the following terms :

(i) Reversible process and Irreversible process

(ii) Extensive and Intensive variables. 2

(b) Calculate w, q, ΔU and ΔH for Isothermal reversible expansion of an ideal gas. 2

UNIT–II

3. (a) Show that the temperature dependence of heat of reaction is given by the relation

$$\left(\frac{\partial \Delta H}{\partial T}\right)_P = \Delta C_P$$

Name the equation. 2

(b) Calculate the enthalpy of hydration of anhydrous copper sulphate ($CuSO_4$) into hydrated copper sulphate ($CuSO_4 . 5H_2O$). Given that the enthalpies of solutions of anhydrous copper sulphate and hydrated copper sulphate are = –66.5 and +11.7 kJ mol^{-1} respectively. 2

4. (a) Define standard enthalpy of reaction, standard enthalpy of formation and standard enthalpy of combustion. What is Hess's law ? What is the thermodynamic basis of Hess's law ? 2

(b) What do you understand by Heat of reaction at constant volume and that at constant pressure ? Derive the relationship between them. Under what conditions, the two are equal ? 2

UNIT–III

5. (a) Discuss the origin of charge on Colloidal particles. How would you determine the charge on a colloid ? Describe briefly the electrical properties of colloids. 2

(b) Explain and illustrate the terms :

(i) Tyndall effect;

(ii) Brownian movement. 2

6. (a) What are the various methods available for preparing the colloidal solutions ? How are colloidal solutions purified ? 2

(b) What are protective colloids ? What is meant by gold number ? Discuss how a lyophilic colloid protects a lyophilic colloid. 2

UNIT–IV

7. (a) Derive a relationship between the depression in freezing point and the molecular weight of a non-volatile solute. 2

(b) Differentiate between ideal and non-ideal solutions. 2

8. (a) State and explain Van't Hoff theory of dilute solutions. 2

(b) 2.0 g of benzoic acid dissolved in 25.0 g of benzene shows a depression in freezing point equal to 1.62 K. Molal depression constant (K_f) of benzene is 4.9 K kg mol^{-1}. What is the percentage association of the acid ? 2

(Compulsory Question)

9. (a) Define with examples, extensive and intensive variables. 1

(b) Explain the concept of standard state and standard molar enthalpy. 1

(c) What are micelles ? Give an example of a micellar system. 1

(d) What do you understand by inversion temperature ? 1

(e) What is Van't Hoff's factor ? 1

(f) What are isotonic solutions ? Explain. 1