This question paper contains 5 printed pages.]

Your Roll No. ....

568-A
A

B.Sc.(Prog.) / II
CH-201: CHEMISTRY
(Admissions of 2007 and before)

Time : 3 *Hours*
Maximum Marks : 75

(Write your Roll No. on the top immediately

on receipt of this question paper.)

Use separate answer-sheets for Sections A and B.

SECTION A

Inorganic Chemistry

Attempt any *four* questions.

1. (a) Why are sulphide ones roasted to oxides before reduction?

    $4\frac{1}{2}$

    (b) Write short notes on

    (i) Mond's Process   4

    (ii) Parting Process   4

2. (a) What is the Pauling's scale of electronegativity? Why is it the most preferred scale in use? $4\frac{1}{2}$

[P.T.O.

(b) Explain any *four* of the following: 4 × 2

    (i)   Calcium hydroxide is the strongest alkali.

    (ii)   Lithium forms a nitride whereas other alkali metals do not.

    (iii)   Beryllium chloride is polymeric

    (iv)   Lithium is as food a reducing agent as cesium in aqueous solution

    (v)   Magnesium salts have higher water of crystallization.

3.   (a) Which elements form interstitial Hydrides? What are the important properties of interstitial hydrides? $4\frac{1}{2}$

    (b) Compare the acidic and basic strengths of the hydrides of Nitrogen and Halogen group. 2

    (c) Explain what happens when an alkali metal in gradually added to liquid ammonia. Comment on the colour, density and conductance of the different coloured solutions. 2 + 4

4.   (a) Write the names, formulas and draw the structures of oxoacids of sulphur. 10

    (b) Write the oxidizing properties of per acids of sulphur.(At least two properties). $2\frac{1}{2}$

5.   (a) What are the differences between inorganic and organic polymers? 4

(b) How are the linear and crosslinked silicones prepared?   6

(c) Give two important uses of silicones. $2\frac{1}{2}$

6. (a) How does the Na/K pump works to decrease the concentration of sodium in the body?   4

(b) Describe the structures of N_2H_4 and N_3H.   2

(c) What are the sources of contamination of mercury ? What are the antidotes? What are its biochemical effects? $6\frac{1}{2}$

SECTION B

Physical Chemistry

Attempt any *two* questions.

1. (a) Derive the expression:

$\eta = \frac{1}{3}m\,\overset{*}{N}\,\bar{u}\lambda$, where all the symbols have their usual meanings. Discuss the effect of temperature on η. $4\frac{1}{2}$

(b) Discuss the effect of temperature and pressure on mean free path (λ), Collision number (Z_1) and collision frequency (Z_{11}). 4

(c) At 300 K, calculate the following for oxygen in a bulb at a pressure of 10^{-5} torr. The molecular diameter of oxygen is 0.36 nm.   4

[P.T.O.

(a) Z_1, number of collision per sec.

(b) Z_{11}, number of collision per second per m^3.

2. (a) What is the effect of temperature on the viscosity of a liquid.?

$2\frac{1}{2}$

(b) Explain why small drops of liquids are spherical.   2

(c) The time of flow of water through an Ostwald viscometer is 1.52 minutes, for the same volume of an organic liquid of density 0.8 g/ml, it is 2.25 minutes. Find the viscosity of liquid related to water and also absolute viscosity at 20°C. Density and viscosity of water are 1.0 g/ml and 1.002×10^{-2} poise, respectively.   4

(d) Explain :   4

(i)   Degree of freedom of motion

(ii)   Law of corresponding states.

3. (a) Derive expressions for P_c, V_c and T_c in terms of a, b_2 and R for a Van der Waals gas.   6

(b) Derive the relation $\Delta Smix = -nR \sum x_i \ln x_i$ 4

(c) Show that in a binary system, the decrease in free energy of mixing is minimum if $x_1 = x_2 = \dfrac{1}{2}$ $2\frac{1}{2}$

4.   (a) Derive therm odynamically

$\pi = \dfrac{n_2}{v} RT$, where all symbols have their usual meanings.

$4\dfrac{1}{2}$

(b) 1.250 g of naphthalene was dissolved in 60 cm³ of benzene and the freezing point of the solution was found to be 277.515 k, while that of pure benzene is 278.49k. Density of benzene is 0.880 g/cm³, K_f= 5.1 K/per 1000 g of benzene. Calculate molar mass of naphthalene.   4

(c) Write the Maxwell Boltzmann distribution law of molecular speeds and derive the expression of most probable speed.   4