

[This question paper contains 4 printed pages.]

Your Roll No.

4600-A

AS

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 Section A and B.)

Use of calculators is allowed.

Log tables will be provided, if asked for.

Section A

Inorganic Chemistry

Marks : 50

Attempt any *Four* questions.

1. (a) What is an Ellingham diagram ? When the value of $\Delta G/\text{mole}$ of oxygen becomes +ve as in the case of mercury and silver, what happens ? 4½
- (b) Write a short note on hydrometallurgy, giving examples of Silver and Copper. 4
- (c) Write the principle of Van Arkel de Boer method. 4

[P. T. O.]

2. (a) Define the Mulliken scale of electronegativity. Which is the most used electronegativity scale ? $4\frac{1}{2}$
- (b) Explain any *four* of the following :
- (i) Alkali metals impart characteristic colour to Bunsen flame. 4×2
 - (ii) Maximum covalency of beryllium is four.
 - (iii) Lithium carbonate decomposes on heating.
 - (iv) Barium sulphate is insoluble in water.
 - (v) The alkali metals react differently on heating with oxygen.
3. (a) How are hydrides classified ? Give the properties of any one of the categories. $4\frac{1}{2}$
- (b) Write the structure of Beryllium Hydride. 2
- (c) The alkali metals form 'true solutions' in liquid ammonia. Why are they blue ? Explain their electrical conductivity with changing concentration. 6
4. (a) Draw the structures of NH_3 and NH_2OH . What are the application of NH_2OH in Organic Chemistry ? Discuss their basic nature. $6\frac{1}{2}$
- (b) Write a short note on silicone oils, greases and rubbers. Are they better than organic counterparts ? 6
5. (a) Write the name, formula and structure of oxides of phosphorous. 4

- (b) Describe the role of calcium in blood clotting and muscle contraction. 4
- (c) Write the sources of contamination of sulphur oxides in atmosphere and their biochemical effects. How can they be minimized ? $4\frac{1}{2}$
6. (a) What are the biochemical effects of toxicity of lead and Arsenic ? What are the antidotes ? 8
- (b) Write the structures and names of oxoacids of chlorine. $4\frac{1}{2}$

Section B

Attempt any *two* questions. Calculators may be allowed.

$$R = 8.314 \text{ J/K/mol}$$

1. (a) Write postulates of kinetic theory of gases and derive kinetic gas equation. 4
- (b) Define critical constants. Derive expressions for critical temperature, pressure and volume for a Vander Waal's gas. $4\frac{1}{2}$
- (c) Calculate root mean square velocity and average velocity of nitrogen gas at 25°C . The molecular weight of nitrogen is 28 g/mol. 4
2. (a) Define surface tension of liquid and describe a method for its determination. 5
- (b) If the flow times for two liquids A and B through the same capillary are in the ratio of 2 : 3 and densities are in the ratio of 1 : 2, what is the ratio of their viscosities ? 3

[P. T. O.]

- (c) Explain Maxwell's distribution law of molecular speeds. Derive the expression of most probable speed. 4½
3. (a) Explain the principle of steam distillation with suitable examples. 4
- (b) Prove thermodynamically that elevation in boiling point is a colligative property. 4½
- (c) The osmotic pressure of a solution containing 18.0 g fructose per litre is 2.472 atm. at 30°C. The molar volume of water at this temperature is 18.10 cm³. Calculate boiling point of this solution. 4
4. (a) What is chemical potential ? Show the variation of chemical potential with temperature and pressure. 5
- (b) Define Raoult's Law and explain the conditions under which the deviation from Raoult's Law is observed. 4
- (c) Calculate the vapour pressure over a solution containing 11.70 g benzene and 4.60 g methyl benzene at 50°C. Given vapour pressure of pure components at this temperature are $3.6 \times 10^4 \text{ Nm}^{-2}$ and $1.12 \times 10^4 \text{ Nm}^{-2}$, respectively.