

Roll No.

(011/17-I)

5169

B. Sc. EXAMINATION

(First Semester)

CHEMISTRY

Second Paper (CH-102)

Physical Chemistry

Time : Three Hours *Maximum Marks : 26*

Note : Attempt *Five* questions in all. Q. No. 1 is compulsory. Attempt at least *two* questions from each Section.

1. (a) What are collision number and collision frequency ?
- (b) How does increase of temperature affect the Maxwell's distribution of velocity ?
- (c) At 293K temperature density of benzene is 0.878 g/cm and its viscosity is 6.47 milli poise. Predict whether it is associated or non-associated liquid.

- (d) What is Boyle's temperature ?
- (e) Give uses of liquid crystals.
- (f) Calculate distance between adjacent planes (hkl) in simple cubic system if side of cube is 5Å for (111) plane.

$$1 \times 6 = 6$$

Section A

2. (a) What are critical constants P_c , V_c and T_c . Derive a relationship between them from van der Waals' equation.
- (b) Give limitations of van der Waals' equation.
- (c) Give significance of van der Waals' constant a and b .
3. (a) Define Most Probable Velocity, Average Velocity and Root Mean Square Velocity. Give ratio between them and show their value on Maxwell distribution curve of velocity.

- (b) Calculate R.M.S. and average velocity of O_2 molecule at 300K temp. 3+2=5
4. (a) Define mean free path. How does it depend upon temperature and pressure of a gas ?
- (b) Discuss Linde's method for liquefaction of a gas. 3+2=5

Section B

5. (a) Derive Bragg's equation $n\lambda = 2d \sin\theta$ for X-ray diffraction by crystals.
- (b) Explain why NaCl and KCl have different X-ray powder diffraction patterns. 3+2=5
6. (a) What are liquid crystals. Give examples of different types of liquid crystals. Give their uses in thermography.
- (b) Define specific refraction and molar refraction. Calculate molar refraction of

acetic acid at 293K temp. If its density is 1.046 g/cm^3 and Rm value for C = 2.42, H = 1.1, O in CO = 2.21 and O in O-H = 15 cm^3/mol .

7. Write notes on the following :
- (i) Weiss indices and Miller indices
- (ii) Rheochor and Chemical constitution
- (iii) Determination of surface tension by using Stalagmometer. $2+1\frac{1}{2}+1\frac{1}{2}=5$