E 3198 (Pages : 2) Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2016

Fifth Semester

Core Course—STATES OF MATTER

(Common for B.Sc. Chemistry Model I and Model II, B.Sc. Petrochemicals, B.Sc. Chemistry Environment and Water Management)

(2013 Admission onwards)

Time : Three Hours Maximum : 60 Marks

Part A

Answer **all** *questions.*

Each question carries 1 *mark.*

1. Write down the expression for most probable velocity.
2. What is the correction factor for the volume in van der Waals equation for real gases ?
3. Total degrees of freedom pocessed by H_2O molecule.
4. What do you mean by cohesive force ?
5. What is meant by improper axis of symmetry ?
6. A crystal system having unit cell dimensions $a \neq b \neq c$ and $\alpha = \beta = \upsilon = 90$ is ———.
7. Calculate the Miller indices of crystal plane which cut through $(2a, 3b, c)$
8. What is the inter planar spacing for a cubic system ?

$(8 \times 1 = 8)$

Part B

Answer any **six** *questions.*

Each question carries 2 *marks.*

9. State and explain Boyle's law.
10. What is meant by mean free path ?
11. State the law of equipartition of energy.
12. Define the compressibility factor.
13. The RMS velocity of oxygen at 298 K is 4.6×10^2 m/s. Calculate its average velocity.

Turn over

14. Explain proper and improper axis of symmetry.
15. What features distinguish a real gas from an ideal gas ?
16. What is meant by superconductivity ?
17. Sketch Freundlich absorption isotherm.
18. Explain Frenkel defect.

(6 × 2 = 12)

Part C

Answer any **four** *questions.*
Each question carries 4 *marks.*

19. Show that the K.E. of an ideal gas is a function of its absolute temperature and independent of its volume or pressure or type of molecule.
20. Calculate RMS and average velocity of SO_2 at 427° B.
21. Derive the Bragg's relation.
22. Explain the structure of 20 S and Ca F_2.
23. How thermotropic liquid crystals are classified.
24. Insulin forms crystals of orthorhombic type with unit cell dimensions of 13 nm × 7.48 nm × 3.09 nm.

    If the density of the crystal is 1.315×10^3 kg/m^3 and there are six insulin molecules per unit cell. What is the molar mass of insulin ?

(4 × 4 = 16)

Part D

Answer any **two** *questions.*
Each question carries 12 *marks.*

25. Discuss the applicability of van der Waals equation in explaining real gas behaviour under different conditions.
26. Discuss the determination of critical constants of a gas.
27. Discuss the various types of defects exhibited by solids.
28. (a) Analyse the powder diffraction pattern of KCl.

    (b) Write a note on crystallographic point group.

(2 × 12 = 24)