TB205125V

Reg. No :.....

Name :.....

B. Sc. DEGREE (C.B.C.S.) EXAMINATION, NOVEMBER 2022

2020 ADMISSIONS REGULAR AND 2019, 2018 ADMISSIONS SUPPLEMENTARY

SEMESTER V - CORE COURSE (CHEMISTRY)

CH5B07B18 - PHYSICAL CHEMISTRY - I

Time : 3 Hours **Maximum Marks : 60**

Part A

I. Answer any Ten questions. Each question carries 1 mark (10x1=10)

1. Calculate the temperature at which hydrogen molecule will have an average speed of 1.7825 x 10^{-3} m/s.
2. Relate Boyle temperature to van der Waal's constant.
3. Calculate the temperature at which RMS velocity of oxygen gas be equal to that of hydrogen gas at 27°C.
4. Define critical temperature of a gas.
5. The radius ratio of an ionic solid is 0.223. Select the possible structure of the crystal? A) Cubic B) Octahedral C) Orthorhombic D) Trigonal planar
6. Recall the number of Bravais lattices possible in crystal systems.
7. State true or false. For an Orthorhombic crystal, a≠b≠c, α=β=γ=90º.
8. Choose the alternate term for an amorphous solid. A) isotopic and supercooled liquids B) isoenthalpic and supercooled liquids C) anisotopic and supercooled liquids D) anisotopic and superheated solids.
9. State true or false: An amorphous solid can be converted to crystalline solid.
10. Recall the principle of stalagmometer.
11. Recall laminar flow of liquids.
12. Alum is used in town water supply. Explain.

Part B

II. Answer any Six questions. Each question carries 5 marks (6x5=30)

13. Discuss the applicability of van der Waal's equation in explaining the real gas behaviour under different conditions.
14. Define Boyle's temperature. Calculate the Boyle temperature for carbon dioxide gas, assuming it to be a van der Waal's gas. a= 3.59 dm^6 atm mol^{-2} and b= 0.0427 dm^3mol^{-1}.
15. Explain the terms unit cell, lattice points, crystal structure and motfis and analyse the relation between them.
16. Define voids in a crystal. Distinguish between tetrahedral and octahedral voids.
17. Explain the term radius ratio with regard to crystal structure. Explain its significance.
18. Define miller indices and weiss indices. Calculate the miller indices of (2a, 2b, c).
19. Explain a) Stability of colloids. b)Hardy-Schulz rule.
20. Explain the principle of stalagmometer. Discuss the surface tension measurement using drop number method.
21. Differentiate surface tension and viscosity of a liquid. Discuss the measurement of these parameters experimentally.

Part C

III. Answer any Two questions. Each question carries 10 marks (2x10=20)

22. A) The collision diameter of Oxygen gas is 3.61 x 10^{-10} m. if the temperature is 298 K, calculate (i) mean free path at 1 atmp (ii) mean free path at 10^{-3} mm of Hg (iii) collision number at 1 atmp (iv) collision frequency at 1 atmp. [1

atmp = 101325 x N/m^2]

B) Distinguish n-type and p-type semiconductors.

23. A)Derive Pc Vc = 3 RTc/8 B) Explain the term Bravais lattices mentioning the different types found among crystals.
24. A) Analyze the structure of NaCl using its powder diffraction pattern. B) Calculate the wavelength of X rays which give a diffraction angle 2θ=16.8º for a first order diffraction for a crystal with interplanar distance 0.200 nm.
25. A) Define and explain an adsorption isotherm. Review the relation between Langmuir isotherm and Freundlich isotherm. B) Explain the terms collision number, collision frequency, and mean free path of a gas. Discuss the effect of pressure and temperature on mean free path.