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Sr. No. 322107

December 2023

B. Sc (Chemistry) BSc - I SEMESTER

Physical Chemistry - I (BCH-102)

Time: 3 Hours

Max. Marks: 75

- Instructions:**
1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
 2. Answer any four questions from Part -B in detail.
 3. Different sub-parts of a question are to be attempted adjacent to each other.
 4. Use of non programmable scientific calculator is allowed

PART -A

- Q1 (a) Why X-rays are used in crystallography? (1.5)
- (b) Write Braggs equation (1.5)
- (c) Discuss significance of van der Waal's constants? (1.5)
- (d) Why hydrogen and helium shows exceptional behavior? (1.5)
- (e) Write mathematical expression for reduced equation of state. (1.5)
- (f) Define surface tension and write its units in SI system. (1.5)
- (g) Write name of various types of forces existing in liquids. (1.5)
- (h) Discuss effect of temperature on surface tension. (1.5)
- (i) How viscosity of a liquid changes with temperature? (1.5)
- (j) How weight of a drop varies with surface tension of a liquid in drop weight method? (1.5)

PART -B

- Q2 (a) Derive an expression for Henderson-Hasselbalch equation and discuss its applications in calculation of pKa values. (10)
- (b) What do you mean by buffer solutions? Discuss their types and preparations in details. (5)
- Q3 (a) Discuss powder XRD method in detail. (5)
- (b) What do you mean by Miller indices? Discuss their salient features and draw (123), (222) (111) planes for a cubic crystal (10)
- Q4 What do you mean by ideal gas? Distinguish ideal and real gases. Discuss causes of deviation from ideal behavior. (15)
- Q5 (a) Derive reduced equation of state and discuss law of corresponding states. (5)
- (b) Discuss critical phenomenon and derive expressions for critical constants in terms of van der Waal's constants. (10)
- Q6 (a) Derive kinetic gas equation $PV = \frac{1}{3}mnu^2$. (10)
- (b) Discuss determination of surface tension of a liquid by capillary rise method. (5)

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