



UNIVERSITY OF THE PUNJAB

B.A. / B.Sc. Part - I
Supplementary Examination - 2017

Roll No.

Subject: Chemistry-I
PAPER: A (Physical Chemistry)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 40

NOTE: Attempt any TWO questions from each section. Question No.1 is compulsory. All questions carry equal marks.

Q. 1 (a) Solve the following set of simultaneous equations **02**

$$2x + y = 25$$

$$4x + 3y = 9$$

(b) Differentiate the following: **03**

$$\sqrt{x} + \frac{1}{\sqrt{x}}$$

(c) Find the following indefinite integral **03**

$$\int \frac{1}{x \ln x} dx$$

Section-I

Q 2. (a) Explain the viscosity of gases. Discuss the effect of temperature and pressure on viscosity of gases. **04**

(b) Derive the mathematical expression for collision frequency and mean free path. **02**

(c) Explain the limitations of Vaander Waal's equation. **02**

Q 3. (a) Derive a Kinetic expression for zero order reaction. **03**

(b) Give postulate of collision theory of reaction rates. What are the failures of collision theory. **03**

(c) Derive units for third order reaction rate. **02**

Q 4. (a) Discuss the isothermal expansion of the gases and derive the equation for the work done due to the expansion of gas. **04**

(b) Discuss entropy change due to mixing of ideal gases. **02**

(c) Two moles of an ideal gas are allowed to expand reversibly and isothermally at 300 k from a pressure of 1 atm to a pressure of 0.1 atm. What is the change in Gibbs free energy? **02**

Q5. (a) Derive Bragg's equation. What is the physical significance of "n" in this equation. **04**

(b) Discuss the utility of Rheochore in the elucidation of structure of molecules. **02**

(c) Calculate the molar refraction of CCl_4 at 20°C . The refractive index of it is

(P.T.O.)

1.4573 and density is 1.595g/cm³. 02

Section-II

- Q 6. (a) Derive the principle quantum number from Schrodinger wave equation. 04
(b) What are operators? Give the expression for Laplacian operator and Hamiltonian operator. 02
(c) What are the eigen values and the eigen functions for the motion of the particle in one dimension box. 02
- Q 7. (a) What is osmosis? Give different method for the measurement of osmotic pressure. 04
(b) Discuss depression in freezing point graphically. 02
(c) 0.440 g of a substance dissolved in 22.2 g of benzene lowered the thre freezing point of the benzene by 0.567 °C. Calculate the molecular mass of the substance. (K_f = 5.12 °C). 02
- Q 8. (a) What is Kohalrausch's Law. Give its three applications. 04
(b) What is equivalent conductance? How it varies with dilution? 02
(c) What is glass electrode and quinhydro electrode. 02
- Q 9. (a) Give the mathematical and graphical explanation of Freundlic adsorption isotherm. 04
(b) Give the characteristics of enzyme catalysis. 02
(c) What is an isotherm? Give applications of Langmuir adsorption isotherm. 02



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Roll No.

Subject: Chemistry-I
PAPER: B (Inorganic Chemistry)

TIME ALLOWED: 3 hrs.
MAX. MARKS: 40

NOTE: Question No.1 is compulsory. Attempt any TWO questions from each Section I and II.

Q.1: Answer the following:

(2 x 4 = 8)

- (i) Differentiate between inner and outer transition elements.
- (ii) Calculate CFSE for d^6 high spin as well as low spin system for octahedral geometry.
- (iii) Which of them is a strong acid and why?
i. HF ii. HI
- (iv) What is an adsorbent? Give two examples.

Section I

Q.2: (a) Define the term Electronegativity. Discuss Mullikan's scale of electronegativity.

(2 + 4 = 6)

(b) The cations of basic radical group II are precipitated as sulphides by passing H_2S gas in acidic medium. Comment the statement.

(2)

Q.3: (a) Elaborate the following terms

i. Co-precipitation ii. Fractional precipitation

(3 + 3 = 6)

(b) Define the term Levelling effect.

(2)

Q.4: What are main postulates of VSEPR theory? Explain shapes of the AB_5 , AB_4E , AB_3E_2 molecules with at least two examples of each case.

(2 + 6 = 8)

Q.5: What is law of Mass action? Derive an expression for equilibrium constant of a reversible reaction.

(2 + 6 = 8)

Section II

Q.6: (a) What is basic principle of chromatography? Discuss classification of chromatographic techniques.

(2 + 4 = 6)

(b) What is Mass defect?

(2)

Q.7: (a) What are Transition elements? Describe their salient features.

(2 + 4 = 6)

(b) Why hybrid orbitals overlap more effectively compared to simple atomic orbitals.

(2)

Q.8: How will you differentiate between Inner orbital and outer orbital octahedral complexes on the basis of VBT? Support your answer with relevant examples.

(8)

Q.9: What are Nuclear Radiations? How these can be measured?

(2 + 6 = 8)