

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc DEGREE EXAMINATION MAY 2023
(First Semester)

Branch – CHEMISTRY

PHYSICAL CHEMISTRY - I

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

1. Identify the activity coefficient of the strong electrolyte.
i) always equal to zero
ii) always equal to one
iii) active concentration
iv) activity coefficient
2. The chemical equilibrium of a reversible reaction is not influenced by.
i) temperature
ii) pressure
iii) catalyst
iv) concentration
3. Conductivity of 0.01 M NaCl solution is 0.00145 Scm^{-1} . What happens to the conductivity if 100ml of water is added to the above solution?
i) Increases
ii) decreases
iii) remains unchanged
iv) first increases and then decreases
4. Find out the aqueous solution which is having highest electrical conductivity from the following ?
i) 0.1 M acetic acid
ii) 0.1 M chloroacetic acid
iii) 0.1 M fluoroacetic acid
iv) 0.1 M difluoroacetic acid
5. A saturated solution of sodium chloride in contact with solid solute has the phases and components equal to
i) 2 and 2
ii) 2 and 3
iii) 3 and 2
iv) 3 and 3

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

6. a) Discuss the variation of chemical potential with temperature and pressure.
OR
b) Derive Gibbs Duhem Equation.
7. a) State Lechatelier - Braun principle and discuss its applications.
OR
b) Derive thermodynamic expression for chemical equilibrium.
8. a) Explain Debye – Huckel limiting law and experimentally verify the limiting law equation.
OR
b) Draw and explain the EMF of a cell measurement using potentiometer.
9. a) Discuss the factors affecting overvoltage.
OR
b) Illustrate the derivation of Zeta potential of electro osmosis.
10. a) Explain Gibbs phase rule and its thermodynamic derivations.
OR
b) Discuss the salient features of phase diagram of water system.

Cont...

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 6 = 30)

11. a) Determine the fugacity of gas by graphical method.
OR
b) Derive Duhem – Margules equation and show that if in a binary solution component A obeys Raoult's law then component B would also obey's Raoult's law.
- 12.a) Explain the temperature dependence of the free energy and equilibrium constant ,
The Van't Hoff equation.
OR
b) Derive thermodynamic derivation of equilibrium constant and list out the significance of equilibrium constant.
- 13.a) Give an account on Debye – Huckel theory of Strong electrolyte.
OR
b) Experimentally verify the Debye – Huckel Onsager equation.
- 14.a) Derive Butler – Volmer equation and Tafel equation.
OR
b) Briefly explain the acid and alkaline accumulators.
- 15.a) Draw and explain the phase diagram for the cu-zn system.
OR
b) Explain the phase equilibrium of three component liquid containing three pair of partially miscible liquids.

Z-Z-Z

END