18CHP03

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2018
(First Semester)

Branch-CHEMISTRY

PHYSICAL CHEMSTRY -1

Time : Three Hours Maximum : 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10 x 1 = 10)

1 A sort of 'fictitious pressure' which is used in order to retain for real gases simple forms of equaions which are applicable to ideal gases only is named as
(i) chemical potential (ii) activity
(iii) first law of thermodynamics (iv) fugacity

2 For an ideal gas, activity is numerically equal to its .
(i) pressure (ii) time
(iii) concentration (iv) weight

3 The equation $\frac{d(\ln K_p)}{dT} = \frac{\Delta H^\circ}{RT^2}$ is known as
(i) Van't Hoffs equation (ii) Nemst equation
(iii) Ideal gas equation (iv) Gibbs Duhem equation

4 The value of $\frac{}{dT}$ approaches zero gradually as the temperature is lowered towards the absolute zero. This statement is known as
(i) Lechatlier's principle (ii) Lachatlier - Braun principle
(iii) Nemst heat theorem (iv) Planck's law

5 If the transference number of cation in greater than that of anion, then liquid junction potential will be
(i) negative (ii) positive
(iii) zero (iv) none of the above

6 In potentiometeric titration of acid-base, as the titration proceeds, the H+ ion concentration goes on decreasing and hence, the potential of hydrogen electrode goes on_____ .
(i) decreasing (ii) increasing
(iii) remains the same (iv) first increases and then decreases

7 The overvoltage varies with current strength. This statement is
(i) correct (ii) wrong
(iii) cannon predict' (iv) none of the above

8 The existence of charges of opposite signs on the fixed and diffuse parts of the double layer leads to the appearance of a difference of potential between the two layers. This difference of potential between the two layers is called
(i) chemical potential (ii) zeta potential
(iii) ionization potential (iv) electrophoretic mobility

9 A compound which melts sharply at a constant temperature into a liquid of the same composition as the solid, is said to possess a_____ .
(i) congruent melting point (ii) incongruent melting point
(iii) triple point (iv) sublimation

SECTION - B (25 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 5 = 25)

11 a State and derive Gibbs- Duhem equation.

OR

b State and explain Duhem - Margules equation.

12 a Discuss the significance of equilibrium constant.

OR

b State and explain the Nemst heat theorem.

13 a Explain briefly the theory of electrolytic conductance.

OR

b Explain briefly the Debye - Huckel limiting law.

14 a State and explain Tafel equation.

OR

b Derive the zeta potential of electro-osmosis.

15 a State phase rule. How is it derives thermodynamically?

OR

b Discuss briefly the Cu-Zn system from the standpoint of the phase rule.

SECTION -C (40 Marks!

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 8 = 40)

16 a Enumerate the terms activity and fugacity. How are they related? Analyse briefly the variation of fugacity with temperature and pressure.

OR

b i) Calculate the free energy change accompanying the compression of 1 mole of a gas at 57°C from 25 to 200 atm. The fugacities of the gas at 57°C may be taken as 23 and 91 atm respectively at pressures of 25 and 200 atm. (5)

ii) Evaluate the effect of pressure and temperature on activity. (3)

17 a Elucidate the Lechatlier - Braun principle and any three applications.

OR

b i) Enumerate the purpose of third law of thermodynamics. (4)

ii) Compare homogeneous equilibria and heterogeneous equilibria. (4)

18 a Elucidate the Debye - Huckel - Onsager equation.

OR

b Evaluate any four applications of EMF.

19 a Enumerate the theory of over voltage.

OR

b Assess the following :

(i) Electrophoresis (ii) Sedimentation potential

(iii) Lippmann's potential (3+2+3)

20 a Draw the criticize the phase diagrams of