

SEAT No. _____

No. of printed pages: 02

[110]

[Eng.]

SARDAR PATEL UNIVERSITY
B.Sc. (Semester-III) Examination
Physical Chemistry (US03CCHE22)

Date: 01/01/2021

Time: 2:00 pm to 4:00 pm

Day: Friday

Total Marks: 70

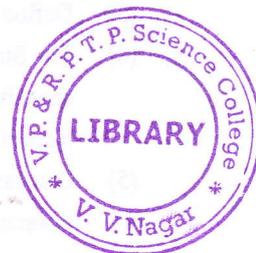
Note: Figures to the right indicates the full marks.

Q. 1 Choose the correct option for the following MCQs. [10]

- (1) Nitrogen gas obeys Boyles law at _____ temperature within 0 to 100 atm. pressure.
(a) -50°C (b) 20°C (c) 50°C (d) -25°C
- (2) _____ is not a critical phenomena of a real gas.
(a) Pressure (b) Volume (c) Temperature (d) Mass
- (3) With increase in temperature, vapor pressure of a liquid _____.
(a) decrease (b) increase (c) no change (d) none of these
- (4) Which of the following is not a state function?
(a) Work (b) Internal energy (c) Entropy (d) Temperature
- (5) Which of the following is expression of enthalpy of the system?
(a) $H + PV$ (b) $E - PV$ (c) $H - PV$ (d) $E + PV$
- (6) Which of the following is a colligative property?
(a) Surface tension (b) Osmotic pressure (c) Optical activity (d) Viscosity
- (7) The law of relative lowering of vapor pressure was given by _____.
(a) Raoult (b) Vant Hoff (c) Berkeley (d) Ostwald
- (8) As a result of osmosis, the volume of the solution _____.
(a) gradually increases (b) gradually decreases
(c) suddenly increases (d) remains constant
- (9) The ionic strength is a property of the _____.
(a) Ions (b) Solution (c) Mobility (d) Activity
- (10) The unit of specific resistance is _____.
(a) ohm (b) $\text{ohm}^{-1}\text{m}^{-1}$ (c) ohm m (d) Mho

Q. 2. Answer the following questions. [Fill in the blank/True-false] [08]

- (1) The value of correction factor 'p' for n mole of gas is _____. [an^2 / V^2 , $\text{a}^2\text{n} / \text{V}^2$]
- (2) Surface tension of a liquid decreases with rise in temperature. [True/False]
- (3) A mixture of gases is an example of _____ system. [Homogeneous/ Heterogeneous]
- (4) Energy of a substance is an intensive property. [True/False]
- (5) The backmann thermometer is used for the measuring _____.
[boiling point / freezing point]
- (6) Dynamic method is used to measure the lowering of vapor pressure. [True / False]
- (7) The unit of conductance is _____. [$\text{ohm} / \text{ohm}^{-1}$]
- (8) Molar conductance of an electrolyte increases with increase in dilution. [True / False]



[1]

[R.T.O.]



Q. 3. Answer the following questions in short. [Any Ten] [20]

- (1) Write any two postulates for kinetic theory of gases.
- (2) Define: (i) Boyle's Temperature (ii) Critical Temperature
- (3) Prove that $1 \text{ poise} = 10^{-1} \text{ kg m}^{-1} \text{ sec}^{-1}$.
- (4) Give the two important properties of a state function.
- (5) Show that $\Delta H = q_p$.
- (6) Derive the relationship between ΔH and ΔE in which gases are involved in the reaction.
- (7) Define the terms: Isotonic solution and Colligative property.
- (8) State Raoult's law with its mathematical statement.
- (9) Define molal boiling point elevation constant. Derive the unit of it.
- (10) Define: Transference Number and Ionic Mobilities.
- (11) Define van't Hoff factor. Give the relation between Van't Hoff factor and degree of dissociation.
- (12) What is cell constant? How is it determined?

Q. 4. Answer the following questions. [Any Four] [32]

- (1) Discuss the van der Waals equation at low and high pressure.
- (2) Describe the Ostwald's viscometer method for the measurement of viscosity of a liquid.
- (3) Define heat capacity. Derive the relation between C_p and C_v .
- (4) The Standard heat of formation of gaseous NH_3 is $-11.02 \text{ Kcal mol}^{-1}$ at 289 K. Heat capacities of gaseous N_2 , H_2 and NH_3 are 6.96, 6.89 and $8.38 \text{ cal deg}^{-1} \text{ mol}^{-1}$ respectively. Calculate ΔH° at 398 K and 773 K.
- (5) Discuss the Static and dynamic method for the measurement of vapour pressure lowering.
- (6) The molar heat of vaporization of water at 100°C is $40.585 \text{ KJ mol}^{-1}$. At what temperature will be a solution containing 5.60 gm of glucose per 1000 gm of water boil? [$R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$, $M_2 = 180 \text{ gram/mol}$.]
- (7) What is transference number. Discuss the Hittorf method for determination of transference number.
- (8) At 25°C , the specific conductance of a 0.01 M aqueous solution of CH_3COOH is $1.63 \times 10^{-2} \text{ ohm}^{-1} \text{ m}^{-1}$ and the molar conductance at infinite dilution is $390.7 \times 10^{-4} \text{ ohm}^{-1} \text{ m}^2 \text{ mol}^{-1}$. Calculate the dissociation constant of CH_3COOH .

X

[2]