SEAT No. _____ No. of printed pages: 04

[80]
E+K

SARDAR PATEL UNIVERSITY

B.Sc. (SEMESTER – III) EXAMINATION- 2021

PHYSICAL CHEMISTRY: US03CCHE22

DATE : 30/11/2021 TIME: 03.00 TO 05.00 p.m.

DAY : TUESDAY Maximum Marks : **70**

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Q.-1. Choose the correct option for the following MCQs. and rewrite it. [10]

1. The real gases show nearly ideal behaviour at,_____
   (a) High P and low T (b) Low P and low T
   (c) High P and high T (d) Low P and high T
2. If η and ϕ are the viscosity and fluidity of a liquid respectively, then, ϕ = ___
   (a) $1 / \eta^2$ (b) ϕ^2 (c) $1 / \eta$ (d) $1 / 2\eta$
3. The excluded volume per molecule of a gas is, _____ times the actual Volume of a gas molecule.
   (a) Three (b) Four
   (c) Five (d) Six
4. Which of the following equation explain the thermal effect of the reaction at constant pressure? _____
   (a) $\Delta H_2 = \Delta H_1 + \Delta C_P \ \Delta T$ (b) $\Delta E = q + w$
   (c) $\Delta T_b = K_b . m$ (d) None of these
5. Which out of the following is incorrect? _____
   (a) Work done on the system is –ve (b) Heat flow from the system is -ve
   (c) Work done by the system is –ve (d) Heat flow into the system is +ve
6. The common method used to measure the freezing point depression is, ___
   (a) Static method (b) Beckmann method
   (c) Landsberger method (d) None of these
7. _____ solution have the same osmotic pressure at the same temperature.
   (a) True (b) Isothermal
   (c) Isotonic (d) Concentrated
8. The mean activity coefficient of each electrolyte at infinite dilution is taken as, _____
   (a) 4 (b) 3 (c) 2 (d) 1
9. The ratio of molar conductance at a given dilution to the molar conductance at infinite dilution gives the value of, _____
   (a) Transport number (b) Degree of dissociation
   (c) Degree of association (d) All of these
10. The electrodes which is used to transfer electrons to and from the solution is called, _____
    (a) Reactive electrode (b) Reversible electrode
    (c) Inert electrode (d) Gas electrode

P.T.O.

Q.-2. Answer the following : [08]

1. The unit of vanderwaal's constant 'b' is, _____ (mole/liter , liter/ mole)
2. The unit of viscosity in SI system is, _____ (Kg/m s , 10^{-1}Kg/m s)
3. Thermoflask is an example of, _____ system. (closed , isolated)
4. Isochoric process takes place at constant volume. (True or False)
5. _____ is also called Cryoscopic constant. (K_b or K_f)
6. Colligative property relates the particles of, _____ (Solute , solvent)
7. The ionic strength is a property of, _____ (Solvent , Solution)
8. Upon dilution the value of specific conductance is increase. (True or False)

Q.-3. Give the answer of <u>ANY TEN</u> questions in short. [20]

1. Write any two postulates of kinetic theory of gases.
2. Explain the terms cohesion and adhesion.
3. Define Boyle's temperature. How is it related to vander waal's constants?
4. State Hess's law of constant heat summation. Give its uses.
5. Define with example : An open system and closed system.
6. Show that : $\Delta E = q_v$.
7. Define the molal freezing point depression constant and derive unit of it.
8. Explain the term : Vapour pressure lowering.
9. Define the terms : Osmosis and osmotic pressure.
10. Define the terms : Molar conductance and specific conductance.
11. Define transference number. Is it constant for an ion?
12. Explain the effect of dilution on conductance and molar conductance.

Q.-4. Attempt <u>ANY FOUR</u> questions from the following : [32]

(A) Derive the relation between critical constants and vander waal's constants using vander waal's equation of state.

(B) Explain the term surface tension. Describe the Capillary rise method and Double capillary rise method for the measurement of surface tension of a liquids.

(C) Write important properties of state function. Graphically show that work is not a state function.

(D) How ΔH is differ from ΔE for solid-liquid and gases? Explain and solve the example : When 78 gm of liquid benzene is burnt completely in Oxygen to form liquid water and carbon dioxide gas. The ΔH of the reaction is -781 Kcal at 25^0 C. Calculate the value of ΔE of the reaction at constant volume. Given that : R = 1.987 Cal/mol K.

(E) Explain the term elevation in boiling point. Derive an expression correlating the elevation in boiling point (ΔT_b) and molal boiling point elevation constant(K_b) when a non-volatile solute is added to a pure solvent.

(F) Describe Dynamic method for the measurement of vapour pressure lowering. Solve the problem : What would be the vapour pressure of 0.5 molal solution of a non-volatile solute in benzene at 30^0 C ? The vapour pressure of pure benzene at 30^0 C is 119.6 torr.

(G) What is an electrolysis ? Explain the electrolysis of HCl solution by considering three compartments.

(H) Explain Van't Hoff factor. Derive the relation : $\alpha = i - 1 / v - 1$.