CLASS-12
CHAPTER-SOLUTIONS
MCQ BASED ON COLLIGATIVE PROPERTIES
AND VAN'T HOFF FACTOR

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Sr. No.	MCQ QUESTIONS	ANSWER
1	Which law specifically governs the relative lowering of vapor pressures in solutions? a) Charles's law b) Boyle's law c) Raoult's law d) None of the above	(c)
2	If the relative lowering of pressure of o-xylene is 0.005 due to addition of 0.5 grams of non-volatile solute in 500 grams of solvent, what is the molecular weight of the solute? a) 21.3 g/mole b) 23.1 g/mole c) 32.1 g/mole d) 1.23 g/mole	(a)
3	Which of the following is the best description of a semipermeable membrane in the context of osmosis? a) A membrane that allows **neither** solute nor solvent particles to pass through it. b) A membrane that **allows solute** particles, but not solvent particles, to pass through it. c) A membrane that **allows solvent** particles, but not solute particles, to pass through it. d) A membrane that **allows both** solute and solvent particles to pass through it.	(c)
4	When some solutes are added to some solvents, the viscosity of the resultant solution is found to be greater than that of the original solvent. However, 'raising of viscosity' is not a colligative property. Why is this? a) The viscosity of the resultant solution depends on the **amount of solute** added. b) The viscosity of the resultant solution depends on the **amount of pure liquid**. c) The viscosity of the resultant solution depends on the **nature of the solute** added. d) The viscosity of the resultant solution depends on the **nature of the pure liquid**.	(c)
5	At 75 °C, the vapour pressure of pure water is 39 kPa. Which one of the following is the most likely vapour pressure for a 1.5 M solution of sucrose (aq) at the same temperature? a) 37 kPa b) 39 kPa c) 0 kPa d) 41 kPa	(a)

6	For ideal systems, the reduction in the chemical potential of solvent molecules upon the addition of solute depends only on which one of the following? a) The **melting point** of the solute. b) The **number** of solute particles. c) The **solubility** of the solute. d) The **boiling point** of the solute.	(b)
7	When a non-volatile solute is added to a solvent what is the difference in vapor pressure expressed as a faction of original vapor pressure equal to? a) Mole fraction of **solute in vapour** phase b) Mole fraction of **solvent in vapour** phase c) Mole fraction of **solute in liquid** phase d) Mole fraction of **solvent in liquid** phase	(c)
8	State the van't Hoff factor (i) for a dilute aqueous solution of the strong electrolyte barium hydroxide, $Ba(OH)_2$ a) 0 b) 1 c) 2 d) 3	(d)
9	The van't Hoff equation may be written as **P = 1000 i [C] RT**, where all terms have their usual meanings. Calculate the osmotic pressure of a 0.2 M solution of NaCl at 25 °C given R =8.314 J K^{-1} mol^{-1}. a) 990 kPa b) 500 kPa c) 83 kPa d) 42 kPa	(a)
10	A cell is bathed is a solution that has a greater osmolarity than that of the cytosol. This solution is best described as which one of the following? a) Isotonic b) Hypertonic c) Hypotonic d) None of the above	(b)

11	Which of the following aqueous solution will show **maximum vapour pressure** at 300 K? a) 1 M NaCl b) 1 M CaCl$_2$ c) 1 M AlCl$_3$ d) 1 M C$_{12}$H$_{22}$O$_{11}$	(d)
12	1 molal aqueous solution of an electrolyte **A$_2$B$_3$** is ionised **60%**. The boiling point of the solution at 1 atm is (K$_b$(H$_2$O) = 0.52 K kg/mol) a) 274.76 K b) 377 K c) 374.76 K d) 376.5 K	(c)
13	In a closed container, **vapour pressure** of a liquid depends upon a) Volume of the container b) Temperature c) Volume of the liquid d) All of the above	(b)
14	Determine the **elevation of the boiling point** of a aqueous solution with 1 mol of solute (glucose). (density=1.2 g/mL) a) K$_b$ b) 0.2 K$_b$ c) 0.02 K$_b$ d) 0.98 K$_b$	(d)
15	In 1L of glacial CH$_3$COOH, 0.1 M acetamide is dissolved. When the solution is cooled, the molecule contains the first crystal that forms at the freezing point is a) Glacial CH$_3$COOH b) Acetamide c) Both acetamide and glacial CH$_3$COOH d) None of the above	(a)
16	The freezing point of a 0.05 molal solution of non-electrolyte in water is (Kf=1.86 K m-1) a) -1.86 °C b) -0.93 °C c) -0.093 °C d) 0.093 °C	(c)

17	How much ethyl alcohol must be added to 1 litre of water so that the solution will freeze at– 14°C ? (Kf for water = 1.86°C/mol) a) 7.5 mol b) 8.5 mol c) 9.5 mol d) 10.5 mol	(a)
18	The osmotic pressure of solution increases if: a) Temperature is decreased b) Solution concentration (R) is increased c) The Volume of the solution increases d) Number of solute molecules is increased	(d)
19	In which of the following cases blood cells will shrink: a) when placed in water containing **more** than 0.9% (mass/ volume) NaCl solution. b) when placed in water containing **less** than 0.9% (mass /volume) NaCl solution. c) when placed in water containing 0.9% (mass/volume) NaCl solution. d) when placed in distilled water.	(a)
20	We have three aqueous solutions of NaCl labelled as 'A', 'B' and 'C' with concentrations 0.1 M, 0.01 M and 0.001 M, respectively. The value of van't Hoff factor for these solutions will be in the order .... a) $i_A < i_B < i_C$ b) $i_A > i_B > i_C$ c) $i_A = i_B = i_C$ d) $i_A < i_B > i_C$	(c)
21	1 mole of liquid A and 2 moles of liquid B make a solution having a total vapour pressure 40 torr. The vapour pressure of pure A and pure B are 45 torr and 30 torr respectively. The above solution a) is an ideal solution. b) shows negative deviation. c) shows positive deviation. d) is a maximum boiling azeotrope	(b)
22	If molality of the dilute solution is doubled, the value of molal elevation constant (K_b) will be a) Halved b) Tripled c) Doubled d) Unchanged	(d)

23	Isotonic solutions have: a) Same boiling point b) Same vapour pressure c) Same melting point d) Same osmotic pressure.	(d)
24	A compound X undergoes tetramerisation in a given organic solvent. The van't Hoff factor is a) 4.0 b) 0.25 c) 0.125 d) 2.0	(b)
25	Which of the following has **equal** boiling point? X- 0.1 M Na_2SO_3 Y- 0,1 M $C_{12}H_{22}O_{11}$ Z- 0.1 M $MgCl_2$ P- 0.1 M $Al(NO_3)_3$ a) X and Z b) Y and Z c) Z and P d) P and X	(a)

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