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Class: 12
Subject: chemistry
Topic: Solutions
No. of Questions: 20
Duration: 60 Min
Maximum Marks: 60

Q1. Vapour pressure of pure A and pure B are 12.8 kPa and 3.2 kPa respectively at 298 K. A solution is prepared with A and B in which the mole fractions of A and B are same. The mole fraction of A in the vapour phase in equilibrium with the solution is

A. 0.24
B. 0.45
C. 0.66
D. 0.8

Sol: d

0. 8 86.4 mole fraction of A = n n 8 n 6.4 number of moles of a component in the vapour phase partial pressure P = P °x 3.2 0.5 = l.6 kPa P = P ° x = 12.8 0.5 = 6.4 kPa A B A B B B A A A \ = + = ´ ´a a a

Q2. Elevation in the boiling point produced by 0.1 molal NaCl solution in water in Kelvin is

A. 0.52
B. 0.052
C. 5.2
D. 1.86

Sol: b

$\Delta T = K_b \times m$
$= 0.52 \times 0.1 = 0.052$ K

Q3. A solution of glycol containing 1.82g/litre has an osmotic pressure of 51.8 cm of mercury at 10°C. What is the molecular weight of
glycol?

A. 62
B. 70
C. 80
D. 100

Sol: a

62 69 10 (10) 1.82 8.3 14 283 VWRT 3 -3 = ´ ´ ´ ´= =p p

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Q4. At higher altitudes the boiling point of water decreases because

A. the atmospheric pressure is high
B. the temperature is low
C. the atmospheric pressure is low
D. the temperature is high

Sol: c

At higher and higher altitudes the external pressure decreases. Water boils at that temperature at which its vapour pressure becomes equal to the external pressure. So boiling point of water decreases.

Q5. The vapour pressure of a solution decreases when

A. the temperature is raised
B. the volume is increased
C. concentration of a nonvolatile solute is increased
D. none of these

Sol: c

Q6. Osmotic pressure of the solution can be increased by

A. increasing temperature of the solution
B. decreasing temperature of the solution
C. increasing the volume of the vessel
D. diluting the solution

Sol: a

Hence T V RTn Osmotic pressure is given by the expression p = RTC = p a

Q7. Which of the following aqueous 1M solution has highest freezing point?

A. NaCl
B. 0.1 M BaCl2
C. Al2(SO4)3
D. 0.1 M urea

Sol: d

Q8. Elevation in boiling point or depression in freezing point of a solution is directly proportional to its

A. normality
B. molarity
C. molality
D. mole fraction

Sol: c

whether T is elevation of boiling point or depression in the freezing point t m where m is the molality of the solution. T K m or T K m depending b f

D

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Q9. Osmotic pressure observed when benzoic acid is dissolved in. benzene is less than that expected from theoretical consideration. That is because

A. benzoic acid has higher molar mass than benzene
B. benzoic acid is an organic solute
C. benzoic acid gets dissociated in benzene
D. benzoic acid gets associated in benzene

Sol: d

Due to association of benzoic acid in benzene the number of particles decrease and hence observed colligative property values decrease

Q10. Solution of two liquids which distills with unchanged composition at constant temperature is called

A. isotomic mixture
B. non-ideal mixture
C. ideal solution
D. azeotropic mixture

Sol: d

All non-ideal liquid mixtures form azeotropic mixtures or also called constant boiling mixtures

Q11. Which of the following solutions will exhibit highest boiling point?

A. 0.1 M KNO3(aq)
B. 0.01 M Na2O2(aq)
C. 0.015 M glucose(aq)
D. 0.015 M urea(aq)

Sol: b

Electrolytes ionise giving more number of particles in solution Non-electrolysis remain unionised Hence the moles of particles obtained in the case of 001 M KNO3, 0.01 M Na2SO4, 0.015 M glucose and 0.015 M urea solution are 0.02, 0.03, 0.015 and 0.015 respectively. More the number of moles of particles more is the elevation in boiling point

Q12. The vapour pressure of the solvent decreased by 10 mm of Hg when a nonvolatile solute was added to the solvent. The mole
fraction of the solute in the solution is 0.2 what should be the mole fraction of solvent if the decrease in vapour pressure is required to
be 20 mm of Hg

A. 0.6
B. 0.8
C. 0.4
D. 0.2

Sol: c

x 0.4 10 p p 20 0.2 x x p 20 0.2 p 10 mole, fraction p p – p Relative lowing the vapour pressure o o o o o = ´ \ = ÷ ÷ø ö ç çè æ ÷ ÷ø ö ç çè æ a a a Q13. At a particular temperature, the vapour pressures of the two liquids A and B respectively are 20 kPa and 30 kPa. If 2 moles of A and 3 moles of B are mixed to form an ideal solution, the vapour pressure of solution at the same temperature will be (in mm of mercury)

A. 28 kPa
B. 26 kPa
C. 18 kPa
D. 8.6 kPa

Sol: b

P = P P = 8 + 18 = 26 kPa 18 kPa 5 30 3 8 kPa P = 5 20 2 P = P P x and P P x A B A B B o A A B o A A \ + = ´ = ´= =

Q14. Assertion (A) Acetic acid has a molecular weight of 120 in benzene solution. Reason (R) There is dimer formation by H-bonding.

A. Both (A) and (R) are true and (R) is the correct explanation of (A).
B. Both (A) and (B) are true but (R) is not the correct explanation of (A).
C. (A) is true but (R) is false.
D. (A) is false but (R) is true.

Sol: a

Q15. The equilibrium pressure under which a liquid and its vapour exist at a given temperature is called

A. decrease in vapour pressure
B. saturated vapour pressure
C. relative lowering of vapour pressure
D. atmospheric pressure

Sol: b

Q16. When two liquids are mixed temperature increased by 2°C. This indicates that the mixture is

A. an ideal solution
B. a non-ideal solution showing negative deviation
C. an ideal solution showing negative deviation
D. one which obeys Raoult's law

Sol: b

Here molecules attract each other. Hence volume of the mixture becomes less than the volumes of the components mixed. Further due to attraction heat is released and the solution warms up. It shows negative deviation from Rault's law

Sol: b

Q17. The vapour pressure of a solution of 5 g of non-electrolyte in 100 g of water at a particular temperature is 2985 Nm-2. The vapour pressure of pure water at that temperature is 3000Nm2. The molecular weight of the solute is

A. 180
B. 90
C. 270
D. 200

Sol: a

P P W M P M o o 1 2 1 2 ÷ ÷ø ö ç çè æ - = *W* 180 15 3000 100 5 18 = ÷ø ö çè ´ æ

Q18. The vapour pressure of water decreases by 10% when a solute is dissolved in it. The approximate molarity of the solution is

A. 5.5
B. 10
C. 2
D. 2.5

Sol: b

n 5.55 or 100 10 = 55.5 n Hence 55.5 n n nn n n n is small compared to 1. So n n n 100 10 P° P of moles of water n = 55.5. So Let n moles of the solute be dissolved in a litre of the solution Approximat e number 2 2 2 1 2 1 2 2 2 1 22 1 = = = + + = = D

Q19. When mercuric iodide is added to the aqueous solution of potassium iodide, the

A. freezing point is raised
B. freezing point does not change
C. freezing point is lowered
D. boiling point does not change

Sol: a

point becomes less. Hence freezing point is raised produced. Due to the reduction in the number of moles depression in the freezing 2 moles of KI gives 4 moles of ions. After adding mercuric iodide 3 moles of ions are

HgI + 2KI K [HgI] 2K + [HgI]2-

2 2 4 4

¾¾® ¾¾® +

Q20. The actual increase in boiling point of a solution by a given mass of the solute depends on

A. the nature of the solvent
B. nature of the solute
C. molecular mass of the solute
D. all the above factors

Sol: d

Higher the molecular mass lower is the elevation for a given mass of the solute. If the solvent is ionic and if the solute is ionic then ionisation takes place. If the solvent is polar no ionisation takes place. if the substance is covalent then no ionisataion takes place. So the actual increase depends on the nature of the solvent, solute, concentration etc.