CHEMISTRY

BOOKS - ACCURATE PUBLICATION

SOLUTIONS

Multiple Choice Questions

1. Which of the following aqueous solution should have the highest boiling point ?

A. 1.0 M NaOH

B. $1.0 M Na_2SO_4$

C. $1.0 M NH_4NO_3$

D. $1.0 M KNO_3$

Answer: B

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2. The Unit of ebulioscopic constant is _____

A. $K \ kg \ mol^{-1} or \ K \ (molality)^{-1}$

B. $mol\ kg\ K^{-1}$ or K^{-1} (molality)

C. $kg\ mol^{-1}K^{1}$ or K^{-1} (molality)

D. $K\ mol\ kg^{-1}$ or K (molality)

Answer: A

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3. In comparison to a 0.01 m solution of glucose, the depression in freezing point of a 0.01 m $MgCl_2$ solution is _____

A. the same

B. about twice

C. about three times

D. about six times

Answer: C

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4. The Values of Van't Hoff factors for KCL NaCl

and K_2SO_4 respectively, are ____

A. 2,2 and 2

B. 2,2 and 3

C. 1,1 and 2

D. 1,1 and 1

Answer: B

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5. Two beakers of capacity 500 mL were taken. One of these beakers, labelled as "A" was filled with 400 mL water whereas the beaker

labelled "B" was filled with 400 mL of 2 M solution of NaCl. At the same temperature both the beakers were placed in closed containers of same material and same capacity as shown in figure given below. At given temperature, which of the following statement is correct about the Vapour pressure of pure water and that of NaCl solution.

A. Vapour pressure in container (A) is more than that in container (b)

B. Vapour pressure in container (A) is less than in container (B)

C. Vapour pressure is equal in both the containers.

D. Vapour pressure in container (b) is twice the Vapour pressure in container (A)

Answer: A

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6. We have three aqueous solutions of NaCl labelled as 'A', 'B' and 'C' with concentrations 0.1M, 0.01 and 0.001M, respectively. The Value of Van't Hoff factor for these solutions will be in the oder

A. $i_A < i_B < i_c$

B. $i_a > i_B > i_c$

C. $i_A = i_B = i_c$

D. $i_A < i_B > i_c$

Answer: C

7. 4L of 0.02 M aqueous solution of NaCl was diluted by adding one litre of water. The molality of the resultant solution is _____
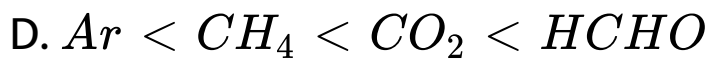
A. 0.004

B. 0.008

C. 0.012

D. 0.016

Answer: D

8. K_H Value for $Ar(g), CO_2(g), HCHO(g)$ and CH_4 (g) are 40.39, 1.67, 1.83×10^{-5} and 0.413 respectively. Arrange these gases in the order of their increasing solubility.
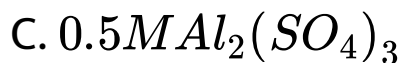
A. $HCHO < CH_4 < CO_2 < Ar$

B. $HCHO < CO_2 < CH_4 < Ar$

C. $Ar < CO_2 < CH_4 < HCHO$

D. $Ar < CH_4 < CO_2 < HCHO$

Answer: C

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9. Which of the following solution shows maximum depression in freezing point.

A. $0.5MLi_2SO_4$

B. 1 M NaCl

C. $0.5MAl_2(SO_4)_3$

D. $0.5MBaCl_2$

Answer: C

10. Molality of pure water is................ .

A. 55.5

B. 20

C. 18

D. 10

Answer: A

11. The number of moles of NaCl in 3 litres of 3

M solution is:

    A. 1

    B. 3

    C. 9

    D. 27

Answer: C

12. The amount of solute required to prepare

10 litres of decimolar solution is:

A. 0.01 mole

B. 0.2 mole

C. 0.05 mole

D. 1.0 mole

Answer: D

13. One kilogram of water contains 4 g of NaOH. The concentration of the solution is best expressed as:

A. 0.1 molal

B. 0.1 molar

C. decinormal

D. about 0.1 mole

Answer: A

14. The number of moles of NaCl in 3 litres of 3 M solution is:

A. 1

B. 3

C. 9

D. 27

Answer: C

15. When 0.6 g of urea is dissolved in 100 g water, the water will boil at (Kb, for water = 0.52 K/m and normal boiling point of water $= 100°C$):

A. 372.48 K

B. 273.52K

C. 373.052 K

D. 273.052 K

Answer: C

16. A solution of solute X'in benzene boils at $0.126K$ higher than benzene. What is the molality of the solution ?

(K_b for benzene = 2.52 K/m)

A. 0.05

B. 2

C. 1

D. 20

Answer: A

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17. The osmotic pressure of 0.2 molar solution of urea at $27°C$ (R=0.082 litre atm $mol^{-1}K^{-1}$) is

A. 4.92 atm

B. 1 atm

C. 0.2 atm

D. 27 atm

Answer: A

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18. Which one of the following pairs of solutions can be expected to be isotonic at the same temperature ?

A. 0.1 M urea and 0.1 M NaCl

B. 0.1 M urea and 0.1 M MgCl

C. 0.1 M NaCl and 0.1 M Na_2SO_4

D. $0.1MCa(NO_3)_2$ and $0.1MNa_2SO_4$

Answer: D

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19. A 3 g of urea is dissolved in 45 g of H_2O

The relative lowering in Vapour pressure is

A. 0.05

B. 0.04

C. 0.02

D. 0.01

Answer: C

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20. Which of the following aqueous solution will exhibit highest boiling point ?

A. 0.01 M urea

B. $0.01M \ KNO_3$

C. $0.01M \ N_2SO_4$

D. $0.015MC_6H_{12}O_6$

Answer: C

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21. The elevation in boiling point of a solution

13.44 g of $CuCl_2$ in 1 kg of water using

following information will be (molecular wt. of

$CuCl_2 = 134.4$, k_b =0.52K/molal)

A. 0.16

B. 0.05

C. 0.1

D. 0.2

Answer: A

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22. Dissolving 120g of urea (mol.wt 60) in 1000g of water gave a solution of density 1.15g/ml. The molarity of solution is:

A. 1.78M

B. 2M

C. 2.05M

D. 2.22M

Answer: C

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23. To observe an elevation of boiling point at $0.05°C$, the amount of solute (mol.wt =100) to be added to 100g of water $(k_b = 0.5)$ is

A. 2 g

B. 0.5 g

C. 1 g

D. 0.75 g

Answer: C

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24. The degree of ionization of HF in 0.100m aqueous solution is (freezing point of the solution $= -0.197°C$ and k_f for water $= 1.86°C$)

A. 6 %

B. 12 %

C. 3 %

D. 9 %

Answer: A

25. The vapour pressure of two liquids P and Q are 80 and 60 torr respectively. The total vapour pressure of solution obtained by mixing 3 mol of P and 2 mol of Q would be.

A. 72 torr

B. 140 torr

C. 68 torr

D. 20 torr

Answer: A

26. In a 0.2 molal aqueus solution of a weak acid HX the degree of dissociation is 0.25. The freezing point of the solution will be nearest to: $(K_f = 1.86 K kg\text{mol}^{-1})$

a) $-0.26°C$

b) $0.465°C$

c) $-0.48°C$

d) $-0.465°C$

A. $-0.56K$

B. $-1.12K$

C. $0.56K$

D. $1.12K$

Answer: D

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27. Which of the following 0.10 m aqueous solution will have the lowest freezing point?

A. KCl

B. $C_6H_{12}O_6$

C. $Al_2(SO_4)$

D. K_2SO_4

Answer: B

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28. Mole fraction of the solute in 1 molal aqueous solution is

A. 0.1770

B. 0.0177

C. 0.0344

D. 1.7700

Answer: B

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29. 1 g of non - electrolyte solute (molar mass 250 g/mol) was dissolved in 5.12g of benzene. If the freezing point of depression constant,

k_f of benzene is 5.12 K kg/mol, the freezing point of benzene will be lowered by

A. 0.3 K

B. 0.5 K

C. 0.2 K

D. 0.4 K

Answer: D

30. The temperature at which 10% aqueous solution of glucose will exhibit the osmotic pressure of 16.4 atm is ($R = 0.082 \mathrm{dm}^3$ atm/K/mol)

A. $360°C$

B. 80 K

C. 90 K

D. 360 K

Answer: D

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31. The number of moles of NaCl in 5 liters of 5M solution is:

A. 1

B. 25

C. 125

D. 5

Answer: B

32. When the solute is present in trace quantities, the following expression is used

A. Gram per million

B. milli gram percent

C. micro gram percent

D. parts per million

Answer: D

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33. Low concentration of oxygen in the blood and tissues of people living. At high altitude is due to:

    A. Low temperature

    B. Low atmospheric pressure

    C. high atmospheric pressure

    D. both low atmospheric pressure and high atmospheric pressure

Answer: B

34. Which of the following mixture does not show positive deviation from the Raoult,s Law?

A. Methanol and acetone

B. Chloroform and acetone

C. Nitric acid and water

D. Phenol and aniline

Answer: A

35. Which of the following aqueous solution should have the highest boiling point ?

A. 1.0M NaOH

B. $1.0MNa_2SO_4$

C. $1.0MNH_4NO_3$

D. $1.0MKNO_3$

Answer: B

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36. In comparison to a 0.01 M solution of glucose, the depression in freezing point of a 0.01M $MgCl_2$ solution is :

A. the same

B. about twice

C. about three times

D. about six times

Answer: C

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37. A fruit or vegetable placed in a concentrated salt solution to prepare pickle, shrivels because

A. it gains water due to osmosis

B. it loses water due to reverse osmosis

C. it gains water due to reverse osmosis

D. it loses water due to osmosis

Answer: B

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38. The value of Henry's constant K_H is :

A. greater for gases with higher solubility

B. it loses water due to reverse osmosis

C. constant for all gases

D. not release to the solubility of gases

Answer: B

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39. If molality of the dilute solution is doubled, the value of molal depression constant K_f will be

A. halved

B. tripled

C. unchanged

D. doubled

Answer: C

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40. A solution containing 500 g of a protein per liter is isotonic with a solution containing 3.42 g sucrose per liter. The molecular mass of protein in 5 x 10^x, hence x is.

A. $300g \ mol^{-1}$

B. $350g \ mol^{-1}$

C. $200g \ mol^{-1}$

D. $250g \ mol^{-1}$

Answer: A

41. SO_2CI_2 (sulphury chloride) reacts with water to given a mixture of H_2SO_4 and HCI. What volume of $0.2MBa(OH)_2$ in needed to completely neutralize $25mL$ of $0.2MSO_2CI_2$ solution :

    A. 5.55 mL

    B. 0 mL

    C. 20 mL

    D. 30 mL

Answer: A

42. What is mole fraction of solute in 1.00 m

solution:

A. 0.0354

B. 0.0177

C. 0.177

D. 1.770

Answer: B

43. At $100°C$, the vapour pressure of a solution of 6.5 g of solute in 100 g of water is 732 mm. If k_b is 0.52 klm, the boiling point of solution will be:

A. $102°C$

B. $103°C$

C. $101°C$

D. $100^\circ C$

Answer: C

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44. Which of the following is not correct for ideal solution?

A. $\Delta H_{min} = 0$

B. $\Delta V_{min} = 0$

C. $\Delta P = P_{obs} - P_{calculated} = 0$

D. $\Delta G_{mix} = 0$

Answer: D

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45. 18 g of glucose is dissolved in 1 kg of water.

At what temperature will the solution boil ? (

K_b for water is 0.52 K kg mol^{-1})

A. $99.052^\circ C$

B. $100^\circ C$

C. $100.052° C$

D. $99° C$

Answer: C

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46. The osmotic pressure of 0.2 molar solution of urea at $27° C$ (R=0.082 litre atm $\mathrm{mol}^{-1} K^{-1}$) is

A. $360° C$

B. 180 K

C. 300 K

D. 360 K

Answer: D

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47. Out of 1 M urea and 1M KCl solution, which has higher freezing point?

A. 1 M glucose

B. 1M NaCl

C. 1M $CaCl_2$

D. 1M AlF_3

Answer: A

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48. The depression in freezing point is directly proportional to

A. mole fraction of solution

B. molarity of solution

C. molality of solution

D. molarity of solution

Answer: C

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49. A 5.2 molal aqueous solution of methyl alcohol CH_3OH is supplied. What is the mole fraction of methyl alcohol in the solution ?

A. 0.086

B. 0.050

C. 0.100

D. 0.190

Answer: A

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50. $CuSO_4 \cdot 5H_2O$ is a

A. solution of solid in solid

B. solution of liquid in solid

C. salt of $CuSO_4$ in water

D. co-ordination compound of copper sulpate with water moleculos.

Answer: D

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51. Which is a colligative property?

A. Osmotic pressure

B. Free energy

C. heat of vaporization

D. change in pressure

Answer: A

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52. Van't Hoff factor of $Ca(NO_3)_2$ is :

A. One

B. Two

C. Three

D. Four

Answer: C

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53. Which of the following units is useful in relating concentration of solution with its vapour pressure ?

A. mole fraction

B. parts per million

C. mass percentage

D. molality

Answer: A

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54. The Unit of ebulioscopic constant is _____

A. $K \ kg \ mol^{-1}$ or K $(molality)^{-1}$

B. $molkgK^{-1}$ or K^{-1} (molality)

C. $kg\ mol^{-1}K^{-1}(molality)^{-1}$

D. $K\ mol\ kg^{-1}$ or K (molality)

Answer: A

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55. The values of Van't Hoff factors for KBr, NaBr and Na_2SO_4 respectively are

A. 2,2 and 2

B. 2,2 and 3

C. 1, 1 and 2

D. 1,1 and 1

Answer: B

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56. Molality of expressed in

A. grams/litre

B. Litre/moles

C. Moles/litre

D. Mole/kg

Answer: D

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57. Which of the not affected by temperature ?

A. Normality

B. Molality

C. Molarity

D. none of these

Answer: B

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58. What is Van't Hoff factor ?

A. zero

B. 1.0

C. less than 1

D. more than 1

Answer: C

59. In crystal structure of sodium chloride, the arrangement of Cl ions is

   A. decrease the boiling point

   B. increase the boiling point

   C. prevent the breaking of eggs

   D. make eggs tasty

Answer: B

60. The Van't Hoff factor (i) accounts for

A. a) degree of solubilisation of solute

B. b) the extent of dissociation of solute

C. c) the extent of dissolution of solute

D. d) the degree of decomposition of solution

Answer: B

61. Molarity of 0.4 N H_2SO_4 is :

A. 0.2

B. 0.8

C. 0.6

D. 0.1

Answer: A

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62. What happens when isotonic solution of A (mol wt. 342) and B (mol. Wt. 60) are put into communication through semipermeable membrane

    A. Transference of solvent from A to B

    B. transference of solvent from B to A

    C. no transference of solvent from A to B

    D. Temperature of solutions changes

Answer: C

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63. Which of the following does not show positive deviation from Raoult's law ?

A. Benzene +acetone

B. Acetone + ethanol

C. Acetone + chloroform

D. Water + ethanol

Answer: C

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64. Isotonic solutions have

    A. vapour pressure

    B. osmotic pressure

    C. boiling point

    D. freezing point

Answer: B

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65. Explain any two functions of water for living organisms?

66. Which of the following experimental methods is adopted to determine osmotic pressure?

A. Ostwald method

B. Berkely-Hartley method

C. Solvay's method

D. Haber's method

Answer: B

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67. Which property is used for determination of molar mass of colloids, polymers and proteins

A. Diffusion pressure

B. Atmospheric pressure

C. osmotic pressure

D. turgor pressure

Answer: C

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68. An aqueous solution of methanol has vapour pressure

A. Equal to that of water

B. equal to that of methanol

C. more than that of water

D. less than that of water

Answer: C

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69. Which has the lowest boiling point at 1 atm

pressure ?

A. 0.1 M KCl

B. 0.1 M Urea

C. 0.1 M $CaCl_2$

D. 0.1 M $AlCl_3$

Answer: B

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70. Osmotic pressure of a solution is 0.0821 atm at temperature of 300 K. The concentration of solution in $mol/litre$ will be

A. 0.33

B. 0.666

C. 0.3×10^{-2}

D. 3

Answer: C

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71. Ethanol is an organic compound yet it is freely miscible with water.Explain.

A. ethanol

B. ether

C. urea

D. none of these

Answer: A

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72. For exothermic dissolution process, solubility of solid with increase in temperature.

A. increases

B. decreases

C. remains same

D. first increases and decreases

Answer: B

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73. The molal elevation constant depends upon

A. nature of solute

B. nature of the solvent

C. vapour pressure of the solution

D. enthalpy change

Answer: B

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74. Solubility of gases in liquids decreases with increase in

A. pressure

B. temperature

C. osmotic pressure

D. density

Answer: B

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75. What is 4R principle?

A. Hoffman principle

B. quantum principle

C. lechatelier's principle

D. atomic principle

Answer: C

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76. Components in binary solutions

A. 4

B. 2

C. 1

D. 3

Answer: B

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77. Solutions are mixtures of two or more than

two components.

A. heterogeneous

B. homogenous

C. hetero trophic

D. homologous

Answer: B

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78. Molal clevation constant is also called as

A. Cryoscopic Constant

B. gas constant

C. Ebull ioscopic constant

D. freezing point depression constant

Answer: C

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79. Colloidal solution can be purified by :

A. concentration

B. density

C. volume

D. mass

Answer: A

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80. Why does water split on the floor disappear after some time?

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81. Molarity of expressed in

A. L/mol

B. mol/L

C. mol/1000 g

D. g/L

Answer: B

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82. Which one is correct?

A. Molality change with temperature

B. Molality does not change with temperature

C. Molarity does not change with temperature

D. Normality, does not change with temperature

Answer: B

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83. What is the molarity of 0.2N Na_2CO_3 solution ?

A. 0.1 M

B. 0 M

C. 0.4 M

D. 0.2 M

Answer: A

84. Out of the following which one is not an example of a solution

A. Air

B. Brass

C. Amalgam

D. Benzene in water

Answer: D

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85. Solubility of gas in liquid depends upon

A. The nature of gas

B. the temperature

C. the nature of the solvent

D. All of the above

Answer: D

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86. The density of 2.05 M acetic acid in water is

`1.02 g/ml . Calculate the molality of solution.

A. 3.29

B. 0.229

C. 22.9

D. 2.29

Answer: D

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87. What is the relation between normality and molarity of given solution of sulphuric acid ?

    A. Normality = 1/molarity

    B. Normality= molarity/2

    C. Normality = $2 \times$ molarity

    D. None of the above.

Answer: C

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88. Which chemical is used for clearing snow on the roads ?

A. NaCl

B. $CaCl_2$

C. both (a) and (b)

D. none

Answer: C

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89. For solutes which do not undergo any association or dissociation in a solute, Van't Hoff factor (i) will be

A. less than 1

B. more than 1

C. equal to 1

D. zero

Answer: C

90. Solubility of a substance is its amount that can be dissolved in a specified amount of solvent at a specific ....

A. minimum, pressure

B. maximum, temperature

C. constant, volume

D. average, mass

Answer: B

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91. Molal freezing point depression constant is also called ....

A. Ebullioscopic constant

B. molal elevation constant

C. Cryoscopic constant

D. Henry's constant

Answer: C

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92. A liquid is in equilibrium with its vapour at its boiling point. On the average, the molecules in the two phases have equal.

A. potential energy

B. kinetic energy

C. total energy

D. intermolecular forces

Answer: B

93. Vapour pressure of dilute aq. solution of glucose is 750 mm of Hg at 373 K. The mole fraction of the solute is ($p°$ water = 760 mm of Hg)

    A. $1/75$

    B. $75/76$

    C. $1/76$

    D. $1/10$

Answer: C

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94. Which of the following is a colligative property ?

    A. vapour pressure

    B. relative lowering in vapour pressure

    C. lowering in vapour pressure

    D. all of these

Answer: B

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95. Which one of the following binary liquid mixtures exhibits negative deviation from Raoult's law?

A. n-Hexane-n-Heptane

B. Chloroform-Acetone

C. Carbon disulphide-Acetone

D. Bromocthane - Chloroethene

Answer: B

96. Constant boiling mixtures are called

A. ideal solution

B. Azeotropes

C. isotonic solution

D. None of these

Answer: B

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97. A pressure cooker reduces cooking time because :

A. heat is more evenly distributed

B. the high pressure tend to rises the food

C. the boiling point of food under pressure is elevated.

D. the boiling point of water in cooker is depressed.

Answer: C

98. At $100°C$, the vapour pressure of a solution of 6.5 g of solute in 100 g of water is 732 mm. If k_b is 0.52 klm, the boiling point of solution will be:

A. 380.4 K

B. 376.2 K

C. 373.5 K

D. 354.7 K

Answer: B

99. Comphor is often used in molecules mass determination bacause

    A. it has a high Cryoscopic constant

    B. it is volatile

    C. it is solvent for organic substance

    D. it is readily available

Answer: A

100. A 0.004 M solution of sodium sulphate is isotonic with .010 M solution of glucose. The apparent percentage dissociation sodium sulphate is

A. 25 %

B. 50 %

C. 75 %

D. 85 %

Answer: C

101. Which of the following expression is useful in relating concentration with its vapour pressure

A. Mole fraction

B. ppm

C. mass percentage

D. molality

Answer: A

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102. At equilibrium the rate of dissolution of a solid solute in a volatile liquid solvent is

A. less then the rate of crystallisation

B. greater then the rate of crystallisation

C. equal to the rate of crystallisation

D. Zero

Answer: C

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103. For a molar solution of NaCl in water at $25°C$ and $1atm$ pressure shows that:

A. molality=normality

B. molarity= normality

C. molarity = mole fraction

D. normality=mole fraction

Answer: B

104. Maximum amount of a solid solute that can be dissolved in a specificd amount of a given liquid solvent does not depend upon

A. Temperature

B. Nature of solute

C. Pressure

D. Nature of solvent.

Answer: C

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105. Which of the following is a colligative property?

A. Melting point

B. Osmotic pressure

C. Freezing point

D. Sublimation temperature

Answer: B

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106. At the given temperature, osmotic pressure of a concentrated solution of substances

A. is higher than that of a dilute solution

B. is lower than that of a dilute solution

C. is same as that of a dilute solution

D. cannot be compared with that of a dilute solution.

Answer: A

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107. What happens to the vapour pressure of a liquid when a non-volatile solute is added to it

A. increases

B. decreases

C. remains same

D. first increases and then decreases

Answer: B

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108. Write the features of desert plants?

109. If M_{normal} is the normal molecules mass and a is the degree of ionization of $K_3[Fe(CN)_6]$, then the abnormal molecules mass of the complex in the solution will be:

A. Hypotonic to blood

B. Isotonic to blood

C. hypertonic to blood

D. equimolar to blood

Answer: B

110. A solution of solute X'in benzene boils at

$0.126K$ higher than benzene. What is the

molality of the solution ?

(K_b for benzene = 2.52 K/m)

A. 0.05

B. 2

C. 1

D. 20

Answer: A

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111. The osmotic pressure of 0.2 molar solution of urea at $27°C$ (R=0.082 litre atm $mol^{-1}K^{-1}$) is

A. 4.92 atm

B. 1 atm

C. 0.2 atm

D. 27 atm

Answer: A

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112. Which of the following solution shows maximum depression in freezing point.

A. $0.5 M Li_2 SO_4$

B. $0.5 M NaCl$

C. $0.5 M Al_2(SO_4)_3$

D. $0.5 M BaCl_2$

Answer: C

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113. The number of moles of NaCl in 3 litres of

3 M solution is:

A. 1

B. 3

C. 6

D. 27

Answer: C

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114. The two solutions A and B are separated by semipermeable membrane. If the solvent flows from A to B :

A. A is more concentrated than B

B. A is less concentrated than B

C. Both A and B are of same concentration

D. None of these

Answer: B

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115. Explain the adaptation of animals to live in mountain region?

116. The vapour pressure of an aqueous solution of glucose is 750 mm of mercury at $100°C$. Mole fraction of solute will be

A. decrease in molality

B. decrease in molarity

C. decrease in mole fraction

D. decrease in mass percentage

Answer: B

117. Which law states the relation between solubility of gas in liquid at constant temperature and external pressure ?

A. Raoult's law

B. Van't Hoff Boyle's law

C. Henry's law

D. van't Hoff Charle's law

Answer: C

118. Decompression sickness describing a condition arising from dissolved. Gases coming out of solution into bubbles inside the body resulting in bursting of capillaries is called

A. Anoxia

B. Hypoxia

C. Edemna

D. Bends

Answer: D

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119. Calculate the depression in the freezing point of water when 10 g of $CH_3CH_2CHClCOOH$ is added to 250 g of water. $K_a = 1.4x10^{-3}$, $K_f = 1.86KkgmoL^{-1}$.

A. 269.768

B. 271.235

C. 270.768

D. 200.578

Answer: C

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120. Which one of the following pairs of solution can we expect to be isotonic at the same temperature?

A. 0.1M urea and $0.1 M NaCl$

B. 0.1M urea and $0.1 M MgCl_2$

C. 0.1 M NaCl and 0.1 M Na_2SO_4

D. $0.1 M Ca(NO_3)_2$ and $0.1 M Na_2SO_4$

Answer: D

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121. An aqueous solution is 1.00 molalin KI. Which change will cause the vapour pressure of the solution to increase ?

a) addition of water

b) addtion of NaCl

c) addtion of Na_2So_4

d) Addition of 1.0 molal KI

A. addition of 1.00 molal KI

B. addition of water

C. addition of NaCI

D. addition of Na_2SO_4

Answer: B

122. P_A and P_B are the vapour pressure of pure liquid components A and B respectively of an ideal binary solution. If X_A represent the mole fraction of component A, then the total pressure of the solution will be

A. $P_A + X_A(P_B - P_A)$

B. $P_A + X_A(P_A - P_B)$

C. $P_B + X_A(P_B - P_A)$

D. $P_B + X_A(P_A - P_B)$

Answer: D

123. At what partial pressure, oxygen will have a solubility of $0.06gL^{-1}$ in water at 293 K? Henrys law constant (k_H) of O_2 in water at 303 K is 46.82 k bar.

(Assume the density of the solution to be and same as that of water)

A. 1×10^4

B. 2×10^4

C. 1×10^{-5}

D. 2×10^{-5}

Answer: C

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124. If the elevation in boiling point of a solution of 10 gm of solute (mol. Wt. = 100) in 100 gm of water is ΔT_b, the ebullioscopic constant of water is

A. Molecular mass of X is less than molecular mass of Y

B. Y is undergoing dissociation while X undergoes no charge

C. X is undergoing dissociation in water

D. molecular mass of X is greater than molecular mass of Y.

Answer: C

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125. The density of 2.0 M solution of solute is 1.2 gm/ml. If the molecular mass of solute is 100 gm mol^{-1} then the molality of the solution is

A. 2.0 m

B. 1.2 m

C. 1.0 m

D. 0.6 m

Answer: A

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126. The Van't Hoff factor i for a dilute aqueous solution of the strong electrolyte barium hydroxide is

A. 0

B. 1

C. 2

D. 3

Answer: D

127. 31 gm of ethylene glycol $(C_2H_6O_2)$ is mixed with 500 gm of solvent. $\left(K_f = 2K\text{kgmol}^{-1}\right)$. What is the freezing point of the solution in K ? (freezing point of solvent = 273K)

A. 272

B. 271

C. 270

D. 274

Answer: A

128. Calculate the temperature at which a solution containing 54 gms of glucose $(C_6H_{12}O_6)$ in 250 gms of water will freeze. K_f for water .

$(1.86 Kkgmol^{-1})$

A. 7.6

B. 76.0

C. 752.4

D. 759

Answer: C

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129. Which one of the following statements regarding Henry's Law is not correct :

A. The value of K_H increases with the nature of gas

B. Higher the value of K_H higher the solubility of gas in the liquid

C. The partial pressure of the gas in vapour pliase is proportional to the mole fraction of the gas in the solution

D. Different gases have different ky value at the same temperature.

Answer: B

130. Dissolving 120g of urea (mol.wt 60) in 1000g of water gave a solution of density 1.15g/ml. The molarity of solution is:

A. 1.78 M

B. $2.00M$

C. $2.05M$

D. $2.22M$

Answer: C

1. Define a solution.

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2. Define aqueous solution ?

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3. Define concentration of a solution. How is concentration of a solution expressed ?

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4. Define

Parts per million

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5. What is the solubility of a substance ?

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6. What is dissolution process ?

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7. What is crystallisation process ?

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8. What is saturated solution ?

9. The substances whose $\Delta_{sol}H$ = +ive (positive) what will effect of temperature on their solubility?

10. What is transition temperature ?

11. Pressure has no effect on the solubility of solid. Why?

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12. Define Henry law ?

> ▶ Watch Video Solution

13. Define Henry's Law constant ?

> ▶ Watch Video Solution

14. Write the significance of K_H (Henry Law constant) ?

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15. What is meant by solid in solid solutions ? Give two examples

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16. Define substitutional solid solution.

17. (a) Define vapour pressure

(b) Explain why vapour pressure of a solvent lowered by the addition of non-volatile solute ?

18. State and explain :

Raoult's law for volatile solute.

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19. State and explain :

Raoult's law for non-volatile solute.

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20. When does the Raould's law become a special case of Henry's law ?

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21. What is non ideal solution ?

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22. Write down the properties of ideal solution ?

23. Which solution shows +ve(positive) deviation from the ideal behaviour ?

24. Is the vapour pressure for the solution showing Positive deviation from ideal behaviour is more or less ?

25. What is dissolution process ?

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26. What are Azeotropes ?

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27. Which solution show minimum boiling azeotropes ?

28. What are colligative properties ? Name four such properties.

29. Define molar elevation constant.

30. Write down the units of K_b ?

31. Define osmosis. What is the difference between osmosis and diffusion ?

32. What is Osmotic pressure?

33. What are isotonic,hypertonic and hypotonic solutions.

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34. What is Hypotonic solution ? Also give example ?

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35. Is reverse osmosis takes place by applying pressure more than Osmotic pressure ?

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36. Why is one molar solution more concentrated than one molal solutions ?

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37. Colligative properties are inversely proportional to the molar mass ?

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38. What is Van't Hoff factor ?

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39. The van't Hoff factor i for an electrolyte which undergoes dissociation and association

in solvents respectively are:

40. If applied pressure is more than osmotic pressure then which process takes place ?

3 Mark Question

1. Write down the factors affecting the solubility of a solid in liquid.

2. What are the factors affecting the solubility of gas in liquid ?

3. What are the limitations of Henry's Law ?

4. Why CO_2 gas is filled in soda bottles ?

5. Vapour pressure of liquid depends on which

factors ?

6. Why is the vapour pressure of a solvent lowered on the addition of non-volatile solute into it ?

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7. Explain the process- Rainwater harvesting?

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8. Define first colligative property?

9. Write down the formula to calculate the relative Molar mass from relative lowering in vapour pressure ?

10. What is a semi-permeable membrane ?

11. What are the conditions to get accurate value of Molar mass from Colligative Properties?

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12. What concentration of NaCl is isotonic with fluids present in Human RBC ?

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13. For what solute did the values of Molar mass is more or value of colligative value is less?

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14. What is degree of dissociation of association ?

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15. Do molality and mole fraction changes with temperature ?

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16. Why aquatic species feel more comfortable in cold water than hot water ?

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17. Which colligative property is preferred for the molecular mass determination of macromolecules?

18. Show that relative lowering in vapour pressure is a colligative property

19. How will you show that elevation in boiling point is a colligative property?

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20. How will you show that depression in freezing point is a colligative property?

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21. Osmotic Pressure (π).

22. Write differences between ideal and non-ideal solutions.

23. Write differences between ideal and non-ideal solutions.

1. Commercially available sample of sulphuric acid is 15% H_2SO_4 by weight (density=1.10g mL^{-1}) . Calculate the molarity of the solution.

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2. Concentrated H_2SO_4 has a density 1 . 9 g/mL and is 99% H_2SO_4 by mass. Calculate the molarity of the acid

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3. Calculate the mass of a non-volatile solute (molar mass 40 g mol^(-1)) which should be dissolved in 114 g octane to reduce its vapour pressure to 80%.

4. 18 g of glucose is dissolved in 1 kg of water. At what temperature will the solution boil ? (K_b for water is 0.52 K kg mol^{-1})

5. How many grams of ethylene glycol (molar mass = 62) should be added to 10 kg of water, so that the resulting solution freezes at $-10°C$ (K_f for water = 1.86 K mol^{-1}).

6. Benzene and toluene form nearly ideal solution . At 313 K the vapour pressure of benzene and toluene are 160 mm and 60 mm

of Hg respectively. Calculate the total pressure of the solution made by mixing their equal masses at 313 K.

7. At 298 K the vapour pressure of pure benzene C_6H_6 is 0.256 bar and vapour pressure of pure toluene, C_6H_8 is 0.925 bar. If the mole fraction of benzene in solution is 0 . 40 , find the total vapour pressure of solution.

Also find the mole fraction of toluene in vapour phase

8. $200 \ cm^3$ of an aqueous solution of a protein contains 1.26g of the protein . The osmotic pressure of such a solution at 300K is found to be 2.7×10^{-3} bar. Calculate the molar mass of the protein (R=0.083 L bar $mol^{-1}K^{-1}$)

9. 4 . 0 g of NaOH are contained in one decilitre of a solution. Calculate the molarity and molality of this solution .

(Density of solution $= 1.038 gmL^{-1}$)

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10. In winter, the normal temperature in Dharmshala is $-8°$ C Is a 30% by mass of an aqueous solution of ethylene glycol (molar

mass = 62) suitable for car radiator . K_f for

water is 1 . 86 K/m

11. Calculate mole fraction of ethanol and

water in a sample of rectified spirit which

contains 92% ethanol by mass.

12. 19.5 g of CH_2FCOOH is dissolved in 500 g of water. The depression in the freezing point of water observed is 1.0° C. Calculate the van't Hoff factor and dissociation constant of fluoroacetic acid.

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13. 4 . 0 g of NaOH are contained in one decilitre of a solution. Calculate the molarity

and molality of this solution .

(Density of solution $= 1.038 gmL^{-1}$)

14. At some temperature the vapour pressure of pure benzene, C_6H_6 is 0 . 256 bar and vapour pressure of toluene, $C_6H_5CH_3$ is 0 . 0 925 bar, if the mole fraction of toluene in a solution is 0 . 60

(i) What is the total vapour pressure of the solution ?

(ii) Calculate the composition of the vapour phase in terms of mole fraction.

15. Vapour pressure of chlolfom $(CHCI_3)$ and dichloromethane (CH_2CI_2) at 298 K are 200 mm Hg and 415 mm Hg respectively. Calculate the vapour pressure of the solution prespared by miximng 25 g of $CHCI_3$ and 45 g of CH_2CI_2 at 298 K. Also find the mole fraction of CHI_3 in the vapour phase .

16. The density of 10% by mass of KCl solution in water is $1.06 gmL^{-1}$. Calculate molarity and molality of the solution

17. The vapour pressure of ethanol (C_6H_5OH) and methanol (CH_3OH) are 44.5 and 88.7 mm Hg respectively. An ideal solution is formed at the same temperature by mixing 60

g of ethanol and 40 g methanol

(i) Calculate the total vapour pressure of the solution

(ii) Find mole fraction of each component in vapour phase

18. Addition of 0.643g of a compound to 43.95g of benzene lowers the freezing point from $5.51°$C to $5.03°$C. If K_f for benzene is 5.12K kg

mol^{-1} , calculate the molar mass of the compound.

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19. 18 g of a compound is dissolved in 10 kg of water so that the resulting solution freezes at $-8°C$. If K_f for water = 1 . 86 K/m . Calculate the molecular mass of the compound

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20. 35 g of compound is added in 1 kg of water so that the resulting solution freezes at $-10°$ C . If K_f for water = 1. 86 K/m . Calculate the molecular mass of the compound

21. Calculate mole fraction of water in a mixture of 12 g of water and 92 g ethanol.

22. In winter, the normal temperature in Dharmshala is $-8°$ C Is a 30% by mass of an aqueous solution of ethylene glycol (molar mass = 62) suitable for car radiator . K_f for water is 1 . 86 K/m

23. Calculate mole fraction of ethanol and water in a sample of rectified spirit which contains 92% ethanol by mass.

24. In winter, the normal temperature in Kashmir valley is $-12°$ C . Is a 25% by mass of an aqueous solution of ethylene glycol (molar mass = 62) suitable for car radiator . K_f for water is $1.86 Km^{-1}$

25. If 1 .71 g of sugar (molar mass = 342) are dissolved in $500 cm^3$ of solution at 300 K, what

will be its osmotic pressure ?

26. Find mole fraction of ethanol and water in a sample of rectified spirit which contain 95 % ethanol by mass.

27. A solution of glucose in water labelled as 10% (W/W). The density of solution is 1.20 g

mL^{-1}. Calculate mole fraction of each component in solution.

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28. Calculate the osmotic pressure in pascals exerted by a solution prepared by dissolving 1 . 0 g of polymer of molar mass 1,85,000 in 450 ml of water at $37°$ C

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29. Concentrated H_2SO_4 has a density 1 . 9 g/mL and is $99\,\%\ H_2SO_4$ by mass. Calculate the molarity of the acid

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30. Calculate the molal elevation constant of water $(K_b = ?)$. Given that 0 . 1 molar aquous solution of a substance boiled at $100.052°$ C

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31. The boiling point of Benzene (C_6H_6) is 353.23 K. When 1 . 80 g of a non - volatile solute was dissolved in 90 g of C_6H_6 the boiling point is raised to 354 . 11 K. Calculate the molar mass of solute .

(Given K_b for benzene is 2 . 53 K kg mol^{-1})

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