



# CHEMISTRY

## BOOKS - V PUBLICATION

### SOLUTIONS

#### Question Bank

1. Define the term solution. How many types of solutions are formed? Write briefly about each type with an example.



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2. Give an example of a solid's solution in which the solute is a gas.



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3. Define the following terms: i. Mole fraction  
Molality ii. Molarity iv. Mass percentage.



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4. Concentrated nitric acid used in laboratory works is '68 %' nitric acid by mass in aqueous solution. What should be the molarity of such .. a sample of the acid if the density of the solution is ' $1.504 \text{ g ml}^{-1}$ ' ?



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5. A solution of glucose in water is labelled as '10 % w / w', what would be the molality and mole fraction of each component in the solution?

If the density of solution is ' $1.2 \text{ g mL}^{-1}$ ', then what shall be the molarity of the solution?



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6. How many mL of 0.1 M HCl are required to react completely with 1 g mixture of ' $\text{Na}_2\text{CO}_3$ ' and ' $\text{NaHCO}_3$ ' containing equimolar amounts of both?



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7. A solution is obtained by mixing 300 g of '25 %' solution and '400 g' of '40 %' solution by mass. Calculate the mass percentage of the resulting solution.



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8. An antifreeze solution is prepared from '222.6 g' of ethylene glycol '(C, H<sub>6</sub> O<sub>2</sub>)' and '200 g' of water. Calculate the molality of the solution. If the density of the solution is '1.072

gmL<sup>-1</sup>,' then what shall be the-molarity of the solution?



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9. . A sample of drinking water was found to be severely contaminated with chloroform '(CHCl<sub>3</sub>)' supposed to be a carcinogen. The level of contamination was 15 ppm (by mass):i. express this in percent by mass ii. determine the molality of chloroform in the water sample.



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**10.** What role does the molecular interaction play in a solution of alcohol and water?



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**11.** Why do gases always tend to be less soluble in liquids as the temperature is raised?



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12. State Henry's law and mention some important applications?



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13. The partial pressure of ethane-over at solution containing ' $6.56 \times 10^{-3} \text{g}$ ' of ethane is 1 bar. If the solution contains ' $5.00 \times 10^{-2} \text{g}$ ' of ethane, then what shall be the partial pressure of the gas?



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14. What is meant by positive and negative deviations from Raoult's law and how is the sign of ' $\Delta_{sol} H$ ' related to positive, and negative deviations from Raoult's law?



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15. An aqueous solution of '2 %' non-volatile solute exerts a pressure of 1.004 bar at the normal boiling point of the solvent. What is the molar mass of the solute?



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**16.** Heptane and octane form an ideal solution. At '373 ~K,' the vapour pressures of the two liquid components are '105.2 kPa and 46.8 kPa respectively. What will be the vapour pressure of a mixture of '26.0 ~g' of heptane. and '35 . g' of octane?



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17. The vapour pressure of water is 12.3 kPa at 300 K. Calculate the vapour pressure of 1 molal solution in it



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



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**19.** A solution containing '30 g' of non-volatile solute exactly in '90, g' of water has a vapour pressure of '2.8 kPa' at '298 K'. Further, '18 g' of water is then added to the solution and the new vapour pressure becomes '2.9 kPa' at '298K'. Calculate: (i) molar mass of the solute (ii) vapour pressure of water at '298 K'.



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20. 5 % solution (by mass) of cane sugar in water has freezing point of  $271\text{ K}$ . Calculate the freezing point of 5 % glucose in water if freezing point of pure water is  $273.15$



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21. Two elements 'A' and 'B' form compounds having formula  $\text{AB}_2$  and  $\text{AB}_4$ . When dissolved in  $20\text{ g}$  of benzene ( $\text{C}_6\text{H}_6$ ),  $1\text{ g}$  of  $\text{AB}_2$  lowers the freezing point by  $2.3\text{ K}$

whereas '1.0 g' of 'AB<sub>4</sub>' lowers it by 1.3. K: The molar depression constant for benzene is 5.1 K kg mol<sup>-1</sup>. Calculate atomic masses of A and B.



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22. At '300 K, 36 g' of glucose present in a litre of its solution has an osmotic pressure of 4.98 bar. If the osmotic pressure of the solution is 1.52 bars at the same temperature, what would be its concentration?



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23. Suggest the most important type of intermolecular attractive interaction in the following pairs. i. n-hexane and n-octane ii. 'I\_2' and 'C C l\_4' iji. 'NaClO\_4' and water iv. methanol and acetone v. acetonitrile (CH<sub>3</sub>CN) and acetone '(fC\_3 H\_6 O)'



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24. Based on solute-solvent interactions, arrange the following in order of increasing

solubility in n-octane and explain. Cyclohexane,  
KCl, 'CH<sub>3</sub> OH, CH<sub>3</sub> CN'



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25. Amongst the following compounds, identify which are insoluble, partially soluble and highly soluble in water? i. phenol - ii. toluene iii. formic acid iv. ethylene glycol v. chloroform vi. pentanol.



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26. If the density of some lake water is  $1.25 \text{ g cm}^{-3}$  and contains  $92 \text{ g}$  of  $\text{Na}^+$  ions per  $\text{kg}$  of water, calculate the molality, of  $\text{Na}^+$  ions in the lake.



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27. If the solubility product of  $\text{CuS}$  is  $6 \times 10^{-16}$  calculate the maximum molarity of  $\text{CuS}$  in aqueous solution



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**28.** Calculate the mass percentage of aspirin ' $C_9H_8O_2$ ' in acetonitrile ' $CH_3CN$ ' when '6.5 g' of ' $C_9H_8O_4$ ' is dissolved in '450 g' of ' $CH_3CN$ '



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**29.** Nalorphene ' $C_{14}H_{21}NO_3$ ,' similar to morphine, is used to combat withdrawal symptoms in narcotic users. Dose of nalorphene generally given is '1.5 mg'.

Calculate the mass of ' $1.5 \cdot 10^{-3}$  m' aqueous solution required for the above dose



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**30.** Calculate ofhe amount of benzoic acid ' $(C_6H_5 COOH)$ ' required for preparing '250 ml' of '0.15 M' solution in methanol. -



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**31.** The depression in freezing point of water observed for the same amount of acetic acid, trichloroacetic acid and trifluoroacetic acid increases in the order given above. Explain briefly.



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**32.** Calculate the depression in the freezing point of water when '10 g' of ' $\text{CH}_3\text{CH}_2$

CHClCOOH' is added to '250 g' of water. 'Ka=1.4  
xx 10<sup>-3</sup>, Kf=1.86Kkgmol<sup>-1</sup>'



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**33.** 19.5 g' of 'CH<sub>2</sub>FCOOH' is dissolved in '500 g' of water. The depression in the freezing point of water observed is '1 C. Calculate the van't Hoff factor and dissociation constant of :  
'fluoroacetic acid.



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34. . Vapour pressure of water at '293 K' is 17.535 'mm Hg' . Calculate the vapour pressure of water at '293 K' when '25 g' of glucose is dissolved in '450 g' of water.



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35. Henry's law constant for the molality of methane in benzene at '298 K' is ' $4.27 \times 10^5$  mm Hg' Calculate the solubility of methane in benzene at '298 K' under '760 mm Hg'



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**36.** 100 g of liquid 'A' (molar mass '140 g/ mol' ) was dissolved in 1000 g of liquid 'B'. (molar mass 180 g/mol The vapour pressure of pure liquid B was found to be 500 torr. Calculate the vapour pressure of pure liquid A and its vapour pressure in the solution, if the total vapour pressure of the solution is 475 torr.



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37. Vapour pressures to pure acetone and chloroform at '328 K' are '741.8 mm Hg' and '632.8 mm' Hg respectively. Assuming that they form ideal solution over the entire range of composition, The experimental data observed for different compositionis of mixture is Plot this data also on the same graph paper. Indicate whether it has positive deviation or negative deviation from the ideal solution.



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**38.** Benzene and toluene form an ideal solution over the entire range of composition. Pressure of pure benzene and toluene at 300 K are 50.71 mm Hg and 32.06 mm Hg respectively. Calculate the mole fraction of benzene in vapour phase if 80 g of benzene is mixed with 100 g of toluene



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**39.** The air is a mixture of a number of gases. The major components are oxygen

and nitrogen with approximate proportion of '20 %' is to '79 %' by volume at '298 K'. The water is in equilibrium with air at a pressure of '10 atm'. At '298 K' if the Henry's law constants for oxygen and nitrogen at '298 K' are ' $3.30 \times 10^7$  mm' and ' $6.51 \times 10^7$  mm' respectively, calculate the composition of these gases in water.



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40. Determine the amount of ' $\text{CaCl}_2$ ' ( $i=2.47$ ) dissolved in 2.5 litre of water such that its osmotic pressure is '0.75 atm' at ' $27^\circ\text{C}$ '



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41. Determine the osmotic pressure of a solution prepared by dissolving '25 mg' of ' $\text{K}_2\text{SO}_4$ ' in 2 litre of water at ' $25^\circ\text{C}$ ' assuming that it is completely dissociated.



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**42. 1.** Give reasons for the following: when '30 ml' of ethanol and '30 ml' of water are mixed, the volume of resulting 'solution. is more than '60 ml'. Ans: In ethanol and water, the molecules are by. drogen bonded. When these are mixed 't 0' form a solution, each liquid tends to break the hydrogen bonds of the other liquid. The attractive forces decrease. The total volume of the solution becomes more than '60 m'



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**43.** Why is elevation in b.p of water different in the following SOLUTIONS? a. 0.1 molar 'dotNaCl' solution b. ' 0.1' molar sugar solution



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**44.** What type of,azeotrope is formed on mixing nitric acid and water?



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**45.** A and B liquids on mixing produce a warm solution. Which type of deviation from Raoult's law is there?



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**46.** Mention a large scale, use of the phenomenon called 'reverse osmosis'



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**47.** Why is elevation in b.p of water different in the following SOLUTIONS? a. 0.1 molar 'dotNaCl' solution b. ' 0.1' molar sugar solution



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**48.** What happens' when blood celis are placed in pure water?



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49. 'CCl<sub>4</sub>' and water are immiscible whereas ethyl alcohol and water are miscible in all proportions. Predict the behaviour of molecular structures of these compounds.



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50. When fruits and vegetables are dried and placed in water, they slowly swell and return to original form, why? Does an increase in temperature accelerate the process? Explain.







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51. What are non-ideal solution?



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52. State the conditions under which the Raoult's law holds goods.



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**53.** Why do we keep ice cream in a mixture containing ice-and common salt?



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**54.** What are isotonic SOLUTIONS?



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**55.** When two liquids 'X' and 'Y' are mixed the solution becomes hot. When pair of liquids, 'Y'

and 'Z' are mixed, the solution becomes cold.

Which of these SOLUTIONS will exhibit negative deviations from Raoult's law?



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**56.** Why is the vapour pressure of a solvent lowered by the addition of a non-volatile solute?



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**57.** What does an ideal solution mean at the molecular level?



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**58.** Give an example of a solution in which 'A-B' interaction are stronger than 'A-A' or 'B-B' interaction



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**59.** Identify the quantity, which, changes with temperature - molarity or molality? Why?



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**60.** What is the normality of a 0.4 M aqueous solution of a tribasic acid?



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**61.** When and why is molality, preferred to, molarity in handling solutions in chemistry?



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**62.** What is the effect of rise in temperature on solubility of a gas in liquid?



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**63.** If ' $\Delta H_{\text{sol}} > 0$ ' for a solid, predict the effect of temperature on its solubility?



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**64.** Which is more concentrated, 1 molar (1M) or 1 molal (1m) Why?



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**65.** The vapour pressure of a liquid is a constant at constant temperature? Why?



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**66.** Pressure cooker reduce-cooking time. Why?



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**67.** 15cc of liquid 'X' is mixed with '15 cc of liquid 'Y'. The volume of the resulting solution is



found to be '30.1 cc .' What is the nature of the resulting solution?



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**68.** Interpret the following a) A cooling effect is produced when two liquids are mixed. b) A warm solution is formed, when two liquids are mixed.



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**69.** After removing the outer shell ( ' $\text{CaCO}_3$ ' ) of two eggs in dil ' $\text{HCl}$ ,' one is placed in distilled ' $\text{H}_2\text{O}$ ' and the other is placed in a saturated solution ' of  $\text{NaCl}$ . Explain the observation?



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**70.** Name the colligative property, used for the determination of molar mass of macromolecules (eg. proteins)?





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71. Account for the following Ethylene glycol is added to radiator in automobiles.



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72. What happens when red blood corpuscles (RBC) are placed in (a) '1 %' NaCl solution (b) '0.6 %' NaCl solution?



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73. When does the measurement of colligative properties of a solution leads to abnormal molecular masses?



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74. Equimolal solutions of 'NaCl' and ' $BaCl_2$ ' are prepared in ' $H_2O$ '. Freezing point of 'NaCl' is found to be  $-2C$ . What is the freezing point of  $BaCl_2$ ?



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**75.** How is molecular mass of a solute related to the elevation in boiling point of the solution?



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**76.** The boiling point of 'A' is higher than that of 'B'. Which of them will have higher vapour pressure?



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77. State Henry's law.



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78. State Raoult's law i) volatile solutes and ii) for a non - volatile solute.



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79. Differentiate between ideal and non - ideal SOLUTIONS?



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**80.** Derive an expression for the relative lowering of vapour pressure?



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**81.** Define (i) ebullioscopic constant and (ii) cryoscopic constant.



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**82.** Show that (i) elevation in boiling point is a colligative property (ii) depression in freezing point is a colligative property and (iii) osmotic pressure is a colligative property?



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**83.** Which is the colligative property, osmosis or osmotic pressure ? Suggest application of reverse osmosis.



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**84.** What are isotonic, hypertonic hyptonic SOLUTIONS



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**85.** Show graphically how the vapour pressure of a solvent and a solution of a non volatile solute change with temperature. Show the boiling points of the solvent and the solution in the graph. Which is higher and why?



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**86.** What is van't Hoff factor? What are its possible values when the solute molecules undergo (i) association and (ii) dissociation in solution?



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**87.** Explain the reason for non ideal behaviour shown by liquid mixtures? Give one example for each case?



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**88.** What is the nature of the solution obtained by mixing a) phenol and aniline and b) ethyl alcohol and H<sub>2</sub>O



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**89.** When two liquids 'X' and 'Y' are mixed the solution becomes hot. When pair of liquids, 'Y' and 'Z' are mixed, the solution becomes cold.

Which of these SOLUTIONS will exhibit negative deviations from Raoult's law?



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**90.** Define osmosis and osmotic pressure?

Arrange the following SOLUTIONS in the increasing order of their osmotic pressure? (a)

'3.42 g / L' g sucrose (b) '60 g / L' urea glucose

(c) '90 g / L' (d) '58.5 g / L NaCl'



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91. An antifreeze solution is prepared from '222.6 g' of ethylene glycol '(C, H<sub>6</sub> O<sub>2</sub>)' and '200 g' of water. Calculate the molality of the solution. If the density of the solution is '1.072 gmL<sup>-1</sup>,' then what shall be the-molarity of the solution?



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92. Find the molarity and molality of a 15% Solution of H<sub>2</sub>SO<sub>4</sub> (density of H<sub>2</sub>SO<sub>4</sub> = 1.020 g cm<sup>-3</sup>) (Atomic mass: H = 1, O = 16, S = 32 amu).



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93. The solubility of ' $\text{Ba(OH)}_2 \cdot 8 \text{H}_2\text{O}$ ' in water at '288 K' is '5.6 g' per '100 g' of water. molality of the hydroxide ions in solution of ' $\text{Ba(OH)}_2 \cdot 8 \text{H}_2\text{O}$ ' at '288 K' [At. mass of ' $\text{Ba}=137$ , ' $\text{O}=16$ , ' $\text{H}=1$ '



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94. Find the molarity of water in pure water ( $d=1 \text{ g mol}^{-1}$ )



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**95.** How much water should be added to '300 mL' of 0.5 M NaOH solution so as to prepare a solution of 0.2 M?



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**96.** 20 mL of '0.02 M  $\text{KMnO}_4$ ' was required to completely oxidise 10 mL of oxalic acid solution. What is the molarity of oxalic acid solution?



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**97.** 300 mL 0.1M HCl and '200 mL' of '0.3M H<sub>2</sub>SO' are mixed. Calculate the normality of the resulting mixture?



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**98.** Calculate the molaity of a solutioniof Cöric.HCl containing '36.5 %' by weight of HCl?



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**99.** '8.0575  $\times 10^{-2}$  kg' of Glauber's salt is dissolved in water to obtain '1 dm<sup>3</sup>' of a solution of density '1077.2 kgm<sup>-3</sup>'. Calculate the molarity, molality and mole fraction of 'Na<sub>2</sub>SO<sub>4</sub>' in solution



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**100.** Calculate the molality of 1 litre solution of '93 %' 'H<sub>2</sub>SO<sub>4</sub>' (weight / vol.) The density of the solution 1.84 g/ml



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**101.** A 6.9 M solution of KOH in water contains '30 %' by weight of 'KOH'. Calculate the density of the solution?



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**102.** H<sub>2</sub>SO<sub>4</sub> used in lead storage cell is '38 %' by mass and has a density of '1.30 g cm<sup>-3</sup>'. Calculate its molarity?



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**103.** Calculate the volume of '80 %  $H_2SO_4$ ' (density '1.80 g / cc' ) required to prepare 1 litre of '20 %' ' $H_2SO_4$ (density 1.25 ~g cc) ?'



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**104.** Addition of 0.643 'g of a compound to '50 mL' of 'benzene (density 0.879 g/mL) lowers the freez ing point from ' $5.51^{\circ}C$ ' to ' $5.03^{\circ}C$ '

C'. If 'K' for benzene is '5.12  $\sim$ K' kg mol  $^{-1}$

Calculate the molar mass of the compound?



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**105.** Osmotic pressure of a solution containing '7 g' of a protein per '100  $\sim$ mL' of solution is '25 mm' Hg at '37 $^{\circ}$ C'. Calculate the molecular mass of protein?



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**106.** Calculate molarity of solution of  $\text{CaCl}_2$  if on chemical analysis it is found that 200 ml of  $\text{CaCl}_2$  contains  $3.01 \times 10^{22} \text{Cl}^-$  ions



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**107.** A solution of 'A' and 'B' with 40 mole percent of 'A' is in equilibrium with its vapour which contain 50 mole percent of A. Assuming that the solution and the vapour behave

ideally, calculate the ratio of the vapour pressures of pure A and pure 'B'.



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**108.** The osmotic pressure of a non-electrolytic solution is '500 mm Hg' at '10 C .' The solution is diluted and its temperature is raised to '30C'. It is now found that the osmotic pressure of the solution is reduced to ' $105^{\prime}3^{\sim}$  mm Hg'. Determine ne extent of dilution of the solution?



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**109.** 1 equivalent is

- A. 1000 milliequivalent
- B. '1000 gm' of the compound
- C. Equivalent mass in gm
- D. Equivalent mass in mg

**Answer: C**



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**110.** The concentration of solution remains independent of temperature in

A. Molarity

B. Normality

C. Formality

D. Molality

**Answer: D**



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111. Molarity is expressed as

A. Grams/litre '.

B. litres/mole

C. moles / litre

D. moles '/ 1000 gm'

**Answer: C**



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**112.** Sum of mole fractions of the two components of a solution is always

A. more than one

B. less than one

C. exactly one

D. not fixed

**Answer: C**



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**113.** solution contains 1 mole of alcohol and 4 moles of water. The möle fraction of water and alcohol will be

A.  $1/4$  and  $7/4$

B. 4 and  $1/5$

C.  $1/5$  and  $8/5$

D.  $4/5$  and  $1/5$

**Answer: D**



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114. If 0.5 mole of ' $\text{BaCl}_2$ ', is mixed with 0.2 mole of ' $\text{Na}_3\text{PO}_4$ ', the maximum number of moles of ' $\text{Ba}_3(\text{PO}_4)_2$ ' that can be formed is

A. 0.1

B. 0.2

C. 0.5

D. 0.7

**Answer: A**



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115. If ' 250 mL' of '0.25 M NaCl' solution is diluted, with water to a volume of '500 mL ', the new concentration of the solution is

A. '0.167 M'

B. '0.125M`

C. '0: 0833 M'

D. '0.0167 M'

**Answer: B**



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**116.** volume of '0.1 M H, SO<sub>4</sub>' solution required to neutralise '50 ~mL' of '0.2 M NaOH' solution is

A. 25 mL

B. '50 mL<sup>2+</sup>,'

C. '75 mL'

D. '100 mL'

**Answer: B**



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117. The formula weight of 'H<sub>2</sub>SO<sub>4</sub>' is '98' .

The weight of the acid in '400 ~mL' of '0.1 M'

solution is +

A. '2.45 g'

B. '3.92 g'

C. '4.90g'

D. '9.8 g`

**Answer: B**



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**118.** Which of the following should be done for preparing 0.4 M NaCl starting with '100 mL' of 0.3 M NaCl (mol. wt. of NaCl 58.5)

A. add '5.85 NaCl'

B. add '20 mL H<sub>2</sub>O'

C. add '0.010 mL NaCl'

D. evaporate '10 ~mL' water '

**Answer: A**



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**119.** How many 'm L' of '1 M H<sub>2</sub>SO<sub>4</sub>' solution will be neutralised by '10 mL' of 1 M NaOH solution?

A. 10

B. 20

C. 2.5

D. 5

**Answer: D**



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**120.** A '500 g' tooth paste sample has '0.2 ~g' fluoride concentration. What is the concentration of fluoride in terms of ppm level?

A. 250

B. 200

C. 400

D. 1000

**Answer: C**



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**121.** Increasing the temperature of an aqueous solution will cause

- A. decrease in molality
- B. decrease in molarity
- C. decrease in mole fraction
- D. decrease in % w/w

**Answer: B**



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122. To 5.85 g NaCl, one kg of water is added to prepare a solution. The strength of 'NaCl' in this solution is

A. '0.1 Normal

B. '0.1 molal

C. '0.1 Molar

D. '0.1 formal

**Answer: B**



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**123.** On dissolving 1 mole of each of the following acids in '1 L' water, the acid which does not give a solution of strength '1 N' is

A. HCL

B. HClO<sub>4</sub>

C. HNO<sub>3</sub>

D. H<sub>3</sub>PO<sub>4</sub>

**Answer: D**



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124. '10 mL' of conc. 'H<sub>2</sub>SO<sub>4</sub>' (18 Molar) is diluted in to 1 litre. the strength could be

A. 0.18N

B. 0.09N

C. 0.36N

D. 1800N

**Answer: C**



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125. What is the normality of a '1 M' solution of 'H<sub>3</sub>PO<sub>4</sub>'?

A. '0.5 ~N'

B. '1 N'

C. '2.0 ~N'

D. '3.0 ~N'

**Answer: D**



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126. '100 mL' of '0.3  $\text{NH}_4\text{Cl}$ ' is mixed with '200 mL' of '0.6  $\text{NH}_2\text{SO}_4$ '. The final normality of the resulting solution will be

A. '0.1 ~N'

B. '0.2 ~N'

C. '0.3 ~N'

D. '0.5 ~N'

**Answer: D**



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127. How many grams of dibasic acid (mol. wt. 200) should be present in '100mL' of its aqueous 'solution to give decinormal strength?

A. '1 ~g'

B. '2 ~g'

C. '10 ~g'

D. '20 ~g'

**Answer: A**



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**128.** Find the molarity of water in pure water( $d=1\text{g mol}^{-1}$ )

A. 55.6

B. 50

C. 100

D. 18

**Answer: A**



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129. ' If we take '44g' of 'CO', and '14 g' of 'N,' what will be mole, fraction ofCO<sub>2</sub>' in the mixture?

A. 1

B. '1 / 2'

C. '2 / 3'

D. 4

**Answer: C**



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**130.** The molarity, of a solution of ' $\text{Na}_2\text{CO}_3$ ' having '10: 6 g / 500mL' of solution is

A. 0.2M

B. 2M

C. 20M

D. 0.02M

**Answer: A**



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131. '25 mL' of '3.0 M HNO<sub>3</sub>' are mixed with '75 mL' of 4.0M HNO<sub>3</sub>.if the volums are additive ,the molarity of the 'mixture is

A. '3.25 M'

B. '4.0 M'

C. '3.75 M'

D. '3.50 M'

**Answer: C**



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**132.** A mixture of two completely miscible non-ideal liquids which distil as such without change in its composition at a constant temperature as if it were a pure liquid. The mixture is

A. binary liquid mixture

B. azeotropic mixture

C. ideal mixture

D. eutectic mixture

**Answer: B**



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**133.** Which one is a colligative property?

A. boiling point

B. vapour pressure

C. osmotic pressure

D. freezing point

**Answer: C**



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**134.** For a dilute solution, Raoult's law states that

A. The lowering of vapour pressure is equal to the mole fraction of the solute

B. The relative lowering of vapour pressure is equal to the mole fraction of the solute

C. the relative lowering of vapour pressure is proportional to the amount of solute



D. The vapour pressure of the solution is equal to the mole fraction of the solvent

**Answer: B**



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**135.** An ideal solution is formed when

A. heat of mixing is zero

B. zero volume change

C. zero heat of mixing and zero volume change

D. heat of mixing is negative

**Answer: A**



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**136.** A mixture of benzene and toluene forms

A. an ideal solution

B. non ideal solution

C. suspension

D. emulsion

**Answer: A**



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**137.** Which of the following liquid pairs shows a positive deviation from Raoult's law?

A. 'H<sub>2</sub>O-HCl'

B. 'H<sub>2</sub>O-HNO<sub>3</sub>'

C. acetone - chloroform

D. benzene - methanol

**Answer: D**



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**138.** An azeotropic solution of two liquids has boiling point tower than' either of them when it

A. shows a négative deviation from Raoult's law

B. shows no deviation from Raoult's law

C. shows positive deviation from Raoult's law

D. is saturated

**Answer: C**



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**139.** The molal b.p.constant ' $(fK_h)$ ' for water is ' $0.513^{\circ}\text{C kgmol}^{-1}$ '. When 0.1 mole of sugar is dissolved 'in '200 ~g' of water, the solution boils under a pressure of 1 atm. At

A. ' $100.513^{\circ}\text{C}$ '

B. vapour pressure

C. ' $100.256^{\circ}\text{C}$ '

D. ' $101.025^{\circ}\text{C}$ '

**Answer: C**



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**140.** The latent heat of vapourisation of water is  $9700 \text{ cal 'l' mol}$  and if the 'b cdot p' is  $'100^{\text{circ}} \text{ C}'$ , the ebullioscopic constant of water is

A.  $'0.513^{\text{circ}} \text{ C}$

B.  $'1.026^{\text{C}}$

C.  $10.26^{\text{circ}} \text{ C}$

D.  $1.832^{\text{circ}} \text{ C}'$

**Answer: A**



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**141.** At high altitudes, the boiling point of water gets lowered because

- A. atmospheric pressure is low
- B. temperature is low
- C. atmospheric pressure is high
- D. none of these



**Answer: A**



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**142.** When a solution is separated from a solvent by a semi permeable membrane the phenomenon taking place is called

- A. Osmosis
- B. diffusion
- C. cataphoresis
- D. plasmolysis

**Answer: A**



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**143.** Which inorganic precipitate acts as a semipermeable membrane?

- A. Calcium sulphate
- B. Barium oxalate
- C. Nickel phosphate
- D. Copper ferrocyanide

**Answer: D**



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**144.** Osmotic pressure is measured quickly and accurately by

- A. Berkeley and Hartley method
- B. Morse's method
- C. Pfeffer's method
- D. De varies method

**Answer: A**



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**145.** Acetic acid undergoes dimerisation in benzene solution, the van't Hoff factor  $i$  is related to the degree of association of the acid as

A.  $i=(1-x)$

B.  $i=(1+x)$

C.  $i=(1-x / 2)$

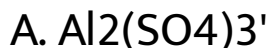
$$D. i = (1 + x / 2)$$

**Answer: C**



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**146.** Which of the following salt will have same value of van't Hoff's factor (i) as that of 'K<sub>4</sub>[Fe(CN)<sub>6</sub>]



C.  $\text{Al}(\text{NO}_3)_3$

D.  $\text{Na}_2\text{SO}_4$

**Answer: A**



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**147.** Which of the following 0.1 M aqueous SOLUTIONS will have the lowest freezing point?

A. Potassium sulphate  $\text{K}_2\text{SO}_4$

B. NaCl'

C. Urea

D. gLucose

**Answer: A**



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**148.** An ideal solution was formed by mixing methanol and ethanol at  $25^{\circ}\text{C}$ . The partial pressure of methanol and that of ethanol was found to be  $2.619\text{KPa}$  and  $4.556$

k ]]Pa respec tively. The composition of vapour  
(in terms of mole fraction) will be

A. 0.635 , 0.365'

B. 0.365,0.635

C. 0.574,0.326

D. 0.173,0.827+3'

**Answer: B**



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149. The van' Hoff factor for 0.1 M  $\text{Ba}(\text{NO}_3)_2$  solution is 2.74 . The degree of dissociation is -

A. 91.3 %

B. 87 %

C. 100 %

D. 74 %

**Answer: B**



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150. Pressure cooker reduce-cooking time.

Why?

A. heat is more evenly distributed:in

cooking space

B. boiling point of water involved in

cooking is increased 'boldsymbolc'

C. pressure inside the cooker wishes fond

material

D. cooking involves chemical changes

helped by rise in temperature '

**Answer: B**



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**151.** '0.004 M' solution of ' $\text{Na}_2\text{SO}_4$ ' is isotonic with '0.01 M' solution of glucose at, same temperature. The apparent degree of dissociation of ' $\text{Na}_2\text{SO}_4$ ' is

A. 0.5

B. 0.25

C. 0.75

D. 0.85

**Answer: C**



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**152.**  $6.02 \times 10^{21}$  molecules of urea are present in 100 'mL' of its solution. "The concentration of urea solution is -

A. 0.001M

B. 0.01 M'

C. 0.02M

D. 0.1

**Answer: B**



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**153.** The elevation in boiling point of a solution of '13.44 g' of ' $\text{CuCl}_2$ ' in '1 kg' of water is ' $(K_b=0.52 \text{ K Kg/mol}) \text{ mol. '}$ ', wt. of ' $\text{CuCl}_2=134.4$ '

A. 0.16

B. 0.1

C. 0.21

D. 5

**Answer: B**



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**154.** Camphor is often used in molecular mass determination because

- A. 'It is reading available
- B. It has a very high cryoscopic constant
- C. It is volatile
- D. If is solvent for organic substances

**Answer: B**



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**155.** Phenol dimerises in benzene having 'van't Hoff factor '0.54 .' What is the degree of association

A. '0.46

B. 0.54

C. 0.27

D. 0.92

**Answer: D**



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**156.** An ' $X$ ' molal solution of a compound in benzene has mole fraction of solute equal to 0.2 The value of ' $X$ ' is nearly



A. 14

B. 3.2

C. 1.4

D. 2

**Answer: B**



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**157.** An aqueous solution freezes at  $-0.186^{\circ}\text{C}$  ( $K_f=1.86$  &  $K_b=0.512^{\circ}\text{C}$ ) What is the elevation in boiling point?

A. 0.186

B. 0.512

C. 0.86

D. 0.0512

**Answer:**



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**158.** An aqueous solution of '6.3 g' oxalic acid dehydrate is made up to 250 mL. The volume

of 0.1 N NaOH required to completely neutralize 10 mL of this solution is :

A. 40

B. 20

C. 10

D. 4

**Answer:**



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