

India's Number 1 Education App

## **CHEMISTRY**

# **BOOKS - BODY BOOKS PUBLICATION**

# SOLUTIONS



1. Which of the following concentration term is

independent of temperature?

A. Molality only

B. Molality and mole fraction

C. Molarity and mole fraction

D. Molarity only

#### Answer:

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**2.** Assuming complete dissociation, the van't Hoff factor for a dilute aqueous solution of sodium chloride is......



**3.** The temperature at which the vapour pressure of a liquid becomes equal to the external pressure is its

A. Boiling point

- B. Melting point
- C. Sublimation point
- D. None of these





# 5. The deviation from Raoult's law is greatest

in

#### A. Sugar in solution

B. Water- oil mixture

C. Salt solution

D. Water - Ethanol solution

#### Answer:

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**6.** The temperature at which the vapour pressure of a liquid becomes equal to the external pressure is its

7. "The tendency for catenation is much higher for silicon than for carbon".State whether this statement is true or false?

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# **8.** What is the effect of adding sugar on boiling and freezing point of water?

A. Boiling point increases and freezing

point decreases

B. Boiling and freezing point increases

C. Boiling and freezing point decreases

D. Bolling point decreases and freezing

point increases

Answer:

**9.** The van't Hoff, factor for a solute that associates in solution is

A. 1

B. Less than 1

C. 0

D. Less than 1

#### **Answer:**

10. Choose the correctly matched pair

A. hypotonic- Lower osmotic pressure

B. hypertonic -Lower osmotlc pressure

C. Isotonic- higher osmotic pressure

D.

Answer:

**11.** The statement "the relative lowering of the vapour pressure Is equal to the ratio of the molecules of the solute to the total number of the molecules In the solution" refers to \_\_\_\_\_



**12.** "The molarity of a solution is independent

of temperature".' State whether, this

statement Is true or false?

**13.** Negative deviation from Raoult's law is ' observed in which one of the following binary liquid mixtures?

A. Ethanol and acetone

- B. Benzeene and toluene
- C. Acetone and Chloroform
- D. Chloroethane and bromoethane

#### Answer:

14. The'ratio of experimental value of a colligative property to the theoretical value is known as

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**15.** How the osmotic pressure vary with

temperature.



**17.** Saline water is prescribed for throat infection .why?

**18.** \_\_\_\_\_ is a substance which' is added to

solvent to lower Its freezing point.

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**19.** Mixing of acetone and chloroform occurs with reduction in volume and is exothermic process. What change will occurs in vapour pressure ? Explain your answer.



**20.** Graphically explain why a solution obtained by dissolving a non-volatile solue in a volatile solvent, freezes at a lower, temperature than that of pure solvent.

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**21.** Which of the following colligative properties can provide molar mass of proteins (or polymers or colloids with great precision)

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

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**23.** Out of the following solutions which has

the lowest freezing point ? Give reasons

A.1 M Urea

B.1 M NaCl

#### C. $1MAICl_3$

D.

#### Answer:

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**24.** To get hard boiled eggs, common salt is added to water during boiling boiling. Give reasons.

**25.** A solute of weight.'W' g is dissolved 'V' litres of water at T temperature.If 'P'.is the osmotic pressure, calculate the molecular weight of solute ?

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**26.** Sheela observed that after buying a pressure cooker, the cooking time is very much

reduced. She asked the teacher about it. Then,

what explaination should the teacher give?



**27.** What are isotonic solutions ? Give one example.

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**28.** Why does water from the soil rise to the

top of a tall tree ?



30. How is the colligative property of solution

changed when a solute in a solution

undergoes: Dissociation





31. What would be the value of van't Hoff

factor for dilute aqueous solution of  $K_2SO_4$ ?

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32. Define revere osmosis .

**33.** Calculated the osmotic pressure in pascals exerted by a solution prepared by dissolving 1.0g of polymer of molar mass 185000 in 450 mL of water at  $37^{\circ}C$ .

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34. Define molal depression constant or

cryoscopic constant.

35. Give one most important application of the

phenomena of depression in freezing point in

every day life.



**36.** Rectified spirit is a mixture of alcohol and water which behaves like pure liquid and boils at constant temperature. What name can be given to such a mixture ?



**37.** Rectified spirit is a mixture of alcohol and water which behaves like pure liquid and boils at constant temperature. Calculate the vapour pressure of 10% aqueous solution of glucose (molecules mass 180) at 303 K. The vapour pressure of pure water at 303 K is 31.8 mm.



**38.** Solution exhibit certain colligative properties such as elevation in boiling point,

depression in freezing point , osmotic pressure. 10g of an organic substance is dissolved in two litres of water at 280 K. Find out the molar mass of the substance if osmotic pressure of the solution id 0.6 atmospheres

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**39.** solution exhibit certain colligative properties such as elevation in boiling point, depression in freezing point , osmotic

pressure. Cold ethylene glycol is added to radiator in vehicles. Which colligates property of water is involved in doing this ? Explain.

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**40.** One of your friends defines molality as follows. "It is the number of gram moles of the solute dissolved per litre of solution: Is it correct?



**41.** One of your friends defines molality as follows. "It is the number of gram moles of the solute dissolved per litre of solution: Can you

help him to define molality?



42. One of your friends defines molality as follows. "It is the number of gram moles of the solute dissolved per litre of solution:Calculate the molality of a solution containing 20 g of NaOH in 250g of  $H_2O$ .



**43.** Vapour pressure of a solution is different from that of pure solvent. Name the law which helps us to determine partial vapour pressure of a volatile component.

State the above law.



44. Vapour pressure of a solution is different

from that of pure solvent. Name the law which

helps us to determine partial vapour pressure

of a volatile component.

State the above law.



#### 45. Wilted flower revive when placed in

freshwater: Identify the phenomenon.



46. Benzoic acid dissolved In benzene shows

double of its molecular mass. Give reasons.

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**47.** How does sprinkling of salt help in clearing

snow covered roads in hilly areas? Explain the

phenomenon involved In the process.

**48.** Colligative properties depend on number of solute particles in solution. Give the applications of colligative properties

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**49.** Colligative properties depend on number

of solute particles in solution: Show that

osmotlc pressure is a colligative property.

**50.** A solution of ,urea In water boils at  $100.18^{\circ}$  C.'Calculate the freezing point of the same solution. Molar constants  $K_f$  and  $K_b$  are 1.86 and  $0.512 km^{-1}$  respectively.



**51.** A solution of ,urea In water boils at  $100.18^{\circ}C$ . Calculate the freezing point of the same solution. Molar constants  $K_t$  and  $K_b$  are 1.86 and  $0.512 km^{-1}$  respectively. How-will you

constant and molar depression constant ?



52. Of the 1 molar solutions, of KCI,glucose and

Aluminium chloride, which Have the largest

boiling point? Why?



**53.** A 6% (*wt*/*volume*) aqueous solution of glucose is Isotonic with a 2% aqueous solution of a non-volatile solute, S. Calculate Its molecular mass. (Molecular mass of glucose Is 180)

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54. The value of molecular mass determined by colligative properties are sometimes incorrect.Explain how these abnormalities occur in the

case of benzoic acid in benzene and KCl in

water ?



55. The value of molecular mass determined by

colligative properties are sometimes incorrect.

What is Van't Hoff factor ?



**56.** Explain Why'the molecular masses of some substances determined with the help of colligative properties are Higher than actual values.

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**57.** Explain why the molecular masses of some substances determined with the help of colligative properties are lower than actual values.



58. What is the expected Van't Hoff factor for

NaCl and  $AICI_3$  when it completely

dissociates In water ?

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**59.** Boiling point of water at 750mm Hg is  $99.63^{\circ}C$  How much sucrose is to be added to 500g of water such that it boils at  $100^{\circ}CK_b$  (water)= 0.52K kg mol^(-1)`



**60.** Colligative properties are properties of solutions which depend on the number of solute particles irrespective of their nature. Name the four important colligative properties



**61.** Colligative properties are properties of solutions which depend on the number of solute particles irrespective of their nature. What happens to the colligative properties when ethanoic acid is treated with benzene ?



**62.** A solution containing 8g of a substance in 100g a diethyl ether bolls at  $36.86^{\circ}C$ , whereas pure ether boils at  $35.60^{\circ}C$ . Determine the

molecular mass of the solute (for ether  $k_b$ 

=2.02 K kg mol^-1)



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

64. Define the term solution. How many types

of solutions are formed? Write briefly about each type with an example.



**65.** Suppose a solid solution is formed between two substances. One of whose particles are very large and the other particles are very small, what kind of solution is this likely to be?



**66.** Concentrated nitric acid used in laboratory work 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  $1.504gML^{-1}$ ?

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**67.** A solution is obtained by mixing 300g of 25% solution and 400 g of 40% solution by

mass. Calculate the mass percentage of the

resulting solution.



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

**70.** Amongst the following compounds, identify which are. insaluble, partially solable and. highly soluble in water?i. phenol - if toluene iii. formic acid iv. ethylene glycol y. chloroform vi. pentanol.



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**72.** Amongst the following compounds, identify which are. insaluble, partially solable and. highly soluble in water?i. phenol - if

toluene iii. formic acid iv. ethylene glycol y.

chloroform vi. pentanol.



**73.** Amongst the following compounds, identify which are. insaluble, partially solable and. highly soluble in water?i. phenol - if toluene iii. formic acid iv. ethylene glycol y. chloroform vi. pentanol.



**74.** Amongst the following compounds, identify which are. insaluble, partially solable and. highly soluble in water?i. phenol - if toluene iii. formic acid iv. ethylene glycol y. chloroform vi. pentanol.

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**75.** Amongst the following compounds, identify which are. insaluble, partially solable and. highly soluble in water?i. phenol - if

toluene iii. formic acid iv. ethylene glycol y.

chloroform vi. pentanol.



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



**77.** For ethanol-acetone mixture solute-solvent interaction is weaker than solute-solute and solvent-solvent interaction.Does this solution

obey Raoult's law ?

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**78.** For ethanol-acetone mixture solute-solvent interaction is weaker than solute-solute and solvent-solvent interaction. Give the vapour pressure-mole fraction graph for this solution.

**79.** In a solution of components 'A' and 'B'? at molecular level, A-B Interactions are weaker than those between A-A or B-B interactions. Then the type of deviation shown by this solution is called.....

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80. What is reverse osmosis? Write any one of

its applications.



**81.** A 5% solution (by mass) of cane sugar  $(C_{12}H_{22}O_{11})$  in water has a freezing point of 271 K. Calculate the freezing point of 5%. (by mass) solution of glucose  $(C_6H_{12}O_6)$  In water. Freezingpoint of pure water is 273.15 K.

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82. A solution contains 15 g urea $\left(molarmass=60g-mol^{-1}
ight)$  per litre of

solution in water has the same osmotic pressure as a solution of glucose  $(molarmass = 180gmol^{-1})$  in water. Calculate the mass of glucose present in one litre of its solution.

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**83.** An element crystallises as FCC with density  $2.8gcm^{-3}$ .Its unit cell having edge. Length  $4 imes10^{-8}cm$ . Calculate the molar mass of the element. $(GivenN_A=6.022 imes10^{23}mol^{-1})$ 





84. Henry's law Is related to solubility of gas in

liquid: State Henry's law

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85. Henry's law Is related to solubility of gas in

liquid:Write any two application of Henry's law.

**86.**  $1000cm^3$  of an aqueous solution of a protein contain 1.26gm of the protein. The osmotic pressure of such a solution at 300 K is found to be  $2.57 \times 10^{-3}$  bar. Calculated molar mass of the protein (R = 0.083L bar  $mol^{-1}K^{-1}$ )

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**87.** Number of moles of the solute per kilogram of the solvent is

A. Mole fraction

**B.** Molality

C. Molarity

D. Molar mass

#### Answer:



88. The extend to which a solute is dissociated

or associated can be expressed by Van't Hoff

factor. Substantiate the statement.

**89.** The vapour pressure of pure benzene at a certain temperature is 0.850 bar. A non-volatile, non-electrolyte solid weighing 0.5g when added to 39g of benzene (molar mass  $78g \ mol^{-1}$ ), vapour pressure becomes 0.845 bar. What is the molar mass of the solid substance ?

**90.** Among the following which Is not a colligative property?

A. Osmotic pressure

B. Elevation of boiling point

C. Vapour pressure

D. Depression of freezing point

#### Answer:

**91.**  $200cm^3$  of aqueous solution of a protein contain 1.26g of protein. The osmotic pressure of solution at 300K is found to be  $8.3 \times 10^{-2}$ bar. Calculate the molar mass of protein, (R=0.083 | bar  $K^{-1}mol^{-1}$ 

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**92.** What is the significant of van't Hoff factor ?

**93.** Osmotic pressure is a colligative property and it is proportional to the molarity of solution. What is osmotic pressure ?

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**94.** Molecular mass of NaCl determine by osmotic pressure measurement is found to be

half of the actual value. Account for it .

**95.** Calculate the osmotic pressure exerted by a solution prepared by dissolving 1.5g of a polymer of molar mass 185000in 500mL of water at  $37^{\circ}C$  (R = 0.0821 L atm  $K^{-1}mol^{-1}$ 



**96.** Colligative properties are properties of solutions which depend on the number of solute particles irrespective of their nature. Name the four important colligative properties



**97.** Which of the following colligative properties can provide molar mass of proteins (or polymers or colloids with great precision)

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**98.** Colligative properties are properties of dilute solutions which depend on the number of solute particles:Calculate the temperature at which a solution containing 54g glucose in



99. Elevation of boiling point is a colligative

property. What is colligative properties ?

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**100.** Elevation of boiling point is a colligative property:Elevation of boiling point $(\Delta T_b)$  is

directly proportional to molality (m) of solution. Thus $\Delta T_b = K_b m, K_b$  is called the molal elevation constant. From,the above relation derivean expression to obtain molar mass of the solute.

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**101.** The boiling point of benzene is 353.23K. When 1.80g of a non-volatile solute was dissolved in 90g of benzene, the boiling point is raised to 354.11K. Calculated the molar mass

of the solute  $k_b$  for benzene is 2.53K kg  $mol^{-1}$ 



**102.** Colloids have many characterstic properites. Among these Tyndall effect is an optical property and coagulation is the process of setting of colloidal particles.What is Tyndall effect?



**103.** A solution is weighing 10g of NaCl and adding 40 g of water .This solution is \_\_\_\_\_

A.  $10~\%~(w\,/\,w)$ 

B.  $20~\%~(w\,/\,w)$ 

C.  $25~\%~(w\,/\,w)$ 

D.  $5~\%~(w\,/\,w)$ 

#### Answer:

**104.** The conductivity of 0:20'M solution of KCl at  $298 \sim K$  is  $0.0248Scm^{-1}$ . Calculate its molar conductivity.



**105.** State Henry's law and give one of its applications .





**107.** A substance shows the phenomenon of deliquescene if its vapour pressure \_\_\_\_\_that of water vapour in air .

**108.** A mixture of chloroform and acetone does not obey raoult 's law under all conditions: Identify the type of deviation and give reason for such behaviour.

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**109.** A mixture of chloroform and acetone does not obey raoult 's law under all conditions:Represent this deviation using a vapour pressure composition curve.





**110.** Carbon tetrachloride and water are immiscible while ethanol and water are miscible in all proportions.Explain.

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**111.** What is the expected deviation from ideal solution behaviour when ethanol and water are mixed to form a solution .

