



CHEMISTRY

BOOKS - NCERT CHEMISTRY (ENGLISH)

SOLUTIONS

Multiple Choice Questions Mcqs

1. 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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2. On dissolving sugar in water at room temperature solution feels cool to touch. Under which of the following cases dissolution of sugar will be most rapid ?

A. Sugar crystals cold water

B. Sugar crystals in hot water

C. Powdered sugar in cold water

D. Powdered sugar in hot water

Answer: D



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

- A. less than the rate of crystallisation
- B. greater than the rate of crystallisation
- C. equal to the rate of crystallisation
- D. zero

Answer: C



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4. A beaker contains a solution of substance 'A' precipitation of substance 'A' takes place when small amount of 'A' is added to the solution. The solution is.....

- A. saturated
- B. supersaturated
- C. unsturated
- D. concentrated

Answer: B



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5. Maximum amount of a solid solute that can be dissolved in a specified 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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6. 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 temperature and high atmospheric pressure

Answer: B



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7. Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixture will show a positive deviation from Raoult's law?

- A. Methanol and acetone
- B. Chloroform and acetone
- C. Nitric acid and water
- D. Phenol and aniline

Answer: A



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8. Colligative properties depend on.....

A. the nature of the solute particles dissolved in solution

B. the number of solute particles in solution

C. the physical properties of the solute particles dissolved in solution

D. the nature of solvent particles

Answer: B

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9. 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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10. The unit of ebullioscopic constant is

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

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

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

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

Answer: A



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11. 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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12. An unripe mango 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: D



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13. At a given temperature, osmotic pressure of a concentrated solution of a substance.....

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 osmotic pressure of dilute solution.

Answer: A



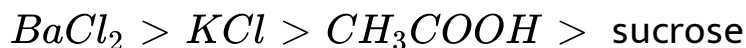
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14. Which of the following statements is FALSE ?

A. Two different solutions of sucrose of same molality prepared in different solvents will have the same depression in freezing point.

B. The osmotic pressure of a solution is given by the equation $\pi = CRT$ (where, C is the molarity of the solution)

C. Decreasing order of osmotic pressure for 0.01 M aqueous solutions of barium chloride, potassium chloride, acetic acid and sucrose is



D. According to Raoult's law, the vapour pressure exerted by a volatile component of a solution is directly proportional to its mole fraction in the solution

Answer: A



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15. 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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16. Which of the following statements is false?

A. Units of atmospheric pressure and osmotic pressure are the same

B. In reverse osmosis, solvent molecules move through a semipermeable membrane from a region of lower

concentration of solute to a region of higher concentration

C. The value of mole depression constant depends on nature of solvent

D. Relative lowering of vapour pressure, is a dimensionless quantity

Answer: B

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17. Value of Henry's constant K_H

A. increase with increase in temperature

B. decrease with increase in temperature

C. remains constant

D. first increases then decreases

Answer: A



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18. The value of Henry's constant K_H

A. greater for gases with higher solubility

B. hreater for gases with lower solubility

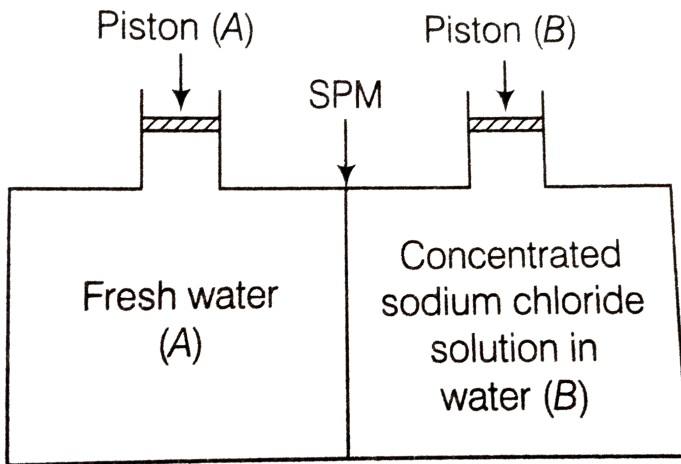
C. constant for all gases

D. not related to the solubility of gases

Answer: B

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19. Consider the figure and mark the correct option.



A. a) Water will move from side (A) to side (B) if a pressure lower than osmotic pressure is applied on piston(B)

B. b) Water will move from side (B) to side (A) if a pressure greater than osmotic pressure is applied on piston (B)

C. c) Water will move from side (B) to side (A) if a pressure equal to osmotic pressure is applied on piston (B)

D. d) Water will move from side (A) to side (B) if pressure equal to osmotic pressure is applied on piston (A)

Answer: B



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20. We have three aqueous solutions of NaCl labelled as A, B and C with concentration $0.1M$, 0.01 and $0.001 M$, respectively. The value of van't Hoff factor for these solutions will be in the order :

A. $i_A < i_B < i_C$

B. $i_A > i_B > i_C$

C. $i_A = i_B = i_C$

D. $i_A < i_B > i_C$

Answer: B



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21. On the basis of information given below mark the correct option. Information:

(P) In bromoethane and chloroethane mixture intermolecular interactions of A.A and B.B is nearly same as A .B type interactions.

(Q) In ethanol and acetone mixture A.A or B.B type intermolecular interaction are stronger than A.B type interactions.

(R) In chloroform and acetone mixture A.A or B.B type intermolecular interactions are weaker than A. B type interactions.

A. (a) Solution (ii) and (iii) will follow Raoult's law

B. (b) Solution (i) will follow Raoult's law

C. (c) Solution (ii) will show negative deviation from Raoult's law

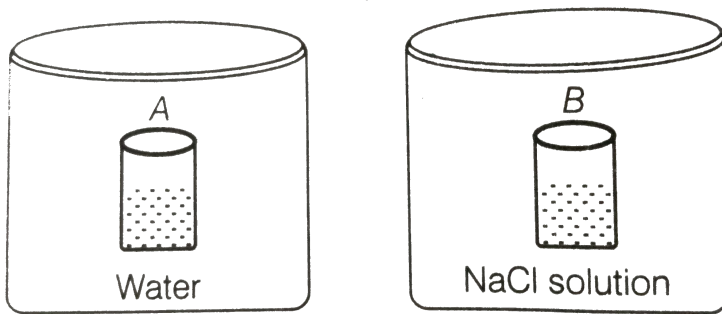
D. (d) Solution (iii) will show positive deviation from Raoult's law

Answer: B

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22. 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 2M solution of NaCl. At the same temperature both the beakers were placed in containers of same material and

same capacity as shown in figure.



- A. Vapour pressure in container (A) is more than that of container (B)
- B. Vapour pressure in container (A) is less than that 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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23. If two liquids A and B form a minimum boiling azeotrope at some specific composition then

- A. A-B interactions are stronger than those A-A or B-B
- B. vapour pressure of solution increases because more number of molecules of liquids A and B can escape from the solution
- C. vapour pressure of solution decreases because less number of molecules of only one of the liquids escape from the solution

D. A-B interactions are weaker than those between A-A
or B-B

Answer: d

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24. 4 L of 0.02 M aqueous solution of NaCl was diluted by adding 1 L of water. The molality of the resultant solution is.....

A. 0.004

B. 0.008

C. 0.012

D. 0.016

Answer: D

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25. On the basis of information given below mark the correct option.

Information : On adding acetone to methanol some of the hydrogen bonds between methanol molecules breaks.

A. At specific composition methanol-acetone mixture will form minimum boiling azeotrope and will show positive deviation from Raoult's law

- B. At specific composition methanol-acetone mixture will form maximum boiling azeotrope and will show positive deviation from Raoult's law
- C. At specific composition methanol-acetone mixture will form minimum boiling azeotrope and will show negative deviation from Raoult's law
- D. At specific composition methanol-acetone mixture will form maximum boiling azeotrope and will show negative deviation from Raoult's law

Answer: A



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26. 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.



Answer: C

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Multiple Choice Questions More Than One Options

1. Which of the following factor (s) affect the solubility of a gaseous solution in the fixed volume of liquid solvent?

(i) Nature of solute

(ii) Temperature

(iii) Pressure

A. (i) and (iii) at constant T

B. (i) and (ii) at constant p

C. (ii) and (iii)

D. Only (iii)

Answer: A::B



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2. Intermolecular forces between two benzene molecules are nearly of same strength as those between two toluene molecules. For a mixture of benzene and toluene, which of the following are not true?

A. $\Delta_{mix} H = \text{zero}$

B. $\Delta_{mix} V = \text{zero}$

C. These will form minimum boiling azeotrope

D. These will not form ideal solution

Answer: C::D



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3. Relative lowering of vapour pressure is a colligative property because

A. it depends on the concentration of non-electrolyte solute in solution and does not depend on the nature of the solute molecules

B. it depends on number of particle of electrolyte solute insolution and does not depend on the nature of the solute molecules

C. it depends on the concentration of non-electrolyte solute in solution as well as on the nature of the solute molecules

D. depends on the concentration of an electrolyte or non-electrolyte solute in in solution as well as on the nature of solute molecules

Answer: A:B

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4. van't Hoff factor (i) is given by the expression

A. $i = \frac{\text{normal malar mass}}{\text{abnormal molar mass}}$

B. $i = \frac{\text{abnormal molar mass}}{\text{normal molar mass}}$

C. $i = \frac{\text{observed colligative property}}{\text{calculated colligative property}}$

D. $i = \frac{\text{calculated colligative property}}{\text{observed colligative property}}$

Answer: A::C



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5. Isotonic solutions must have the same.....

A. solute

B. density

C. elevation in boiling point

D. depression in freezing point

Answer: C::D



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6. Which of the following binary mixture will have same composition in liquid and vapour phase?

A. Benzene-toluene

B. Water-nitric acid

C. Water-ethanol

D. n-hexane-n-heptane

Answer: B::C



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7. In isotonic solutions.....

A. solute and solvent both are same

B. osmotic pressure is same

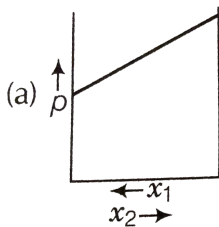
C. solute and solvent may or may not be same

D. solute is always same solvent may be different

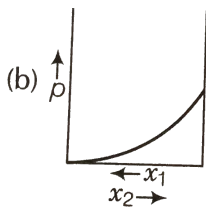
Answer: B::C

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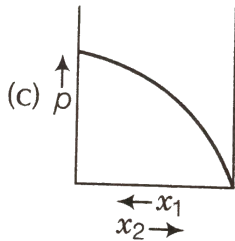
8. For a binary ideal liquid solution, the variation total vapour pressure versus composition of solution is given by which of the curves?



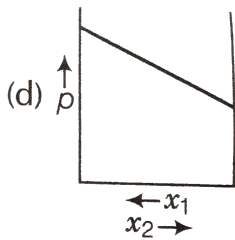
A.



B.



C.



D.

Answer: A:D



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9. Colligative properties are observed when.....

- A. a non-volatile solid is dissolved in a volatile liquid
- B. a non-volatile liquid is dissolved in another volatile liquid
- C. a gas is dissolved in non-volatile liquid
- D. a volatile liquid is dissolved in another volatile liquid

Answer: A::B

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10. Components of a binary mixture of two liquids A and B were being separated by distillation. After some time separation of components stopped and composition of vapour phase became same as that of liquid phase. Both

the components stated coming in the distillate. Explain why this happened ?

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11. Explain in why on addition of 1 mole of NaCl to 1L of water, the boiling point of water increases, while addition of 1 mole of methyl alcohol to 1 L of water decreases its boiling point .

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12. Explain the solubility rule "like dissolves like" in terms of intermolecular forces that exist in solutions,

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13. Concentration terms such as mass percentage, ppm, mole fraction and molality are independent of temperature, however molarity is a function of temperature. Explain.

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14. What is the significance of Henry's law constant K_H ?

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15. why are the aquatic species more comfortable in cold water in comparison to warm water?

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16. (a) Explain the following phenomena with the help of Henry's law.

(i) Painful condition known as bends.

(ii) Feeling of weakness and discomfort in breathing at high altitude.

(b) Why soda water bottle kept at room temperature fizzes on opening?

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17. Why is the vapour pressure of an aqueous solution of glucose lower than that of water ?

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18. How does sprinkling of salt help in clearing the snow covered roads in hilly areas? Explain the phenomenon involved in the process.

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19. What is "semipermeable membrane"?

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20. Give an example of a material used for making semipermeable membrane for carrying out reverse osmosis.

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21. Match the following columns

Column I	Column II
A. Saturated solution	1. Solution having same osmotic pressure at a given temperature as that of given solution.
B. Binary solution	2. A solution whose osmotic pressure is less than that of another.
C. Isotonic solution	3. Solution with two components.
D. Hypotonic solution	4. A solution which contains maximum amount of solute that can be dissolved in a given amount of solvent at a given temperature.
E. Solid solution	5. A solution whose osmotic pressure is more than that of another.
F. Hypertonic solution	6. A solution in solid phase.

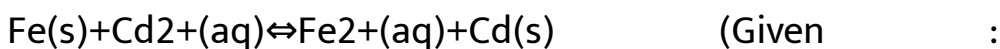
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Column I	Column II
A. Soda water	1. A solution of gas in solid
B. Sugar solution	2. A solution of gas in gas
C. German silver	3. A solution of solid in liquid
D. Air	4. A solution of solid in solid
E. Hydrogen gas in palladium	5. A solution of gas in liquid
	6. A solution of liquid in solid

22.

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23. Calculate the equilibrium constant for the reaction



$$E^\circ_{\text{Cd}^{2+} | \text{Cd}} = 0.40\text{V}, E^\circ_{\text{Fe}^{2+} | \text{Fe}} = -0.44\text{V}.$$

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24. Match the following columns

Column I	Column II
A. Mass percentage	1. $\frac{\text{Number of moles of the solute component}}{\text{Volume of solution in litres}}$
B. Volume percentage	2. $\frac{\text{Number of moles of a component}}{\text{Total number of moles of all the components}}$
C. Mole fraction	3. $\frac{\text{Volume of the solute component in solution}}{\text{Total volume of solution}} \times 100$
D. Molality	4. $\frac{\text{Mass of the solute component in solution}}{\text{Total mass of the solution}} \times 100$
E. Molarity	5. $\frac{\text{Number of moles of the solute components}}{\text{Mass of solvent in kilograms}}$

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25. Assertion (A) Molarity of a solution in liquid state changes with temperature.

Reason (R) The volume of a solution changes with change in temperature.

- A. Assertion and reason both are correct statements and reason is correct explanation for assertion.
- B. Assertion and reason both are correct statements but reason is not correct explanation for assertion.
- C. Assertion is correct statement but reason is wrong statement.
- D. Assertion and reason both are incorrect statements.

Answer: a

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26. Assertion (A) When methyl alcohol is added to water, boiling point of water increases.

Reason (R) When a volatile solute is added to a volatile solvent elevation in boiling point is observed.

A. Assertion and reason both are correct statements and reason is correct explanation for assertion.

B. Assertion and reason both are correct statements but reason is not correct explanation for assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Assertion and reason both are incorrect statements.

Answer: d



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27. Assertion (A) When NaCl is added to water a depression in freezing point is observed.

Reason (R) The lowering of vapour pressure of a solution causes depression in the freezing point.

A. Assertion and reason both are correct statements and reason is correct explanation for assertion.

B. Assertion and reason both are correct statements but reason is not correct explanation for assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Assertion and reason both are incorrect statements.

Answer: a

28. Assertion (A) When solution is separated from the pure solvent by a semipermeable membrane, the solvent molecules pass through it from pure solvent side to the solution side.

Reason (R) Diffusion of solvent occurs from a region of high concentration solution to a region of low concentration solution.

A. Assertion and reason both are correct statements and reason is correct explanation for assertion.

B. Assertion and reason both are correct statements but reason is not correct explanation for assertion.

C. Assertion is correct statement but reason is wrong statement.

D. Assertion and reason both are incorrect statements.

Answer: b

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Long Answer Type Questions

1. Define the following modes of expressing the concentration of a solution? Which of these modes are independent of temperature and why?

{:(a),w//w("mass percentage"),(b),V//V("volume percentage")),((c),w//V("mass by volume percentage")),

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2. Using Raoult's Law explain how the total vapour pressure over the solution is related to mole fraction of components in the following solution.

$CHCl_3(l)$ and $CH_2Cl_2(l)$ (b) $NaCl(s)$ and $H_2O(l)$

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3. Explain the terms ideal and non-ideal solution in the light of forces of interactions operating between molecules in liquid solutions.



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4. Why is it not possible to obtain pure ethanol by fractional distillation ? What general name is given to binary mixture which show deviation from Raoult's law and whose omponents cannot be separated by fractional distillation. How many types of such mixture are there?



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5. When kept in water, raisin swells in size. Name and explain the phenomenon involved with the help of a diagram. Give thre applications of the phenomenon.



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6. Discuss biological and industrial applications of osmosis.

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7. How can you remove the hard calcium carbonate layer of the egg without damaging its semipermeable membrane? Can this egg be inserted into a bottle with a narrow neck without distorting its shape? Explain the process involved.

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8. Why is the mass determined by measuring a colligative property in case of some solutes abnormal? Discuss it with the help of van't Hoff factor.



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