

SOLUTIONS

Assertion and Reason Type

- (i) Assertion and reason both are correct statements and reason is correct explanation for assertion.
- (ii) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
- (iii) Assertion is correct statement but reason is wrong statement.
- (iv) Assertion and reason both are incorrect statements.
- (v) Assertion is wrong statement but reason is correct statement.

1. **Assertion** : Molarity of a solution in liquid state changes with temperature.

Reason : The volume of a solution changes with change in temperature.

2. **Assertion** : When methyl alcohol is added to water, boiling point of water increases.

Reason : When a volatile solute is added to a volatile solvent elevation in boiling point is observed.

3. **Assertion** : When NaCl is added to water a depression in freezing point is observed.

Reason : The lowering of vapour pressure of a solution causes depression in the freezing point.

4. **Assertion** : When a solution is separated from the pure solvent by a semi- permeable membrane, the solvent molecules pass through it from pure solvent side to the solution side.

Reason : Diffusion of solvent occurs from a region of high concentration solution to a region of low concentration solution.

Multiple Choice Questions

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

- (i) mole fraction
- (ii) parts per million
- (iii) mass percentage
- (iv) molality

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?

- (i) Sugar crystals in cold water.
- (ii) Sugar crystals in hot water.
- (iii) Powdered sugar in cold water.
- (iv) Powdered sugar in hot water.

3. 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 _____.

- (i) saturated
- (ii) supersaturated
- (iii) unsaturated
- (iv) concentrated

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

- (i) 0.004
- (ii) 0.008
- (iii) 0.012
- (iv) 0.016

5. Considering the formation, breaking and strength of hydrogen bond, predict

which of the following mixtures will show a positive deviation from Raoult's law?

- (i) Methanol and acetone.
- (ii) Chloroform and acetone.
- (iii) Nitric acid and water.
- (iv) Phenol and aniline.

6. Which of the following aqueous solutions should have the highest boiling point?

- (i) 1.0 M NaOH
- (ii) 1.0 M Na₂SO₄
- (iii) 1.0 M NH₄NO₃
- (iv) 1.0 M KNO₃

7. In comparison to a 0.01 M solution of glucose, the depression in freezing point of a 0.01 M MgCl₂ solution is _____.

- (i) the same
- (ii) about twice
- (iii) about three times
- (iv) about six times

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

- (i) is higher than that at a dilute solution.
- (ii) is lower than that of a dilute solution.
- (iii) is same as that of a dilute solution.
- (iv) cannot be compared with osmotic pressure of dilute solution.

9. The values of Van't Hoff factors for KCl, NaCl and K₂SO₄, respectively, are _____.

- (i) 2, 2 and 2
- (ii) 2, 2 and 3
- (iii) 1, 1 and 2
- (iv) 1, 1 and 1

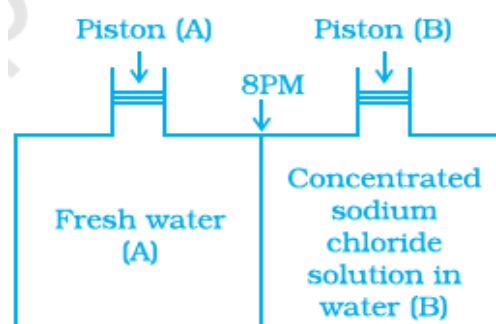
10. Which of the following statements is false?

- (i) Units of atmospheric pressure and osmotic pressure are the same.

(ii) In reverse osmosis, solvent molecules move through a semipermeable membrane from a region of lower concentration of solute to a region of higher concentration.

(iii) The value of molal depression constant depends on nature of solvent.
 (iv) Relative lowering of vapour pressure, is a dimensionless quantity.

11. Consider the Fig. and mark the correct option.



- (i) water will move from side (A) to side (B) if a pressure lower than osmotic pressure is applied on piston (B).
- (ii) water will move from side (B) to side (A) if a pressure greater than osmotic pressure is applied on piston (B).
- (iii) water will move from side (B) to side (A) if a pressure equal to osmotic pressure is applied on piston (B).
- (iv) water will move from side (A) to side (B) if pressure equal to osmotic pressure is applied on piston (A).

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

- (i) $i_A < i_B < i_C$
- (ii) $i_A > i_B > i_C$
- (iii) $i_A = i_B = i_C$
- (iv) $i_A < i_B > i_C$

_____.

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

Information:

- (A) In bromoethane and chloroethane mixture intermolecular interactions of A–A and B–B type are nearly same as A–B type interactions.
- (B) In ethanol and acetone mixture A–A or B–B type intermolecular interactions are stronger than A–B type interactions.
- (C) In chloroform and acetone mixture A–A or B–B type intermolecular interactions are weaker than A–B type interactions.
- (i) Solution (B) and (C) will follow Raoult's law.
- (ii) Solution (A) will follow Raoult's law.
- (iii) Solution (B) will show negative deviation from Raoult's law.
- (iv) Solution (C) will show positive deviation from Raoult's law.

14. 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 Fig.



At a given temperature, which of the following statement is correct about the vapour pressure of pure water and that of NaCl solution.

- (i) vapour pressure in container (A) is more than that in container (B).
- (ii) vapour pressure in container (A) is less than that in container (B).

(iii) vapour pressure is equal in both the containers.

(iv) vapour pressure in container (B) is twice the vapour pressure in container (A).

15. If two liquids A and B form minimum boiling azeotrope at some specific composition then _____.

- (i) A–B interactions are stronger than those between A–A or B–B.
- (ii) vapour pressure of solution increases because more number of molecules of liquids A and B can escape from the solution.
- (iii) vapour pressure of solution decreases because less number of molecules of only one of the liquids escape from the solution.
- (iv) A–B interactions are weaker than those between A–A or B–B.

16. 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 break.

- (i) At specific composition methanol-acetone mixture will form minimum boiling azeotrope and will show positive deviation from Raoult's law.
- (ii) At specific composition methanol-acetone mixture forms maximum boiling azeotrope and will show positive deviation from Raoult's law.
- (iii) At specific composition methanol-acetone mixture will form minimum boiling azeotrope and will show negative deviation from Raoult's law.
- (iv) At specific composition methanol-acetone mixture will form maximum boiling azeotrope and will show negative deviation from Raoult's law.

