Solutions

Assertion & Reason Type Questions

consists of two statements, one is Assertion (A) and the other is Reason (R). Give answer:
a. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
c. Assertion (A) is true but Reason (R) is false.
d. Assertion (A) is false but Reason (R) is true.

Q 1. Assertion (A): Molarity of a solution in liquid state changes with temperature.
Reason (R): The volume of a solution changes with change in temperature. (NCERT EXEMPLAR)

Answer : (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Q 2. Assertion(A): Molarity of a solution changes with temperature.
Reason (R): Molarity is a colligative property. (CBSE SQP 2021 Term-1)

Answer : (c) Reason is false. Molarity is not a colligative property. It is a method of expressing concentration of solution.

Q 3. Assertion (A): In an ideal solution, Amix H is zero.
Reason (R): In an ideal solution, A-B interactions are lower than A-A and B-B interactions.

Answer : (c) In an ideal solution, A-B interactions are same as A-A and B-B interactions.

Q 4. Assertion (A): A solution of phenol and aniline will show negative deviations from Raoult's law.
Reason (R): In case of negative deviations from Raoult's law, A-B forces are stronger than A-A and B-B forces.

Answer : (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Q 5. Assertion (A): The solutions which show large positive deviations from Raoult's law form maximum boiling azeotropes.
Reason (R): 95% aqueous solution of ethanol is minimum boiling azeotrope.

Answer : (d) The solutions which show a large positive deviation from Raoult's law form minimum boiling azeotrope, and 95% ethanol solution is minimum boiling azeotrope.

Q 6. Assertion (A): When methyl alcohol is added to water, boiling point of water increases.
Reason (R): When a non-volatile solute is added to a volatile solvent, elevation in boiling point is observed.

Answer : (d) Assertion (A) is false but Reason (R) is true. Assertion is wrong because when methyl alcohol is added to water, boiling point of water decreases to hydrogen bonding.

Q 7. Assertion (A): Elevation in boiling point is a colligative property.
Reason (R): The lowering of vapour pressure of solution causes elevation in boiling point.

Answer : (c) The lowering of vapour pressure of solution causes depression in freezing point.

Q 8. 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.

Answer : (a) When NaCl is added to water, a depression in freezing point is observed. This is due to lowering of vapour pressure of a solution. Lowering of vapour pressure is observed due to intermolecular interaction of solvent-solute particles.

Q 9. Assertion (A): Osmotic pressure is a colligative property.
Reason (R): Osmotic pressure is proportional to the molality.

Answer : (c) Osmotic pressure is proportional to the molarity, C of the solution at a given temperature T.

Q 10. Assertion (A): When a 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.

Answer : (b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

Q11**. Assertion :** Molarity of a solution in liquid state changes with temperature.
Reason : The volume of a solution changes with change in temperature.

Q12**. Assertion :** If a liquid solute more volatile than the solvent is added to the solvent, the vapour pressure of the solution may increase i.e., $p_s > p_o$.
Reason : In the presence of a more volatile liquid solute, only the solute will form the vapours and solvent will not.

Q13**. Assertion :** If one component of a solution obeys Raoult's law over a certain range of composition, the other component will not obey Henry's law in that range.
Reason : Raoult's law is a special case of Henry's law.

Q14**. Assertion :** Azeotropic mixtures are formed only by non-ideal solutions and they may have boiling points either greater than both the components or less than both the components.

Reason : The composition of the vapour phase is same as that of the liquid phase of an azeotropic mixture.

Q15**. 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.

Q16**. 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.

Q17**. 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.

ANSWER KEY 11 to 17

Q11 : (a)

Q12 : (c) Both the solute and solvent will form the vapours but vapour phase will become richer in the more volatile component.

Q13 : (b) **Q14 :** (b) **Q15 :** (d) **Q16 :** (a)

Q17 : (b)