

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, $\Delta_{mix} H$ 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)

