ANSWERS

I. Multiple Choice Questions (Type-I)

1. (i) 2. (iv) 3. (iii)

4. (ii), [**Hint :** If added substance dissolves, the solution is unsaturated. If it does not dissolve solution is saturated. If precipitation occurs solution is supersaturated.]

5. (iii)

6. (ii), [**Hint :** Body temperature of human beings remains constant.]

7. (i)	8. (ii)	9. (ii)	10. (i)	11. (iii)	12. (iv)
13. (i)	14. (i)	15. (ii)	16. (ii)	17. (i)	18. (ii)
19. (ii)	20. (iii)	21. (ii)	22. (i)	23. (i)	24. (iv)
25. (ii)	26. (iii)				

II. Multiple Choice Questions (Type-II)

27. (i), (ii)	28. (iii), (iv)	29. (i), (ii)	30. (i), (iii)	31. (ii), (iii)
32. (ii), (iii)	33. (ii), (iii)	34. (i), (iv)	35. (i), (ii)	

III. Short Answer Type

36. Since both the components are appearing in the distillate and composition of liquid and vapour is same, this shows that liquids have formed azeotropic mixture and hence cannot be separated at this stage by distillation.

37. NaCl is a non volatile solute, therefore, addition of NaCl to water lowers the vapour pressure of water. As a result boiling point of water increases. Methyl alcohol on the other hand is more volatile than water, therefore its addition increases, the total vapour pressure over the solution and a decrease in boiling point of water results.

38. A substance (solute) dissolves in a solvent if the intermolecular interactions are similar in both the components; for example, polar solutes dissolve in polar solvents and non polar solutes in non polar solvents thus we can say "like dissolves like".

39. Molarity of a solution is defined as the number of moles of solute dissolved in one litre of solution. Since volume depends on temperature and undergoes a change with change in temperature, the molarity will also change with change in temperature. On the other hand, mass does not change with change in temperature, as a result other concentration terms given in the question remain unchanged by changing temperature. According to the definition of all these terms, mass of the solvent used for making the solution is related to the mass of solute.

40. Higher the value of Henry's law constant K_H, the lower is the solubility of the gas in the liquid.

41. At a given pressure the solubility of oxygen in water increases with decrease in temperature. Presence of more oxygen at lower temperature makes the aquatic species more comfortable in cold water.

42. Refer to the NCERT textbook for Class XII.

43. In pure liquid water the entire surface of liquid is occupied by the molecules of water. When a non volatile solute, for example glucose is dissolved in water, the fraction of surface covered by the solvent molecules gets reduced because some positions are occupied by glucose molecules. As a result number of solvent molecules escaping from the surface also gets reduced, consequently the vapour pressure of aqueous solution of glucose is reduced.

44. When salt is spread over snow covered roads, snow starts melting from the surface because of the depression in freezing point of water and it helps in clearing the roads.

45. Continuous sheets or films (natural or synthetic) which contain a network of submicroscopic holes or pores through which small solvent molecules like water can pass; but the passage of bigger molecules of solute is hindered, are known as semi permeable membrane.

46. Cellulose acetate.

IV. Matching Type

47. (i) → (d) (ii) → (c) (iii) → (a) (iv) → (b) (v) → (f) (vi) → (e)

48. (i) → (e) (ii) → (c) (iii) → (d) (iv) → (b) (v) → (a)

49. (i) → (c) (ii) → (e) (iii) → (d) (iv) → (a) (v) → (b)

50. (i) → (d) (ii) → (c) (iii) → (b) (iv) → (e) (v) → (a)

V. Assertion and Reason Type

51. (i) 52. (iv) 53. (i) 54. (ii)

VI. Long Answer Type

55. Refer to NCERT textbook for Class XII.

56. **Hint :** Discuss the following formulas

(i) for a binary solution having both components as volatile liquids, the total pressure will be

$$p = p_1 = x_1 p_1^0 + x_2 p_2^0$$
$$= x_1 p_1^0 + (1 - x_1) p_2^0$$
$$= (p_1^0 - p_2^0)\, x_1 + p_2^0$$

p = total vapour pressure

p_1 = partial vapour pressure of component 1

p_2 = partial vapour pressure of component 2.

(ii) For a solution containing non-volatile solute, the Raoult's law is applicable only to vaporisable component (1) and total vapour pressure is written as

$$p = p_1 = x_1 p_1^0$$

57. Refer to page 45 of NCERT textbook for Class XII.

58. See page 46 of NCERT textbook for Class XII.

59. [**Hint :** Explain it with the help of a diagram (Fig. 2.3) illustrating the osmosis of water into raisin.]

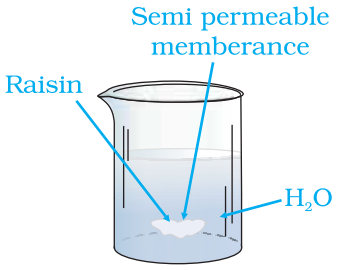


Fig. 2.3

60. **Hint :** The process of osmosis is of immense biological and industrial importance as is evident from the following examples :

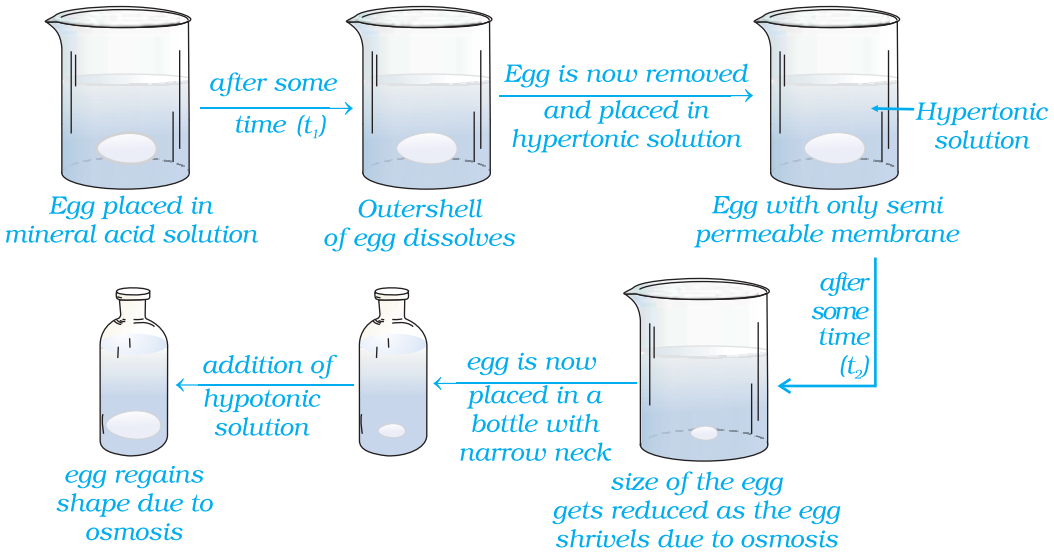
(i) Movement of water from soil into plant roots and subsequently into upper portion of the plant is partly due to osmosis.

(ii) Preservation of meat against bacterial action by adding salt.

(iii) Preservation of fruits against bacterial action by adding sugar. Bacterium in canned fruit loses water through the process of osmosis, shrivels and dies.

(iv) Reverse osmosis is used for desalination of water.

61. **Hint :**



62. Certain compounds when dissolved in suitable solvents either dissociate or associate.

For example ethanoic acid dimerises in benzene due to hydrogen bonding, while in water, it dissociates and forms ions. As a result the number of chemical species in solution increases or decreases as compared to the number of chemical species of solute added to form the solution. Since the magnitude of colligative property depends on the number of solute particles, it is expected that the molar mass determined on the basis of

colligative properties will be either higher or lower than the expected value or the normal value and is called abnormal molar mass.

In order to account for the extent of dissociation or association of molecules in solution, Van't Hoff introduced a factor, *i*, known as the Van't Hoff factor. It can be defined as follows.

$$i = \frac{\text{Expected molar mass}}{\text{Abnormal molar mass}}$$

$$= \frac{\text{Observed colligative property}}{\text{Calculated colligative property}}$$

$$= \frac{\text{Total number of moles of particles after association/dissociation}}{\text{Number of moles of particles before association/dissociation}}$$