G.N. NATIONAL PUBLIC SCHOOL

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Assignment Sheet : Solution

1. The molarity of 720 g of pure water is
a. 40 M *b.* 4 M
c. 55.5 M *d.* unpredictable

2. Molarity is expressed as
a. g / L *b.* L / mol
c. mol / L *d.* mol / 1000g

3. The formula weight of H_2SO_4 is 98. The weight of the acid in 400 mL 0.1 M solution is
a. 2.45 g *b.* 3.92 g *c.* 4.90 g *d.* 9.8 g

4. Out of molarity (M), molality (m), normality (N) and mole fraction (χ), those independent of temperature are
a. M and m *b.* N and χ *c.* m and χ *d.* M and χ

5. A χ molal solution of a compound in benzene has mole fraction of solute equals to 0.2. The value of χ is
a. 14 *b.* 3.2 *c.* 1.4 *d.* 2

6. On mixing 10 mL of acetone with 50 mL of chloroform, the total volume of the solution is
a. < 60 mL *b.* > 60 mL
c. = 60 mL *d.* unpredictable

7. The normality of 10% (weight / volume) acetic acid is
a. 1 N *b.* 10 N *c.* 1.66 N *d.* 0.83 N

8. Normality of 2 M H_2SO_4 is
a. 4 N *b.* 6 N *c.* $\frac{N}{4}$ *d.* $\frac{N}{6}$

9. Suppose sea water contains 3.50 weight per cent of NaCl. Calculate the molarity of sea water.
a. 6.2 m *b.* 0.062 m *c.* 0.62 m *d.* 0.0062 m

10. Which of the following statements is true about saturated solution?
a. A solution in which no more solute can be dissolved at the same temperature and pressure
b. The solution which is in dynamic equilibrium with undissolved solute and contains maximum amount of solute dissolved in solvent
c. The solution in which more solute can be dissolved at the same temperature
d. Both (a) and (b)

11. Calculate the mass of urea (NH_2CONH_2) required in making 2.5 kg of 0.25 molal aqueous solution.
a. 37 g *b.* 35 g *c.* 34 g *d.* 32 g

12. One litre of $N/2$ HCl solution is heated in a beaker and it is observed that when volume was reduced to 600 mL, 3.25 g of HCl is lost. Calculate the normality of new solution.
a. 0.50 N *b.* 0.60 N *c.* 0.68 N *d.* 0.70 N

13. A substance will be deliquescent if its vapour pressure
a. is equal to the atmospheric pressure
b. is equal to that of water vapour in air
c. is less than that of water vapour in air
d. is greater than that of water vapour in air

14. The aqueous solution that has the lowest vapour pressure at a given temperature, is
a. 0.1 M sodium phosphate
b. 0.1 M barium chloride
c. 0.1 M sodium chloride
d. 0.1 M glucose

15. For determination of molecular mass, Raoult's law is applicable only to
a. dilute solutions of electrolytes
b. concentrated solutions of electrolytes
c. dilute solutions of non-electrolytes
d. concentrated solutions of non-electrolytes

16. 100 mL of liquid A was mixed with 25 mL of liquid B to give non-ideal solution of A-B. The volume of this mixture will be
a. 75 mL
b. 125 mL exact
c. fluctuate between 75 mL and 125 mL
d. close to 125 mL but not to exceed 125 mL

17. 6.0 g of urea (molecular weight = 60) was dissolved in 9.9 moles of water. If the vapour pressure of pure water is p_0, the vapour pressure of solution is
a. 0.10 p_0 *b.* 1.10 p_0 *c.* 0.90 p_0 *d.* 0.99 p_0

18. On mixing 25 mL of CCl_4 with 25 mL of toluene, the total volume of the solution is
a. = 50 mL *b.* > 50 mL
c. < 50 mL *d.* unpredictable

19. An azeotropic mixture of two liquids has boiling point lower than either of them when it
a. shows a negative deviation from Raoults' law
b. shows no deviation from Raoults' law
c. shows positive deviation from Raoult's law
d. is saturated

20. A sugar solution boils at 101°C. The molality of the sugar solution is (Given, $K_b = 0.52°$ C kg mol^{-1})
a. 1.84 m *b.* 1.92 m *c.* 2.02 m *d.* 4.02 m

21. An unknown compound is immiscible with water. It is steam distilled at 98.0°C. At 98.0°C, p and $p^\circ_{H_2O}$ are 737 and 707 torr respectively. This distillate was 75% by weight of water. The molecular weight of the unknown will be
a. 318.15 g mol^{-1} *b.* 300 g mol^{-1}
c. 306.76 g mol^{-1} *d.* None of these

22. The relative lowering of vapour pressure of an aqueous solution containing a non-volatile solute, is 0.0125. The molality of the solution is

a. 0.69 m *b.* 0.50 m *c.* 0.80 m *d.* 0.40 m

23. How many grams of H_2SO_4 is/are to be dissolved to prepare 200 mL aqueous solution having concentration of $[H_3O^+]$ ions is 1 M at 25°C temperature?

a. 19.6 g *b.* 0.98 g *c.* 4.9 g *d.* 9.8 g

24. Vapour pressure of pure *A* is 70 mm of Hg at 25°C . If it forms an ideal solution with *B* in which mole fraction of *A* is 0.8 and vapour pressure of the solution is 84 mm of Hg at 25°C, then the vapour pressure of pure *B* at 25°C is

a. 140 mm *b.* 70 mm *c.* 56 mm *d.* 28 mm

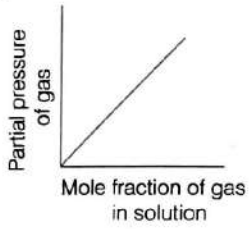
25. Lowering of vapour pressure is highest for

a. 0.1 M $BaCl_2$ *b.* 0.1 M glucose

c. 0.1 M $MgSO_4$ *d.* urea

26. Which of the following curves represent the Henry's law?

a.



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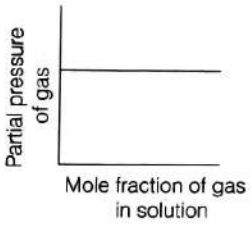

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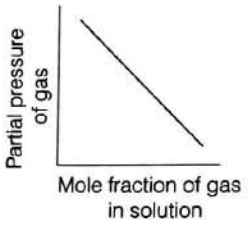
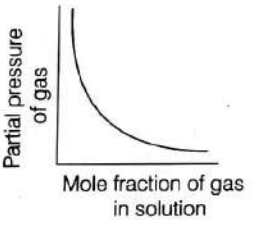


d.



27. If p° and p_s are the vapour pressures of the solvent and solution respectively and n_1 and n_2 are the mole fractions of solvent and solute respectively. Then,

a. $p_s = p^\circ n_1$ *b.* $p_s = p^\circ n_2$

c. $p^\circ = p_s n_2$ *d.* $p_s = p^\circ \left(\frac{n_1}{n_2}\right)$

28. Arrange the following in the increasing order of their solubility in *n*-octane based on solute-solvent interaction:

a. KCl < CH_3CN < CH_3OH < Cyclohexane

b. KCl < Cyclohexane < CH_3OH < CH_3CN

c. KCl < CH_3OH < CH_3CN < Cyclohexane

d. KCl < Cyclohexane < CH_3CN < CH_3CN

29. Which one of them is more volatile component?

a. CH_2Cl_2 *b.* $CHCl_3$

c. Both *a* and *b* *d.* Not able to determine

30. The elevation in boiling point would be highest for

a. 0.08 m $BaCl_2$ *b.* 0.10 m glucose

c. 0.10 m KCl *d.* 0.06 m calcium nitrate

31. A 0.2 molal aqueous solution of weak acid (*HX*) is 20% ionised. The freezing point of this solution is (Given, $K_f = 1.86^\circ C m^{-1}$ for water)

a. −0.45° C *b.* −0.55° C *c.* −0.90° C *d.* −0.31° C

32. The van't Hoff factor for a very dilute solution of $Fe_2(SO_4)_3$ is

a. 9 *b.* 5

c. 24 *d.* None of these

33. The latent heat of vaporisation of water is 9700 cal/mol and if the boiling point is 100°C, the ebullioscopic constant of water is

a. 0.516°C *b.* 1.026 °C *c.* 10.26°C *d.* 1.832°C

34. The relative lowering of vapour pressure of an aqueous solution containing a non-volatile solute is 0.0125. The molality of the solution is

a. 0.70 m *b.* 0.590 m *c.* 0.80 m *d.* 0.40 m

35. The osmotic pressure of one molar solution at 27°C is

a. 2.46 atm *b.* 24.6 atm *c.* 1.21 atm *d.* 12.1 atm

36. The freezing point of 0.1M solution of glucose is −1.86° C. If an equal volume of 0.3 M glucose solution is added, the freezing point of the mixture will be

a. −7.44°C *b.* −5.58°C *c.* −3.72°C *d.* −2.79°C

37. The van't Hoff factor for 0.1 M $Ba(NO_3)_2$ solution is 2.74. The degree of dissociation is

a. 91.3% *b.* 87% *c.* 100% *d.* 74%

38. In a 0.2 molal aqueous solution of a weak acid *HX*, the degree of ionisation is 0.3. Taking K_f for water as 1.85, the freezing point of the solution will be nearest to

a. −0.360° C *b.* −0.260° C

c. + 0.480° C *d.* −0.481° C

39. Acetic acid exists in benzene solution in the dimeric form. In an actual experiment, the van't Hoff factor was found to be 0.52. Then, the degree of dissociation of acetic acid is

a. 0.48 *b.* 0.88 *c.* 0.96 *d.* 0.52

40. A compound *X* undergoes tetramerisation in a given organic solvent. The van't Hoff factor is

a. 4.0 *b.* 0.25 *c.* 0.125 *d.* 2.0

41. The freezing point (in °C) of a solution containing 0.1 g of $K_3[Fe(CN)_6]$ (molecular weight 329) in 100 g of water (K_f = 1.86 K kg mol^{-1}) is

a. -2.3×10^{-2} *b.* -5.7×10^{-2}

c. -5.7×10^{-3} *d.* -1.2×10^{-2}

42. 0.004 M Na_2SO_4 is isotonic with 0.01 M glucose. Degree of dissociation of Na_2SO_4 is

a. 75% *b.* 50% *c.* 25% *d.* 85%

43. Colligative properties of a solution depends upon

a. nature of solute only

b. nature of both solute and solvent

c. number of solute particles

d. number of solvent particles

44. Among the following 0.10 m aqueous solutions, which one will exhibit the largest freezing point depression?
a. KCl *b.* $C_6H_{12}O_6$ *c.* $Al_2(SO_4)_3$ *d.* K_2SO_4

45. To observe an elevation of boiling point of 0.05°C, the amount of a solute (molecular weight = 100) to be added to 100 g of water ($K_b = 0.5$) is
a. 2 g *b.* 0.05 g *c.* 1 g *d.* 0.75 g

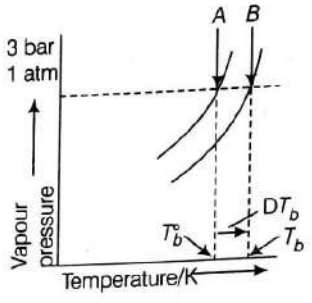
46. van't Hoff factor can be applied to the
a. relative lowering of vapour pressure of solvent
b. elevation of boiling point
c. osmotic pressure of solution
d. all colligative properties

47. Determine the amount of $CaCl_2$ ($i = 2.47$) dissolved in 2.5 L of water such that its osmotic pressure is 0.75 atm at 27°C.
a. 1.0 g *b.* 9.2 g *c.* 3.42 g *d.* 2.42 g

48. Find out the osmotic pressure of 0.1 M monobasic acid if pH = 2.0 at 25°C.
a. 2.69 atm *b.* 26.9 atm
c. 0.269 atm *d.* None of these

49. Elevation in boiling point was 0.52°C when 6 g of a compound *X* was dissolved in 100 g of water. Molecular weight of *X* is (K_b of water is 5.2°C per 100 g of water)
a. 120 *b.* 60 *c.* 600 *d.* 180

50. What does point *A* and *B* represent in the following diagram?



Point *A*	Point *B*
a. Boiling point of solvent	Boiling point of solution
b. Boiling point of solution	Boiling point of solvent
c. Boiling point of solute	Boiling point of solvent
d. Boiling point of solvent	Boiling point of solute