Solution

Q1. option - c
Molarity - The number of moles of a solute per litre of a solution.

Q2. option - b
Molality does not change with temperature.

Q3 X_A - 3.65g of HCl
X_B - 16.2g of H_2O (water)

The mole fraction of HCl

$$= \frac{\text{No. of moles of HCl}}{\text{Total number of moles of all components}}$$

$$= \frac{3.65\,g}{3.65\,g + 16.2\,g}$$

$$= \frac{3.65\,g}{19.85\,g}$$

$$= 0.1$$

option - d

Q4 option - d

$$N_2 = \frac{N_1 V_1}{V_2}$$

Q5 option - b

Normality define -

The normality, N, of a solution is the number of gm equivalents wt. of solute dissolved in one litre of solution.

Q6 option - a

Normality formula

$$N_1 V_1 = N_2 V_2$$

Q7. option - a Mole fraction

Q8. $X_A + X_B = 1$ option - c

The sum of the mole fractions of all the components present in the solution is equal to one

Q9. wt. of H_2SO_4 in 500ml = 4.9 g

wt. of H_2SO_4 in 1 litre = 9.8 g

(1 dm^3) (2 × 4.9)

Normality = $\frac{\text{gm per litre}}{\text{Eq. wt.}}$

$= \frac{9.8}{49}$

$= 0.2$

option - 0.2

Q10. Eq. wt of NaOH = 40

option - b

Q11. option - (0.2M) c

Molarity (M) = $\frac{\text{wt of solute}}{\text{Mol. wt}} \times \frac{1000}{\text{vol}^m \text{ of Solution in ml}}$

$= \frac{8}{40} \times \frac{1000}{1000}$

$= 0.2$

Q12. option - 9

Solution -

wt. of litre of H_2SO_4 = $\frac{25}{5}$

$= 5g$

a) Normality = $\frac{\text{gm per litre}}{\text{Eq. wt}}$

$$= \frac{5}{49} = 0.102$$

b) Molarity (M) =

$$\frac{\text{mol. wt of solute}}{\text{Mol. wt}} \times \frac{1000}{\text{vol. of soln in ml}}$$

$$= \frac{\text{wt. of solute}}{98} \times \frac{1000}{2000}$$

$$= \frac{25}{98} \times \frac{1000}{2000}$$

$$= \frac{5}{98} = 0.051$$

Q 13. option - 9

$$\frac{\text{Normality}}{\text{Molarity}} = \frac{\text{Mol. wt}}{\text{Eq. wt}}$$

$$\frac{N}{M} = \frac{98}{49}$$

$$\frac{N}{M} = 2$$

$$M = \frac{N}{2} = \frac{0.2}{2} = 0.1$$

Molarity of solution = 0.1 M

Q14. Solution - option - a

Mole fraction = No. of moles of ethanol / (No. of moles of water + No. of moles of ethanol)

$= \frac{5}{2+5} = \frac{5}{7}$

Mole fraction = No. of moles of water / (No. of moles of water + No. of moles of ethanol)

$= \frac{2}{2+5} = \frac{2}{7}$

Q15 option - a

S.I. unit of Molality $= \frac{mol}{Kg}$

Q16 option - a

Normality is also known as the equivalent concentration of a solution.

Q17. S.I. Unit of Molality = $\frac{mol}{m^3}$

option - c

Q18. 6.023×10^{23}

option - a

Q19. Units of Molarity are M or $\frac{mol}{L}$

option - c

Q 20. Normality = $\frac{\text{Wt. of solute per litre}}{\text{Eq. wt. of solute}}$