CHAPTER III

1. The concept like dissolves like is based on _____.
   A) surface tension
   B) viscosity
   C) intermolecular attraction
   D) molecular weight

2. Which of the following has very high solubility in water?
   A) C_6H_6
   B) C_2H_5OH
   C) $C_6H_5NH_2$
   D) C_6H_5OH

3. In which of the following cases is the solvation an ion-dipole interaction?
   A) water + glucose
   B) ether + urea
   C) water + NaCl
   D) benzene + aniline

4. Which of the following pairs is completely miscible in all the proportions?
   A) $CH_3OH + H_2O$
   B) $H_2O + C_6H_5OH$
   C) $C_6H_6 + H_2O$
   D) H_2O + 1–butanol $(CH_3CH_2CH_2CH_2OH)$

5. Which of the following is more soluble in benzene than in water?
   A) potassium chloride
   B) naphthalene
   C) washing soda
   D) CsF

6. 12 g of urea (molar mass = 60 g) is dissolved in 180 g of water. The mole fraction of urea is _____.
   A) 0.20
   B) 0.066
   C) 0.020
   D) 0.66

13. 6.00 g of urea (molar mass = 60 g) is dissolved in 100 g of water (M.W – 18). The percent by mass of urea in the solution is _____.
    A) 5.7%
    B) 6.0%
    C) 16.6%
    D) 3.0%
14. 18 g of glucose (molar mass =180 g) is present in 500 mL of a solution. The molarity of glucose in the solution is _____ mol · L^{-1}.
    A) 0.20
    B) 0.10
    C) 0.050
    D) 1.2
15. Which of the following is dependent on temperature?
    A) mole fraction
    B) percent by mass
    C) molality
    D) molarity

16. The amount of water to be added to 5.00 g of urea to obtain a 16.2 percent by mass urea solution is _____.
    A) 15.2 g
    B) 16.2 g
    C) 18.6 g
    D) 25.9 g
17. The molality of 14.3 g of sucrose ($C_{12}H_{22}O_{11}$) in 676 g of water is _____.
    A) 0.0210 m
    B) 2.03 m
    C) 0.0619 m
    D) 1.09 m

18. The molality of 2.50 M NaCl solution (density of solution = 1.08 g/mL) is _____.
    A) 1.53 m
    B) 0.68 m
    C) 1.68 m
    D) 2.68 m
19. The molality of a 48.2% by mass of KBr solution is _____.
    A) 3.42 m
    B) 7.82 m
    C) 5.12 m
    D) 10.08 m

20. The molality of 1.22 M sugar ($C_{12}H_{22}O_{11}$) solution is 1.74 m. The density of the solution is _____ g/mL.
    A) 1.08 m
    B) 1.22 m
    C) 1.12 m
    D) 1.72 m

21. The concentrated H_2SO_4 used in the laboratory is 98% H_2SO_4 by mass and has a density of 1.83 g/mL. The molality of the solution is _____.
    A) 50.0 m
    B) 18.0 m
    C) 5.00 m
    D) 500. m

22. The solubility of a gas in a liquid depends on _____.
    A) temperature
    B) pressure
    C) nature of the gas
    D) all of the above

23. The solubility of oxygen in water can be increased by _____.
    A) increase of temperature
    B) decrease of pressure
    C) decrease of temperature
    D) increase of volume of O_2

24. The unit of Henry's law constant, k is _____.
    A) mol·L
    B) mol/L·atm
    C) L/mol
    D) mol/K

25. The mathematical form of Raoult's Law is _____.
    A) $P_i° = X_i P_i$
    B) $P_i = X_i P_i°$
    C) $\dfrac{P_i°}{P_i} = X_i$
    D) $P_i = X_i + P_i$

26. In Osmosis _____.
    A) The solute migrates from the solution of lower to higher concentration
    B) The solvent migrates from the solution of lower to higher concentration
    C) The solute migrates from the solution of higher to lower concentration
    D) The solvent migrates from the solution of higher to lower concentration

27. The vapor pressure of water at 30 °C is 31.8 mmHg. The vapor pressure of an aqueous solution of 396 g sucrose in 624 g water is _____ mmHg.
   A) 23.1
   B) 25.1
   C) 28.2
   D) 30.8

28. What mass of sucrose in kilograms must be added to 552 g of water to yield a solution with vapor pressure 2.0 mmHg less than that of pure water at 20 °C (The vapor pressure of water is 17.5 mmHg at 20 °C)?
   A) 0.52 kg
   B) 0.052 kg
   C) 1.3 kg
   D) 3.1 kg

29. The vapor pressure of pure benzene is 100 mmHg at 21.6 °C. The vapor pressure of a solution of 24.6 g of camphor ($C_{10}H_{16}O$) dissolved in 98.5 g of benzene is _____ mmHg.
   A) 78.2
   B) 88.6
   C) 92.1
   D) 83.1

30. The osmotic pressure of 1.36 M aq solution of urea at 22 °C is _____ atm.
   A) 3.29
   B) 12.8
   C) 32.9
   D) 24.2

31. A solution of 0.8330 g of a polymer in 170.0 mL of an organic solvent has an osmotic pressure of 5.20 mmHg at 25 °C. The molar mass of the polymer is _____ kg/mol .
   A) 375.8
   B) 17.5
   C) 6.49
   D) 37.5

32. 7.480 g of an organic compound (MW = 430 g) was dissolved in water to make 300 mL of the solution at 27 °C. The osmotic pressure of the solution is _____ atm.
   A) 1.09
   B) 24.3
   C) 1.43
   D) 36.1