Practice Test 01

NEET (2023)

CHEMISTRY

SECTION - A

1. Solubility of a gas X in water increases by lowering the temperature. This implies
(1) Dissolution process is endothermic
(2) Dissolution process is independent of temperature
(3) $\Delta S_{dissolution} > 0$
(4) $\Delta H_{dissolution} < 0$

2. Henry's law constant (K_H) values for gases P, Q, R and S are 40.39, 1.67, 1.83×10^{-5} and 0.413 respectively. Which gas has maximum solubility?
(1) P (2) Q
(3) R (4) S

3. A glucose solution weighing 200 g contains 36 g water. The molal concentration of solution is
(1) $\frac{164}{180}\times\frac{1000}{36}m$ (2) $\frac{200}{180}\times\frac{1000}{200}m$
(3) $\frac{36}{180}\times\frac{1000}{55.5}m$ (4) $\frac{164}{180}\times\frac{1000}{200}m$

4. If the total vapour pressure of the liquid mixture of A and B is given by the equation $P = 160\ x_A + 80$, then the ratio of the vapour pressure of the pure liquids A and B is given by
(1) 1 : 2 (2) 2 : 3
(3) 2 : 5 (4) 3 : 1

5. The value of Henry's law constant
(1) Increases with increase in temperature
(2) Decreases with increase in temperature
(3) Increases with decrease in temperature
(4) Independent of temperature and depend only on pressure

6. The boiling point of water in pressure cooker is
(1) 100°C (2) > 100°C
(3) <100°C (4) 25°C

7. On mixing 10 ml of CH_3COCH_3 and 40 ml of $CHCl_3$, the total volume of the solution is
(1) < 50 ml (2) > 50 ml
(3) = 50 ml (4) Cannot be predicted

8. Which of the following solution will have minimum vapour pressure?
(1) 1 M NaCl (2) 1 M $MgCl_2$
(3) 1 M $AlCl_3$ (4) 1 M sucrose

9. Total vapour pressure of a mixture of 2 mole A $\left(P_A^o = 200\ torr\right)$ and 4 mole B $\left(P_B^o = 400\ torr\right)$ is 250 mm. Therefore, solution shows
(1) Positive deviation from Raoult's law
(2) Negative deviation from Raoult's law
(3) No deviation
(4) Molecular masses of A and B are also required.

10. 10 g of a non-volatile solute when dissolved in 100 g benzene raises its boiling point by 1°C. Molar mass of the solute is
(K_b for benzene = 2.53 K kg/mol^{-1})
(1) 25 g/mol (2) 253 g/mol
(3) 44 g/mol (4) 180 g/mol

11. Which solution has maximum molal depression constant?
(1) 0.1 M aq. KCl
(2) 0.1 M aq. sodium sulphate
(3) 0.2 M aq. barium phosphate
(4) Same for all

12. Which of the following is the correct order of boiling points of the following solutions? (Assume complete dissociation of salts)
a. 0.15 M NaCl
b. 0.4 M glucose solution
c. 0.15 M $CaCl_2$ solution
d. 0.15 M urea solution
(1) d < a < c < b (2) d < b < a < c
(3) d < a < b < c (4) d < c < b < a

13. 5.85 g NaCl is dissolved in 200 ml of water at 27°C. The osmotic pressure of solution will be
(Assume that NaCl is completely ionised)
(1) 6 atm (2) 12.315 atm
(3) 24.63 atm (4) 30 atm

14. Equal moles of benzene and toluene are mixed. The vapour pressures of benzene and toluene in pure state are 700 and 600 mm Hg respectively. The mole fraction of benzene in vapour state is

(1) 0.50 (2) 0.7

(3) 0.53 (4) 0.6

15. 0.1 molal aqueous solution of sodium bromide freezes at –0.335°C at atmospheric pressure. K_f for water is 1.86 K kg mol^{-1}. The percentage of dissociation of the salt in solution is

(1) 40 (2) 60

(3) 80 (4) 90

16. Which solution is isotonic with 3 M NaCl aq. solution?

(1) 3 M Urea (2) 2 M $BaCl_2$

(3) 1 M $AlCl_3$ (4) 2 M KCl

17. Consider the following 0.01 M aqueous solutions of

I. KCl

II. $CaCl_2$

III. Glucose

The relative lowering of vapour pressure will be in the order

(1) III > II > I (2) I > II > III

(3) III > I > II (4) II > I > III

18. If α = 50% for $Al_2(SO_4)_3$, then van't hoff factor would be

(1) 1.5 (2) 0.5

(3) 3 (4) 2.0

19. Which of the following aqueous solution has maximum freezing point?

(1) 0.01 M NaCl

(2) 0.005 M C_2H_5OH

(3) 0.005 M MgI_2

(4) 0.01 M $MgSO_4$

20. Pure water boils at 373 K and pure nitric acid boils at 359 K. The azeotropic mixture of water and nitric acid boils at T K.

(1) T < 359 K

(2) T > 373 K

(3) T < 373 K but > 359 K

(4) Unpredictable

21. The unit of Vander Waal's constant 'a' is

(1) atm L^2 mol^{-2} (2) dyne cm^4 mol^{-2}

(3) N m^4 mol^{-2} (4) All of these

22. The density of a gas A is four times that of gas B at the same temperature. Molar mass of gas A is half of gas B. The ratio of the pressure acting on A and B will be

(1) 1 : 2 (2) 2 : 1

(3) 8 : 1 (4) 1 : 8

23. The incorrect statement among the following is

(1) Average translational kinetic energy per molecule is the same for all gases at a given temperature

(2) The equation PV = nRT is not applicable to real gases at high pressure and low temperature

(3) $\frac{PV}{RT}$ is independent of the amount of the gas

(4) $\frac{PV}{RT}$ > 1 for H_2 and He at 273 K and 1 atm pressure

24. The relative order of different types of velocities at a given temperature is correctly given as

(1) $V_{rms} > V_{m.p.} > V_{avg}$

(2) $V_{rms} > V_{avg} > V_{m.p.}$

(3) $V_{m.p.} > V_{avg} > V_{rms}$

(4) $V_{m.p.} > V_{rms} > V_{avg}$

25. Out of $PCl_5(g)$, NH_3, SO_3, O_2, rate of diffusion is minimum for

(1) PCl_5 (2) NH_3

(3) O_2 (4) SO_3

26. At what ratio of the partial pressure, $p_{O_2} : p_{N_2}$, will the masses of two gases, O_2 and N_2 contained in vessel be equal?

(1) 0.785 (2) 8.75

(3) 11.4 (4) 0.875

27. An open vessel containing air at 27°C. If the vessel is heated to 127°C, then fraction of air escaping out from the vessel is

(1) $\frac{1}{3}$ (2) $\frac{1}{2}$

(3) $\frac{1}{2.5}$ (4) $\frac{1}{4}$

28. A gas can be liquefied at a temperature T K and pressure P provided that
(1) $T = T_C$ and $P < P_C$
(2) $T < T_C$ and $P > P_C$
(3) $T > T_C$ and $P > P_C$
(4) $T < T_C$ and $P < P_C$

29. A gas is found to have formula $[CO]_x$ and its vapour density is 70. The value of *x* will be
(1) 3 (2) 5
(3) 6 (4) 2.5

30. In a hydrocarbon, the mass ratio of carbon to hydrogen (H) is 6 : 2. The empirical formula of the hydrocarbon is
(1) CH (2) CH_2
(3) CH_3 (4) CH_4

31. Maximum number of oxygen atoms are present in
(1) 24 g O_3 (2) 11 g CO_2
(3) 32 g SO_2 (4) 8 g O_2

32. The number of molecules of product formed when 100 atoms of A and 100 atoms of B are allowed to react according to the equation, is

$$A(g) + B_2(g) \longrightarrow AB_2(g)$$

(1) 100 (2) 50
(3) 40 (4) 66

33. Number of moles of electrons present in 64 g of CH_4 is
(1) 64 (2) 40
(3) 24 (4) 16

34. 3 M Na_2CO_3 solution has density 1.5 g/cc, molality of the same solution will be
(1) 3.15 (2) 3.00
(3) 3.95 (4) 2.54

35. 25 ml of 3 M HNO_3 is mixed with 75 ml of 4 M HNO_3. The molarity of the final mixture would be
(1) 3.25 M (2) 4 M
(3) 3.75 M (4) 3.5 M

SECTION - B

36. Which colligative property is the best method for the determination of molecular weight of proteins and polymers?
(1) Osmotic pressure
(2) Lowering in vapour pressure
(3) Lowering in freezing point
(4) Elevation in boiling point

37. In the case of osmosis, solvent molecules move from solution having
(1) Higher vapour pressure to lower vapour Pressure
(2) Higher concentration to lower concentration
(3) Lower vapour pressure to higher vapour pressure
(4) Higher osmotic pressure to lower osmotic pressure

38. 0.5 molal aqueous solution of a weak acid (HX) is 20% ionized. If K_f water is 1.86 K kg mol^{-1}, the lowering in freezing point of the solution is
(1) –0.56 K (2) –1.12 K
(3) 0.56 K (4) 1.12 K

39. Acetic acid dimerises in benzene solution. The van't Hoff factor for the dimerization of acetic is 0.8. The % dimerization of acetic acid is
(1) 20% (2) 40%
(3) 60% (4) 80%

40. Which one is not equal to zero for an ideal solution?
(1) $\Delta P = P_{\text{Observed}} - P_{\text{calculated using raoult's law}}$
(2) ΔH_{mix}
(3) ΔS_{mix}
(4) ΔV_{mix}

41. Correct order of V_C for the following gases is
(1) $CO_2 > O_2 > He$ (2) $He > O_2 > CO_2$
(3) $CO_2 > He > O_2$ (4) $O_2 > He > CO_2$

42. Temperature at which the root mean square speed of oxygen gas becomes equal to most probable speed of sulphur dioxide gas at 600 K, is
(1) 300 K (2) 200 K
(3) 400 K (4) 600 K

43. The temperature at which real gas obeys ideal gas laws over an appreciable range of pressure is called
(1) Boiling temperature
(2) Boyle temperature
(3) Critical temperature
(4) Inversion temperature

44. Absolute zero is
(1) -273.15^oC
(2) Zero kelvin
(3) Temperature at which no substance exists in gaseous state.
(4) All of the above

45. Ratio of average Kinetic energy of CH_4 to that of H_2 both at 300 K is :

(1) 1 : 8 (2) 2 : 1

(3) 1 : 1 (4) 4 : 1

46. An element X exist in two isotopic form X^{25} and X^{28}. If their percentage abundance is 40% and 60% respectively, then average atomic mass of X is

(1) 25.2 u (2) 26 u

(3) 27.3 u (4) 26.8 u

47. Numbers of atoms of iron present in 100 g Fe_2O_3 having 20% purity is [Fe : 56 g/mol]

(1) 0.10 N_A (2) 0.25 N_A

(3) 0.50 N_A (4) 0.80 N_A

48. 7.5 g of a gas occupy 5.6 L of volume at S.T.P. The gas is

(1) NO (2) N_2O

(3) CO (4) CO_2

49. Molality of NaOH solution if mole fraction of water is 0.8 is equal to

(1) $\frac{1000}{18}$m (2) $\frac{1000}{72}$m

(3) $\frac{1000}{36}$m (4) $\frac{1000}{54}$m

50. Consider the following chemical reaction

$$Fe_3O_4 + CO \rightarrow Fe + CO_2$$

What mass of Fe_3O_4 is required to obtain 2 kg of Fe if the process is 90% efficient? [Fe : 56 g/mol]

(1) 3.97 kg (2) 3.07 kg

(3) 2.96 kg (4) 1.45 kg

ANSWER KEY

Section-A

1. (4)
2. (3)
3. (1)
4. (4)
5. (1)
6. (2)
7. (1)
8. (3)
9. (2)
10. (2)
11. (4)
12. (3)
13. (3)
14. (3)
15. (3)
16. (2)
17. (4)
18. (3)
19. (2)
20. (2)
21. (4)
22. (3)
23. (3)
24. (2)
25. (1)
26. (4)
27. (4)
28. (2)
29. (2)
30. (4)
31. (1)
32. (2)
33. (2)
34. (4)
35. (3)

Section-B

36. (1)
37. (1)
38. (4)
39. (2)
40. (3)
41. (1)
42. (2)
43. (2)
44. (4)
45. (3)
46. (4)
47. (2)
48. (1)
49. (2)
50. (2)

Hints and Solution

Section-A

1. (4)

Dissolution of gas in liquid is an exothermic process

∴ Solubility of gas in water increases on lowering the temperature

2. (3)

$P = K_H x$

At constant $P, x \propto \frac{I}{K_H}$

K_H for 'R' → minimum

∴ Solubility of R → maximum

3. (1)

No. of moles of glucose

$$= \frac{(200-36)\,g}{180\ g/mol} = \frac{164}{180}\ mol$$

Molality of solution $= \frac{164}{180} \times \frac{1000}{36}\ m$

4. (4)

$$P = p_A^0 x_A + p_B^0 x_B$$

$$p = p_A^0 x_A + p_B^0 (1 - x_A)$$

$$p = p_A^0 x_A + p_B^0 - p_B^0 x_A$$

$$p = P_B^0 + \left(p_A^0 - p_B^0\right) x_A - (1)$$

Given, $P = 160\, x_A + 80 - (2)$

Comparing eq. (1) & (2)

$$P_B^0 = 80,\ P_A^o - P_B^0 = 160$$

$$P_A^0 = 160 + 80 = 240$$

$$\frac{P_A^0}{P_B^0} = \frac{240}{80} = \frac{3}{1}$$

5. (1)

K_H increases on increasing temperature

6. (2)

Boiling point of water increases in pressure cooker.

∴ B.P. > 100° C

7. (1)

Acetone and chloroform on mixing show negative deviation from raoult's law

$\therefore \Delta V_{mix} < 0$

⇒ total volume of solution will be less than 50 mL

8. (3)

$\frac{\Delta p}{p^0}$ = Relative lowering in vapour pressure

$$\frac{\Delta p}{p^0} = i x_{solute}$$

$AlCl_3 \rightarrow Al^{3+} + 3Cl^-\ (i = n = 4, \alpha = 1)$

Among the given solutions relative lowering in V.P. will be maximum for $AlCl_3$

∴ it will minimum V.P.

9. (2)

$$P_T = P_A^0 x_A + P_B^0 x_B$$

$$= 200 \times \left(\frac{2}{6}\right) + 400 \times \left(\frac{4}{6}\right)$$

= 66.66 + 266.66

= 333.32 mm

Since $(P_T)_{calculated} > (P_T)_{observed}$ (250 mm)

∴ solution shows negative deviation from Raoult's law.

10. (2)

$$\Delta T_b = i \times k_b \times m$$

$$1 = 1 \times 2.53 \times \left\{\frac{\frac{10}{M}\ mol}{\frac{100}{1000}\ kg}\right\}$$

⇒ $M = 253$ g/mol.

11. (4)

K_f (Molal depression constant) depends on nature of solvent, so it will be same for all aqueous solutions.

12. (3)

B.P. of solution $\propto \Delta T_b \propto i \times m$

[m = M]

$$\underset{(1\times0.15)}{\text{Urea}} < \underset{(2\times0.15)}{\text{NaCl}} < \underset{(1\times0.4)}{\text{Glucose}} < \underset{(3\times0.15)}{CaCl_2} \quad [\text{B.P.}]$$

13. (3)

$\pi = icRT$

$$\pi = 2 \times \left\{\frac{\frac{5.85}{58.5}\ mol}{\frac{200}{1000}\ L}\right\} \times 0.0821\ atm\ LK^{-1}mol^{-1} \times 300\ K$$

$\pi = 24.63$ atm

14. (3)

Mole fraction of benzene in vapour phase

$$= \frac{P_{Benzere}}{P_{total}} = \frac{P_B^0 \times x_B}{P_B^0 x_B + p_T^0 x_T}$$

$$y_B = \frac{700 \times \frac{1}{2}}{700 \times \frac{1}{2} + 600 \times \frac{1}{2}} = 0.53$$

15. (3)

$$\Delta T_f = ik_f m$$

$$0.335 = i \times 1.86 \times 0.1$$

$$i = 1.80$$

For NaBr, n = 2,

$$\alpha = \frac{i-1}{n-1} = \frac{1.80-1}{2-1} = 0.8$$

$\Rightarrow$ % dissociation of salt = 80%

16. (2)

For isotonic solutions $\pi_1 = \pi_2$

$$\left.\begin{array}{ll} NaCl & \pi_1 = iCRT = 2 \times 3 \times RT \\ BaCl_2 & \pi_2 = iCRT = 3 \times 2 \times RT \end{array}\right\} \text{ same}$$

17. (4)

Relative lowering in vapour pressure $\propto i$

$$\underset{(\alpha=1)}{\underset{(i=3)}{CaCl_2}} > \underset{(i=2)}{KCl} > \underset{(i=1)}{Glucose}$$

18. (3)

$$Al_2(SO_4)_3 \longrightarrow 2Al^{3+} + 3SO_4^{2-}$$

$$n = 5 \quad \alpha = 0.5$$

$$i = \alpha(n-1) + 1 = 0.5(4) + 1 = 3$$

19. (2)

Solution which has minimum depression in freezing point will have maximum value of freezing point.

$$\Delta T_f = i \times k_f \times m$$

Consider m = M

For C_2H_5OH

$i \times M = 1 \times 0.005 \Rightarrow$ Minimum value, so it will max. freezing point.

20. (2)

HNO_3 and H_2O form maximum boiling azeotropic mixture at a particular composition.

B.P. of mixture > B.P. of H_2O & HNO_3

21. (4)

$$\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$$

Unit of $\frac{an^2}{V^2} \Rightarrow$ unit of p

$\Rightarrow$ 'a' $\rightarrow$ atm L^2 mol^{-2}

$\Rightarrow$ 'a' $\rightarrow$ dyne cm^4 mol^{-2}

$\Rightarrow$ 'a' $\rightarrow$ N m^4 mol^{-2}

22. (3)

$$d = \frac{PM}{RT},\ d_A = 4d_B, M_A = \frac{1}{2}M_B$$

$$\frac{d_A}{d_B} = \frac{P_A M_A}{P_B M_B}$$

$$\frac{P_A}{P_B} = \frac{4d_B}{d_B} \times \frac{M_B \times 2}{M_B} = \frac{8}{1}$$

23. (3)

$$PV = nRT$$

$$\frac{PV}{RT} = n \text{ (amount of gas)}$$

24. (2)

$$V_{rms} = \sqrt{\frac{3RT}{M}}, V_{avg} = \sqrt{\frac{8RT}{\pi M}}, V_{mp} = \sqrt{\frac{2RT}{M}}$$

$$V_{rms} > V_{avg} > V_{mp}$$

25. (1)

Rate of diffusion $\propto \frac{1}{\sqrt{\text{Molar mass}}}$

$PCl_5(g)$ has maximum molar mass & it will diffuse slowly.

26. (4)

$$m_{O_2} = m_{N_2} = m$$

$$\frac{P_{O_2}}{P_{N_2}} = \frac{x_{O_2}}{x_{N_2}} = \frac{n_{O_2}}{n_{N_2}} = \frac{\frac{m}{32}}{\frac{m}{28}} = \frac{28}{32} = \frac{7}{8}$$

$$\frac{P_{O_2}}{P_{N_2}} = 0.875$$

27. (4)

$$n_1 T_1 = n_2 T_2$$

$$n_1 \times 300 \text{ K} = n_2 \times 400 \text{ K}$$

$$\frac{n_1}{n_2} = \frac{4}{3}$$

Fraction of air escaped out $= \dfrac{n_1 - n_2}{n_1}$

$$= \frac{\frac{4}{3}n_2 - n_2}{\frac{4n_2}{3}} = \frac{1}{3} \times \frac{3}{4} = \frac{1}{4}$$

28. (2)

Gas can be liquefied only if

$T < T_C$

$P > P_C$

29. (2)

Vapour density × 2 = Molar mass

Molar mass = 140 g/mol

$28 \times x = 140 \Rightarrow x = 5$

30. (4)

In CH_4,

$$\frac{\text{mass of C}}{\text{mass of H}} = \frac{12}{4} = \frac{3}{1}$$

31. (1)

- 24 g O_3

No. of 'O' atoms

$$= \frac{24\,\text{g}}{48\,\text{g/mol}} \times N_A \times 3(\text{maximum})$$

- 11 g CO_2

$$\text{No. of 'O' atoms} = \frac{11\,\text{g}}{44\,\text{g/mol}} \times N_A \times 2$$

- 32 g SO_2

$$\text{No. of 'O' atoms} = \frac{32\,\text{g}}{64\,\text{g/mol}} \times N_A \times 2$$

- 8 g O_2

$$\text{No. of 'O' atoms} = \frac{8\,\text{g}}{32\,\text{g/mol}} \times 2$$

32. (2)

$$A(g) + B_2(g) \longrightarrow AB_2(g)$$

Given: 100 atoms 50 molecules

$B_2 \Rightarrow$ limiting reagent

$\Rightarrow$ 50 molecules of AB_2 will be produced.

33. (2)

$$\text{No. of moles} = \frac{64\ \text{g}}{16\ \text{g/mol}} = 4\ \text{mol}$$

1 molecule CH_4 contains 10 electrons

1 mol of CH_4 will contain 10 mol of electrons

$\Rightarrow$ 4 mol of CH_4 will contain 40 mol of electrons

34. (4)

$$\text{molality, } m = \frac{1000M}{1000d - MM'}$$

$$m = \frac{1000 \times 3}{1000 \times 1.5 - 3 \times 106}$$

$$m = 2.54\ \text{mol/kg}$$

35. (3)

$$M_1V_1 + M_2V_2 = M_{\text{Final}} \times V_{\text{Final}}$$

$$(3 \times 25) + (4 \times 75) = M_{\text{Final}} \times 100$$

$$\Rightarrow M_{\text{Final}} = 3.75\ \text{mol/L}$$

Section-B

36. (1)

Osmotic pressure measurements are mostly done at room temperature [proteins are stable at R.T.] and for very dilute solutions values of osmotic pressure are quite large [which helps in determining accurate molar masses of polymers]

37. (1)

During osmosis, solvent molecules move from solution having

- Higher vapour pressure to lower vapour pressure
- Lower concentration to higher concentration
- Lower osmotic pressure to higher osmotic pressure.

38. (4)

$\Delta T_f = ik_f m$

$$\alpha = \frac{i-1}{n-1} \qquad [HX \rightleftharpoons H^+ + X^-]$$

$$0.2 = \frac{i-1}{2-1}$$

$\Rightarrow i = 1.2$

$\Delta T_f = 1.2 \times 1.86 \times 0.5 = 1.12$ K

39. (2)

$\alpha = \dfrac{n(1-i)}{(n-1)}$ = Degree of association

$$\alpha = \frac{2(1-0.8)}{2-1} = 0.4$$

$\Rightarrow$ % dimerisation of acetic acid is 40%

40. **(3)**

For ideal solution,

$\Delta H_{mix} = 0$

$\Delta V_{mix} = 0$

$\Delta P = 0$

$\Delta S_{mix} > 0$

$\Delta G_{mix} < 0$

41. **(1)**

$V_c = 3b$

b $\Rightarrow$ measure of effective size of gas molecule

$\therefore CO_2 > O_2 > He \quad (V_c)$

42. **(2)**

$$\left(V_{rms}\right)_{O_2} = \left(V_{mps}\right)_{SO_2}$$

$$\sqrt{\frac{3RT_{O_2}}{M_{O_2}}} = \sqrt{\frac{2RT_{SO_2}}{M_{SO_2}}}$$

$$T_{O_2} = \frac{2 \times Tso_2}{Mso_2} \times \frac{Mo_2}{3} = \frac{600 \times 32 \times 2}{64 \times 3}$$

T_{O_2} = 200 K

43. **(2)**

Temperature at which real gas obeys ideal gas laws over an appreciable range of pressure is called Boyle temperature.

44. **(4)**

Absolute zero is the hypothetical minimum temperature at which gas cease to exist

Absolute zero = 0 K = –273.15°C

45. **(3)**

Average kinetic energy is only temperature dependent

$$\therefore \left(K.E\right)_{CH_4} : \left(K.E\right)_{H_2}$$

1 : 1

46. **(4)**

Average atomic mass

$$= \frac{25\ u \times 40 + 60 \times 28\ u}{100} = 26.8\,u$$

47. **(2)**

$$\% \text{ purity} = \frac{\text{Pure amount}}{\text{Total mass of sample}} \times 100$$

Pure amount of $Fe_2O_3 = 100 \times \frac{20}{100} = 20\,g$

No. of Fe atoms

$$= \frac{20\ g}{160\ g/mol} \times N_A \times 2 = 0.25\,N_A$$

48. **(1)**

$$\frac{7.5\ g}{M} = \frac{5.6\,L}{22.4\,L/mol}$$

$\Rightarrow$ M = 30 g/mol

$\Rightarrow$ Gas is NO

49. **(2)**

$$x_{H_2O} = 0.8$$

$$x_{NaOH} = 1 - 0.8 = 0.2$$

$$\text{Molality, } m = \frac{x_{solute}}{x_{solvent}} \times \frac{1000}{M_{solvent}}$$

$$m = \frac{0.2 \times 1000}{0.8 \times 18} = \frac{1000}{72}\ mol/kg$$

50. **(2)**

$$Fe_3O_4 + 4CO \longrightarrow 3Fe + 4CO_2$$

232 g F_3O_4 gives 168 g Fe

2000 g Fe will be obtained from

$$= \frac{232}{168} \times 2000\ g\,Fe_3O_4$$

$$= 2761.90\ g\,Fe_3O_4$$

For 100% efficiency, amount of Fe_3O_4 required =2761.90 g

For 90% efficiency, amount required will

$$= \frac{2761.90}{90} \times 100$$

= 3068.7 g

= 3.06 kg Fe_3O_4