**ALVA’S PRE UNIVERSITY COLLEGE, MOODBIDRI**

**Department of Chemistry**

**CET / NEET Crash Course 2019 – 2020**

**Topic: States of matter : Gases, liquids and solutions-C06**

1. 5mL of chloroform is mixed with 100mL of ethoxy ethane. The vapour pressure of ethoxy etane above the solution is

1) Equal to the vapour pressure of ethoxy ethane.

2) Equal to the vapour pressure of the solution.

**3) Less than the vapour pressure of ethoxy ethane.**

4) More than the vapour pressure of ethoxy ethane.

**ANS: 3**

1. Glauber’s salt is a
2. Solution of solid in a liquid.
3. Salt only and cannot be called a solution
4. **Solution of liquid in a solid.**
5. Coordination compound of copper with water molecules as ligands.

**ANS: 3 , Glauber’s salt is Na2SO4.10H2O Liquid water is uniformly mixed in to solid Na2SO4.**

1. Benzene and toluene form nearly ideal solutions. At 200c, vapour pressure of benzene is 75 torr and that of toluene is 22torr. The partial vapour pressure of benzene at 200c for a solution containing 78g benzene and 46g toluene in torr is
2. **50**  2) 25 3) 37.5 4) 53.5

**ANS: 1 nB = w/M =78/78=1 , nA = w/M =46/92=0.5**

**PB = XB x P0B = (1/1.5)x75 = 50torr**

1. Out of the compounds below, the vapur pressure of (B) at a particular temperature is

p-O2N-C6H4 –OH(A), o-O2N-C6H4-OH (B)

1. **Higher than that of (A)**

2) Lower than that of (A)

3) Higher or lower than that of (A) depending on the size of the vessel.

4) Same as that of (A)

**ANS : 1 B has intramolecular H-bonds.A has intra mlecular H-bonds.**

1. A sugar syrup of water weight 214.2g contains 34.2g of sugar. The molal concentration is
2. **0.55m** 2) 5.5m 3) 55m 4) 0.1m

**ANS: 1 Water present = 214.2 – 34.2 = 180g , 34.2g sugar = 0.1mol ,**

**molality = 0.1/0.180=0.55**

1. On a humid day in summer, the mole fraction of gas water ( water vapour) in the air at 250c can be as high as 0.0287. Assuming a total pressure of 0.977atm.What is the prtial pressure of dry air?

1) 94.9atm **2) 0.949atm**  3) 949atm 4) 0.648atm

**ANS : 2 PH2O = XH2O PT =0.0287x 0.0977= 0.028, PT= Pdryair+PH2O,**

**Pdryair = PT –PH2O = 0.977-0.028 = 0.949atm**

1. At 250c for a given solution M= m, then at 500c the correct relationship is
2. M=m 2) M >m **3) M<m** 4) M=2M

**ANS : 3**

1. The values of KH for O2 , H2 , He and N2 are 34.86 , 69.16 , 144.97 and 76.48 kbar respectively at 298k .What is the correct order of solublity.
2. O2>H2>He>N2 2) H2>He>O2>N2 **3)O2>He<H2>N2** 4) N2<He<H2<O2

**ANS : 3 , higher the KH value gas is lest soluble**

1. 16g of methanol is present in 100mL of the solution. If the density of the solution is 0.96g/ml the molality of the solution is

1) 6.7 m 2) 6.25m 3) 5.75m **4) 5.2m.**

**ANS : 4 , d = m/v , 0.96x100 = m = 96, molality = = 5.2m**

1. Vapour pressure of pure A is 70 mmof Hg at 270C. It forms an ideal solution with B in which mole fraction of A is 0.8. If the vapour pressure of the solution is 84mm of Hg at 250C then vapour pressure of pure B is
2. 28mm 2) 56mm 3) 70mm **4) 140mm**

**ANS : 4 XB = 1-XA =1-0.8= 0.2, PT = PA0x XA + P0B x XB , 84 = 70 x 0.8 + P0B x 0.2 = 140**

1. Vapour pressure of pure A is 100mmHg, vapour pressure of pure B is 150mmHg. Distillate of vaours of a solution containing 2 moles of A and 3 moles of B will have total vapour pressure, approximately , on condensation.
2. 145mm 2) 130mm 3) 140mm **4) 135mm**

**ANS : 4 Vapours are condenced, hence to determine vapour pressure of the distillate, we**

**take mole fraction of vapours above liquid mxture.YA, YB=mole fractions in vapour phase,**

**XA, XB = mole fraction in liquid phase.**

**YA = PA/PT = P0AXA/P0AXA+P0BXB = = 4/13, YB = 9/13,**

**Ptotal = P0AYA + P0BYB= 100x 4/13+ 150 x9/13 = 1750/13 = 135mm**

1. The total pressure of mixture of 1mol A (PoA = 150torr) and 2 mol B (PoB = 240Torr) is 200 mmHg. In this case
2. There is positive deviation from Raoult’s law
3. **There is negative deviation from Raoult’s law**
4. There is no deviation from Raoult’s law
5. Molecular masses of A and B required.

**ANS : 2 Ptotal = PoAXA + PoB XB= 150x1/3 + 240 x2/3= 210mm**

**210mm>200(given) observed value of total vapour pressure decreased .**

**Hence, there is negative deviation.**

1. Molarity of a given orthophosphoric acid solution is 3M. Its normality is
2. **9N** 2) 0.3N 3) 3N 4) 1N

**ANS : 1 N = n M, N = 3x 3= 9 , Phosphoric acid basicity = 3**

1. An aqueous solution of glucose is 10% in strength. The volume in which 1g mole of it is dissolved will be
2. 18 times **2) 1.8L**  3) 9L 4) 0.9L

**ANS : 2 10g glucose present in 100ml. hence 180g present in = mL=1.8L**

1. In which case Van’t Hoff factor is maximum?

1) KCl, 50% ionised

2) K2SO4, 40% ionised.

**3) FeCl3, 30% ionised**

4) SnCl4, 20% ionised.

**ANS: 3 solute Y(total no. of ions) x(degree of dissociation) i= [1+(Y-1)x]**

**KCl 2 0.5 1.5**

**K2SO4 3 0.4 1.8**

**FeCl3 4 0.3 1.9**

**SnCl4 5 0.2 1.8**

1. Which has minimum osmotic pressure ?

**1)200mL of 2M NaCl solution**.

3) 200mL of 3Mglucose solution.

2) 200mL of 2M urea solution.

4) All have same osmotic pressure.

**ANS: 1 π = iCRT for NaCl π= 2x2RT= 4RT , for glucose π= 1x3RT= 3RT,**

**For urea π= 1 x2RT= 2RT Hence NaCl has maximum π**

1. In certain solvent, phenol dimerises to the extent of 60% . Its observed molecular mass in that solvent should be

**1) >94**  2) =94 3) <94 4) unpredictable.

**ANS: 1 , Due to association no. of particles decreases . thus colligative property decreases and molarmass increases.**

1. The freezing poit(in0C) of a solution containing 0.1g of K3[Fe(CN)6] (mol.wt=329g/mol ) in 100g of water (Kf = 1.86 KKg/mol) is

**1)-2.3 x 10-2**  2) -5.7 x 10-2 3) -5.7x 10-3 4) -1.2 x 10-2

**ANS: 1. Pt = 𝜟Tf = iKfm =iKfw21000/MW1= 4x1.86x1000/329x100 = 2.3 x 10-2,**

**Tf =Tf0- 𝜟Tf= 0 -2.3 x 10-2= -2.3 x10-2**

1. The boiling point of a solution of 0.11g of substance in 15g of ether was found to be 0.10c higher than that of pure ether. The molecular mass of the substance will be ( Kb= 2.16KKg/mol).

1)148 **2) 158**  3) 168 4) 178

**ANS : 2 M2 = 1000Kbw2/ Tbw1 = 1000x 2.16 x 0.11 / 0.1 x 15 = 158.4**

1. A 0.1 molal aqueous solution of a weak acid is 30% ionized. If Kf for water is 1.86KKg/mol. The freezing point of the solution will

1) -0.180C 2) -0.540C 3) -0.360C **4) -0.240C**

**ANS: 4 Given 30%dissociation hence α=0.3, HA H+ + A-**

**1- α α α**

**1- 0.3 0.3 0.3**

**i= 1-0.3+0.3+0.3 =1.3, 𝜟Tf = iKfm=1.3x1.86x0.1=0.2418, Tf = 0-0.2418 = -0.2418**

1. Osmotic pressure of solution is directly proportional to

1) The molecular concentration of the solute.

2) The absolute temperature at a given concentration.

3) The lowering of vapour pressure

**4) All of these.**

**ANS :4**

1. Osmotic pressure of blood is 7.40atm at 270c. Number of moles of glucose to be used per litre for an intravenous injection that is to have the same osmotic pressure as blood, is

1) 0.6 **2) 0.3**  3) 0.1 4) 0.6

**ANS : 2**

**𝜫 = CRT, C= 𝜫/RT= 7.4/(0.082 x 300)= 0.3**

1. The amount of urea to be dissolved in 500mL of water ( kb = 1.86KKg/mol ) to produce a depression of 0.1860c in the freezimg point is

1) 0.3g **2) 3g**  3) 6g 4) 9g

**ANS : 2 Tf = Kb x m , 0.186 = = w2= = = 3**

1. A 5.2% solution of a substance is isotonic with a 1.5% solution of urea (molar mas = 60g/mol) in the same solvent. If the densities of both the solutions are assumed to be equal to 1.0g/cm3 . Molar mass of substance will be

1) 208.0g/mol 2) 90.0g/mol 3) 115.0g/mol 4) 105.0g/mol

Ans:1, osmotic pressure (π) of the isotonic solutions are equal.

For solution of unknown substance C1 (concentration) C1 = no. of moles/ V=

For solution of urea C2 (concentration) C2= no. of moles/ V= ,

Given π1 = π2, hence C1RT = C2RT , = , M = 208g/mol

1. 0.004 M solution of Na2SO4 is isotonic with 0.01 M solution of glucose at same temperature. The apparent degree of dissociation of Na2SO4 is

1) 25% 2) 50% 3) 75% 4) 85%

Ans : 3, π(Na2SO4) = π(glucose), iCRT (Na2SO4) = iCRT (glucose),

iC(Na2SO4) = C ( glucose) ,

i x 0.004 = 0.01 , i = 2.5 , For Na2SO4  2Na+ + SO42-

1-α 2α α

i= (1-α+2α+α0/1 =1+2α

i = 1+ 2α , 2.5 = 1+2α , 2α= 2.5-1, α= 0.75 , hence degree of dissociation is 75%

1. FeCl3 on reaction with K4[Fe(CN)6] in aqueous solution gives blue colour. These are separated by a semipermeable membrane(SPM). Due to osmosis there is 0.1M K4[Fe(CN)6] side X SPM 0.01MFeCl3 sideY

1)Blue colour formation in side X 3) Blue colour formation in both sides X &Y

2)Blue colour formation in side Y 4) No blue colour formation.

Ans : 4, Osmosis of the solvent(H2O) and not of ions takes place. Hence, no colour

Change appears.

1. At fixed temperature and 600 mm pressure, the density of gas is 42. At the same temperature and 700 mm pressure, what is the density of the gas?

1) 49 2) 38 3) 67 4) 70

**Ans: (1) P 1/V**

**d mass/volume P d**

**P1/d1 = P2/d2**

**d2 = P2 × d1/P1**

**d2 = 700 × 42 / 600 = 49**

1. Vapour densities of O2 and CH4 are 32 and 16 respectively. The ratio of rate of diffusion of CH4 to that of O2 is

1) :1 2) 1: 3) 2:1 4) 1:2

**Ans: (1)**

**= =**

1. What weight of hydrogen at STP could be contained in a vessel that holds 4.8 g oxygen at STP?

1) 4.8 g 2) 3 g 3) 0.6 g 4) 0.3 g

**Ans: (4)**

**4.8 g O2 = 4.8/32 mol= 4.8×2/32 = 0.3 g**

1. Surface tension of water is 73 dyne cm-1 at 200 C. If surface area is increased by 0.1m2, work done will be

1) 73 ergs 2) 730 ergs 3) 7300 ergs 4) 73000 ergs

**Ans: (4)**

**Work done = surface tension ×increase in surface area = 73dynecm-1×0.1×104 cm2 =7.3×104 dynecm = 7.3×104ergs**

1. If collision frequency at 1 atm is Z, then its collision frequency at 05 atm is

1) 0.25 Z 2) 0.50 Z 3) Z 4) 2Z

**Ans: (1)**

**Z α P2**

1. Which of the following property of water can be used to explain the spherical shape of rain droplets

1) Viscosity 2) surface tension 3) critical phenomena 4) pressure

**Ans: (2)**

1. Equal weights of methane and hydrogen are mixed in an empty container at 250 C. The fraction of the total pressure exerted by hydrogen is

1) 1/2 2) 8/9 3) 1/9 4) 16/17

**Ans: (2)**

**Partial pressure of hydrogen/total pressure = mole fraction of hydrogen**

**=( x/2)/(x/2 +x/16) = 8/9**

1. The temperature of a gas is increased from 50 to 510 C at the same pressure. The volume of the gas

1) remains same

2) Will increase by 1/273th of its volume at 273 K

3) Will increase by 1/273th of its volume at 500 C

4) Will increase by an amount 50/51 × 1/273

**Ans: (2)**

1. Ideal gas equation in terms of KE per unit volume, E is

1) RT 2) E 3) RT 4) E

**Ans: (2)**

**KE = RT**

**PV = RT =**

1. What is the average speed of a molecule, having a molecular mass of 529.5 g mol-1 at temperature 100 K?

1) 1 2) 2 3) 3 4) 4

**Ans: (2)**

**uav = = = 2**

1. Average volume available to a molecule in a sample of a gas at STP is

1) 1.66×10-24 cm3 2) 3.72×10-20 cm3 3) 22,400 cm3 4) unpredictable

**Ans: (2)**

**Volume available per molecule = 22400/6.022×1023**

1. NH3 gas is liquefied more easily than N2. Hence

1) Vander Waals constants a and b of NH3 > that of N2

2) Vander Waals constants a and b of NH3 < that of N2

3) a(NH3)>a(N2) but b(NH3)<b(N2)

4) a(NH3)<a(N2) but b(NH3)>b(N2)

**Ans: (3)**

**Gases which can be liquefied easily have high a and low b value**

1. The temperature to which the gas must be cooled before it can be liquefied by compression is called

1) Boyle’s temperature 2) Critical temperature

3) Liquefaction temperature 4) Inversion temperature

**Ans: (4)**

1. The rate of diffusion of methane is twice that of x. The molecular mass of X is divided by 32. What is value of x?

1) 1 2) 2 3) 3 4) 4

**Ans: (2)**

**r= = = 2rx/ rx =**

**Mx = 64**

**x = Mx/32 = 64/32 =2**

1. 5 g of He at 270C is subjected to a pressure change from 0.5 atm to 2 atm. The initial volume of the gas is 10dm3. The change in the volume in dm3 of gas is

1) 4 2) 7.5 3) 5 4) 6.5

**Ans: (2) V2 = P1V1/P2 = (0.5×10)/2 = 2.5 dm3**

**ΔV=V1-V2 = 10-2.5 = 7.5 dm3**

1. The temperature at which the volume of a given amount of gas at 250C becomes twice when pressure is kept constant

1) 3250C 2) 3240C 3) 3220C 4) 3230C

**Ans: (4)**

**T2 = V2T1/V1 = 298×2V/V = 596 K**

**596-273 = 3230C**

1. Initial volume of a gas is 1L at temperature 100 K. What is the volume of a gas in L at 300 K?

1) 1 2) 2 3) 3 4) 4

**Ans: (3)**

**V1/T1 = V2/T2**

**V2 = 1×300/100 = 3**

1. A cylinder containing cooking gas can withstand a pressure of 15 atm. The pressure gauge indicates 12 atm at 270 C. Due to sudden fire in the building, the temperature starts rising. The temperature at which cylinder explode

1) 375 K 2) 376 K 3) 150 K 4) 250 K

**Ans: (2)**

**T1= =15×300/12 = 375 K Cylinder will burst above 375 K**

1. Which of the following pair of gases will diffuse at the same rate through the porous plug

1) CO, NO2 2) NO, C2H6 3) NO2, CO2  4) NH3, PH3

**Ans: (2) Due to same molecular mass**