Today's Goal

Colligative Properties

Colligative Properties

Definition

Properties depend on the number of solute particles irrespective of their nature relative to the total number of particles present in the solution. Such properties are called colligative properties (Colligative : From Latin : co – means together, ligate – means to bind)

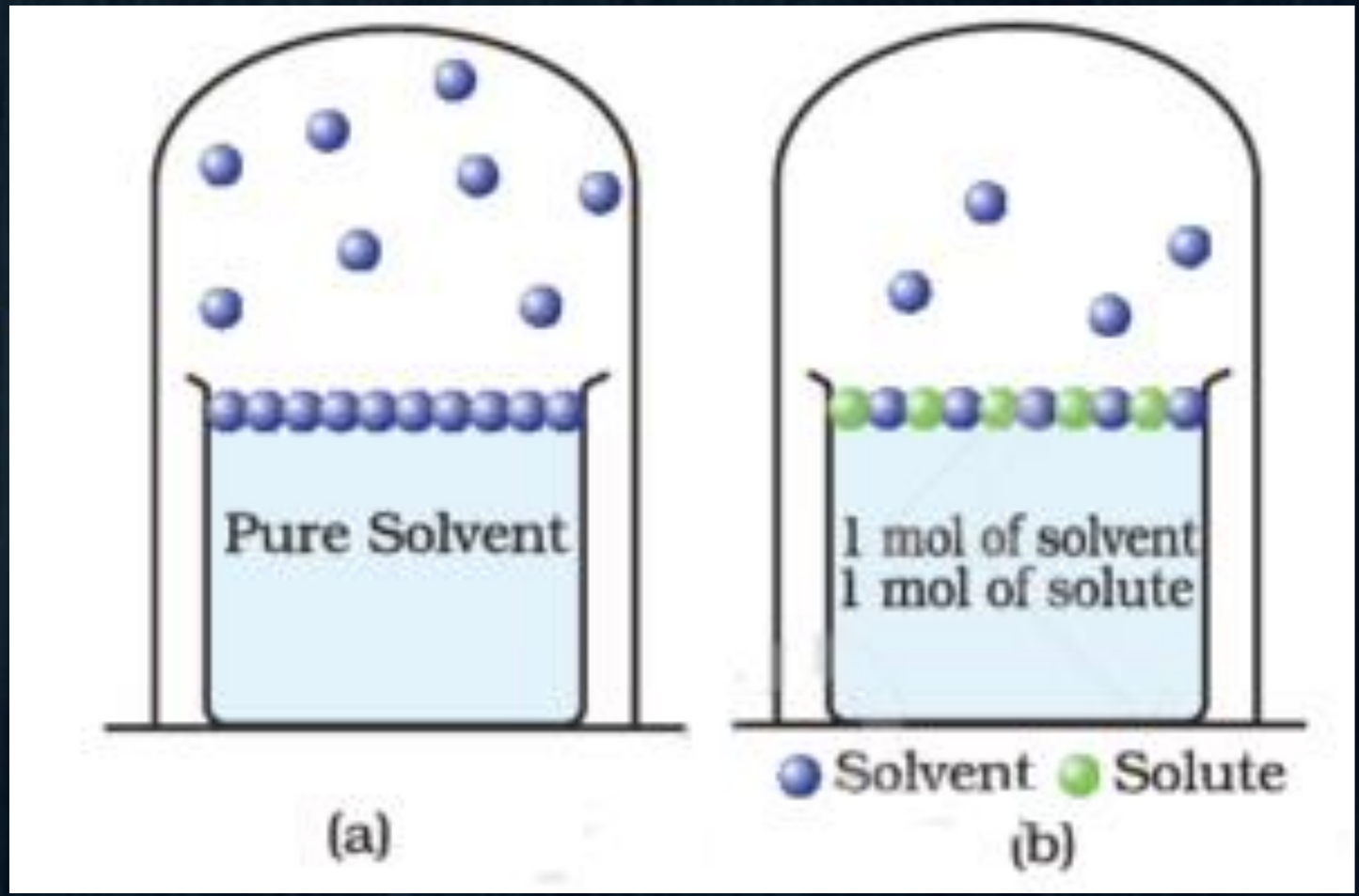
1. Relative Lowering in V.P (RLVP)
2. Elevation in Boiling Point (EBP)
3. Depression in Freezing point (DFP)
4. Osmotic Pressure (OP)

RLVP

Relative Lowering of Vapour Pressure (R.L.V.P)

When Non-volatile Solute is added to volatile Solvent Vapour Pressure decreases

Conceptually :



Some examples of Non-volatile Solutes : NaCl, Glucose, Fructose, Sucrose, Urea etc.

Mathematically :

Q

Calculate V.P of Solution. The mole fraction of the solute is 0.25. The vapour pressure of pure solvent is 0.8 atm?

A 0.2 atm

B 0.8 atm

C 0.6 atm

D 0.4 atm

Ostwald – Walker Method

It is used to determine R.L.V.P

Based on Le Chatelier’s Principle

Q

Dry air was passed through a solution of 5gm of solute in 90gm of water and then it is passed through pure water. Loss in weight of solution was 2.5 gm, loss in weight of pure water was 0.04 gm. Find M.W of solute?

A 62.5 gm/mol

B 100 gm/mol

C 145 gm/mol

D 98 gm/mol

Q

6.0g of urea (molecular weight = 60) was dissolved in 9.9 moles of water. If the vapour pressure of pure water is P^o , the vapour pressure of solution is :

A. 0.10 P^o

B. 1.10 P^o

C. 0.90 P^o

D. 0.99 P^o

Q

An ideal solution was found to have a Vapour pressure of 80 torr when the mole fraction of a non-volatile solute was 0.2. What would be the vapour pressure of the pure solvent at the same temperature?

A 64 torr

B 80 torr

C 100 torr

D 400 torr

Q

The vapour pressure of an aqueous solution of sucrose at 373K is found to be 750 mm Hg. The molality of the solution at the same temperature will be :

A 0.26

B 0.73

C 0.74

D 0.039

Q

Estimate the lowering of vapour pressure due to the solute (glucose) in a 1.0 m aqueous at 100°C :

A 10 torr

B 18 torr

C 13.45 torr

D 24 torr

Q

Calculate the weight of non-volatile solute having molecular weight 40, which should be dissolved in 57gm octane to reduce its vapour pressure to 80% :

A 47.2 g

B 5 g

C 106.2 g

D Mai Chomu hu bhaiya aap Nikal do

Q Which of the following is not a colligative property ?

A Vapour pressure

B Depression of Freezing point

C Elevation in Boiling Point

D Osmotic Pressure