

**CHAPTER-SOLUTIONS**

**(LECTURE-19)**

**DATE-18.07.20**

**EXPERIMENTAL MEASUREMENT OF OSMOTIC PRESSURE**

**DETERMINATION OF MOLAR MASS FROM OSMOTIC PRESSURE**

**ISOTONIC SOLUTIONS**

**HYPERTONIC SOLUTIONS**

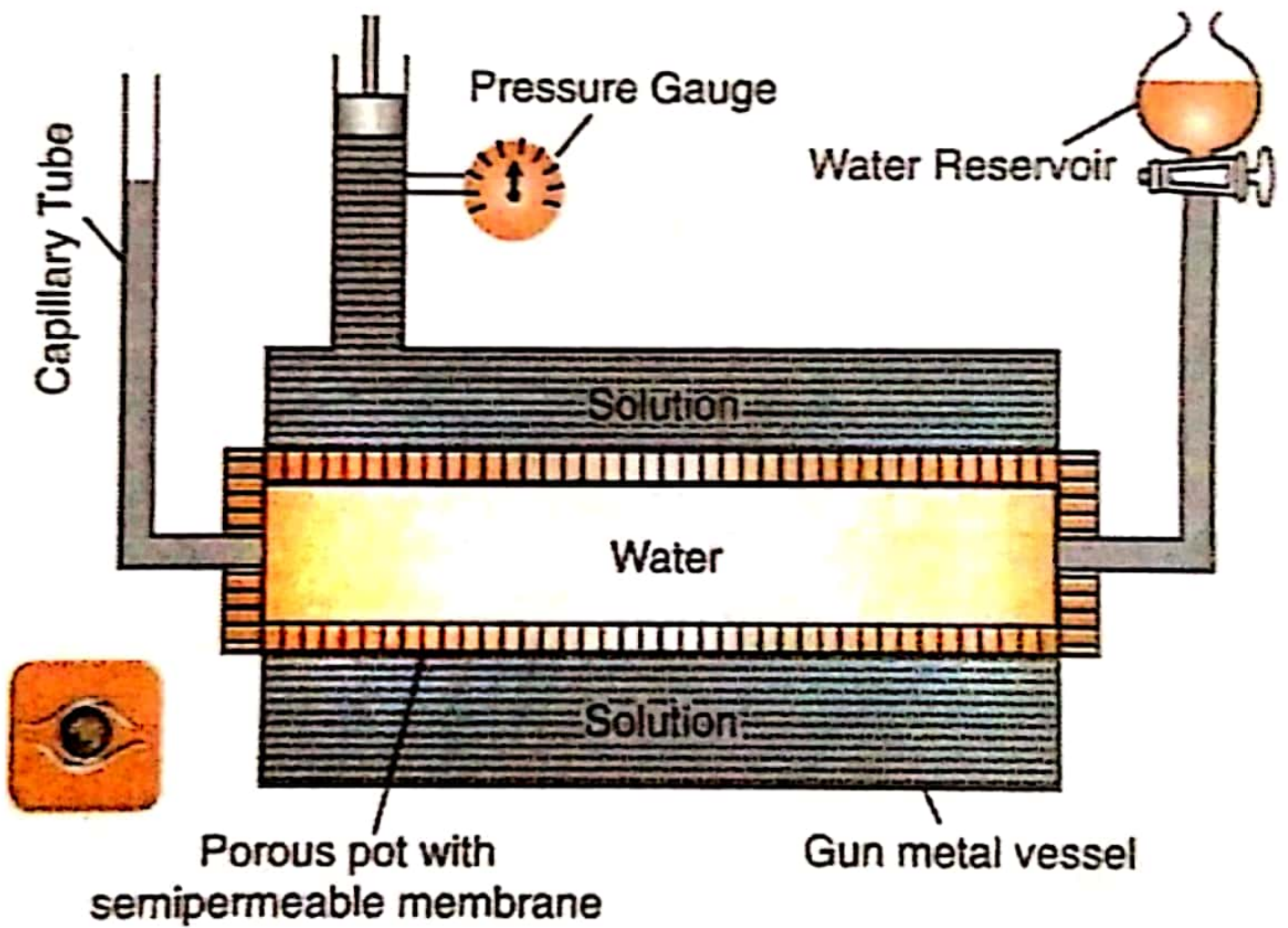
**HYPOTONIC SOLUTIONS**

**REVERSE OSMOSIS**

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**Fig. 18.** Berkely and Hartley apparatus for measuring osmotic pressure.

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## etermination of Molar Mass from Osmotic Pressure

According to Van't Hoff equation,

$$\pi = cRT$$

But

$$c = \frac{n}{V}$$

where  $n$  is the number of moles of solute dissolved in  $V$  litre of the solution.

$$\therefore \pi = \frac{n}{V} RT$$

$$\text{or } \pi V = nRT \quad \dots(21)$$

This equation is called Van't Hoff equation for dilute solutions.

The number of moles of solute  $n$  may be given as  $\frac{w_B}{M_B}$ . Here  $w_B$  is the weight of the solute and  $M_B$  is its molar mass.

Substituting the value of  $n$  in the above expression,

$$\pi = \frac{w_B RT}{VM_B} \quad \text{or} \quad M_B = \frac{w_B RT}{V\pi}$$

Thus, the molar mass of the solute,  $M_B$ , can be calculated.

ons for Getting Accurate Value of Molar Mass

## On the basis of osmotic pressure, -the solution can be

(i) **Hypertonic solution** A solution is called hypertonic if its osmotic pressure is higher than that of the solution from which it is separated by a semipermeable membrane.

When a plant cell is placed in a hypertonic solution, the fluid from the plant cell comes out and cell shrinks, this phenomenon is called plasmolysis.

(ii) **Hypotonic solution** A solution is called hypotonic if its osmotic pressure is lower than that of the solution from which it is separated by a semipermeable membrane.

(iii) **Isotonic solution** Two solutions are called isotonic if they exert the same osmotic pressure. These solutions have same molar concentration. 0.91% solution of pure NaCl is isotonic with

## isotonic solution

Two solutions are isotonic if they have the same molar concentration, e.g., if x % solution of X is isotonic with y % solution of Y, this means molar concentration of X = Molar concentration of Y

Osmotic pressure method is the best method for determining the molecular masses of polymers since observed value of any other colligative property is too small to be measured with reasonable accuracy.