**Osmotic Presure**

**\*\*\*\*Process of osmosis**

Diffusion of a solvent (usually water molecules) through plasma

membrane from an area of low solute concentration to an area of

high solute concentration.

Tendency of water to flow from a hypotonic solution (low concentration of dissolved substances) to hypertonic solution (higher concentration of dissolved substances) across a semipermeable membrane(plasma membrane).

**Hypotonic:** A medium where solute concentration on the outside of the

cell are lower than the cytoplasm. May lead to plasmoptysis (the

bursting forth of protoplasm from a cell through rupture of the cell

wall).

**Isotonic:** Environments where the solute concentration is the same inside

and outside the cell.

**Hypertonic:** Environments exist when the solute concentration greater on

the outside of the cell relative to the cytoplasm and this causes water to

diffuse out of the cytoplasm. When this develops, the cell undergoes

plasmolysis resulting in a loss of water , dehydration of the cytoplasm,

and shrinkage of the cell membrane away from the cell wall. In these

situations, considerable and often irreversible damage can occur to the

metabolic machinery of the cell.

Microorganisms can be grouped based on their ability to cope with high

osmotic pressure:

1. **Halophiles:** require high concentrations of sodium chloride to grow.

examples are the halophilic bacteria that require 15-30% sodium chloride

to grow and maintain integrity of their cell walls.

1. **Halotolerant:** are capable of growth in moderate concentrations of salt.

For example Staphylococcus aureus can tolerate sodium chloride

concentrations that approach 11%.

1. **Osmophiles:** which are able to grow in environments where sugar

concentrations are excessive.( require high solute concentrations for

growth).

**Procedure of Osmotic Pressure:**

1-*E.coli* bacteria cultivate on nutrient broth at a temperature of 37°C for

24 hours (*E.coli* bacteria can tolerate NaCl concentration that approach 2-

5%).

2-Serial dilutions are prepared taken from the previous cultural media and

works a series of dilution by placing 9 ml of distilled water in test tubes

and added 1 ml to the previous tube and thus operate the other dilution.

3-Taken last diluted and 3 ml divided to three clean test tubes containing

a-The first tube is added 1ml to neutral solution **(Isotonic)** from normal

Saline which is the concentration of sodium chloride in it (0.85-0.90) because its Osmotic Pressure equal to the pressure cell.

b-The second tube is added 1ml to **(Hypotonic)** solution of distilled water

because it’s the Osmotic Pressure much less from pressure the cell which

leads to the entry of water into the bacterial cell and can swelling occurs

this phenomenon is called **plasmoptysis.**

c-The third tube is added 1 ml to **(Hypertonic)** solution of high salt

concentration (NaCl= 8%) because it’s the Osmotic Pressure higher from

pressure the cell which leads to the pulling of water from the bacterial

cell and Shrinkage occurs this phenomenon is called **plasmolysis.**

4-The three tubes are incubated by incubator for one hour.

5-Taken 0.1 ml inoculums from each three tubes and is transferred onto

the nutrient agar surface in the plate and is spread.

6-The three plates are incubated by incubator at a temperature of 37°C for

24 hours and read results.***ty***