

Difference Between Endosmosis and Exosmosis

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Key Difference - Endosmosis vs Exosmosis

In the context of movement of water within biological systems, osmosis takes an important place. It is a process where water moves across the cell membrane according to a water potential gradient that is built across the cytosol of the cell and the surrounding environment. Osmosis is a process of passive diffusion. Depending on the direction of the movement of water, osmosis is subdivided into two groups; endosmosis and exosmosis. **In endosmosis, water moves into the cell via the cell membrane. In exosmosis, water moves out from the cell via the cell membrane.** This is the **key difference** between endosmosis and exosmosis.

What is an Endosmosis?

In endosmosis, movement of water molecules occurs from the surrounding environment into the cell due to a difference in water potential along the cell membrane. The water potential of the surrounding environment is higher than the water potential within the cell in endosmosis. In simple terms, endosmosis is the movement of water into the cell through a semi-permeable cell membrane. Concerning the solute concentrations, cell cytosol has a higher solute concentration than the cell surrounding. The difference in water potential and the difference in solute concentrations involve in building up of a potential gradient that results in endosmosis.

Endosmosis could be induced when the cell is placed in a hypotonic solution. A hypotonic solution means a solution that contains a lower osmotic pressure with regards to another solution. A hypotonic solution has a low solute concentration and high water potential. Endosmosis results in making the cell swollen. This condition is known as cell turgidity. Endosmosis is an important biological phenomenon in the context of absorption of water by plant roots.

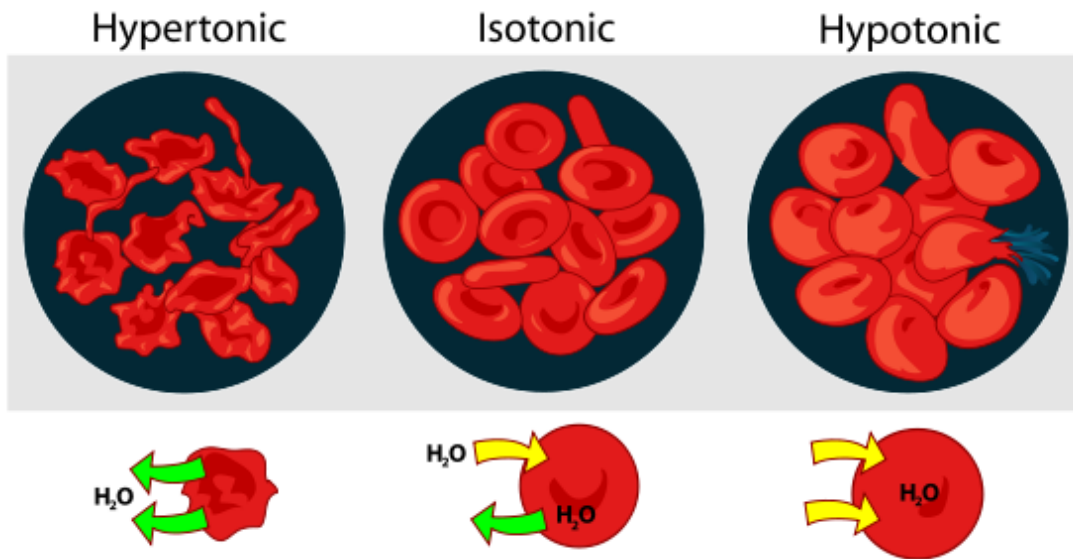


Figure 01: Endosmosis of Red Blood Cells

Absorption of capillary water that is present in the soil by root hair cells and movement of water into the xylem vessels are the best examples for endosmosis. If the cell experiences continuous endosmosis it leads to cell bursting. But normal cellular mechanisms prevent the occurrence of such phenomena.

What is an Exosmosis?

In exosmosis, water that is present in the cytosol is moved out from the cell due to a water potential gradient built across the cell and the surrounding environment. Here, the water potential of the cell is said to be higher concerning the surrounding environment. Therefore, water moves from the place of higher water potential (cell cytosol) to a place of lower potential (solution). Exosmosis in simple terms is the movement of water out from the cell. During exosmosis, the solute concentration in the cell is lower than the outside environment. Both factors such as the difference in water potential and solute concentration cause the built up of a potential gradient and finally results in the occurrence of exosmosis in a cell.

Shrinkage of cells occurs due to the movement of water out from the cell. Cell shrinkage could be induced by placing the cell in a hypertonic solution which is a type of solution that has a lower water potential due to the presence of high solute concentration. Therefore, it possesses a high osmotic pressure.

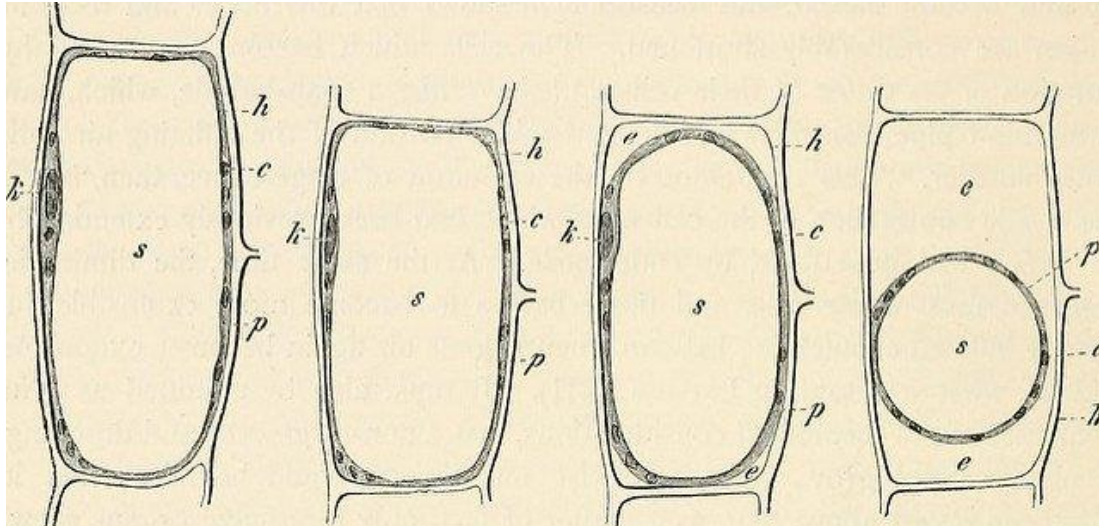


Figure 02: Exosmosis

Cell shrinkage depends on the type of isotonic solution that it is placed. If it is a strong hypertonic solution, water will be moved out from the cell in larger quantities and causes for the cell death due to dehydration. This condition is defined as plasmolysis. The movement of water molecules from the cell of the root hairs to the cells of the root cortex is an example for exosmosis that takes place within a plant body.

What are the Similarities Between Endosmosis and Exosmosis?

- Both processes are types of osmosis.
- During both processes, movement of water molecules happens across the cell membrane.

What is the Difference Between Endosmosis and Exosmosis?

Endosmosis vs Exosmosis	
Movement of water molecules from the outside environment (higher water potential and lower solute concentration) into the cell (Lower water potential and higher solute concentration) across the cell membrane is known as endosmosis.	Movement of water molecules from the cell (higher water potential and lower solute concentration) into the outside environment (lower water potential and higher solute concentration) across the cell membrane is known as exosmosis.
Movement of Water	
Water moves into the cell in endosmosis.	Water moves out from the cell in exosmosis.
Type of Solution	
Endosmosis occur when the cell is placed in a hypotonic solution.	Exosmosis occurs when cells are placed in a hypertonic solution.

Examples

The movement of water from the soil into the root hair cells is one example for endosmosis.

The movement of water from root hair cells to cortical cells of the root is one example for exosmosis.

Summary - Endosmosis vs Exosmosis

Osmosis is a type of passive diffusion process. It is the process of movements of water molecules from a region with high water potential to a region with low water potential across a semi-permeable membrane. There are two types of osmosis: endosmosis and exosmosis. Endosmosis is the movement of water from the surrounding environment into the cell according to a difference in water potential along a potential gradient. In endosmosis, the water potential of the surrounding environment is higher than the water potential within the cell. Cell cytosol has a higher solute concentration than the cell surrounding. Absorption of capillary water that is present in the soil by root hair cells and movement of water into the xylem vessels are the best examples for endosmosis. Endosmosis could be induced when the cell is placed in a hypotonic solution such as distilled water etc. Exosmosis is the process of moving water molecules from the cell to the cell surrounding. Here, the water potential of the cell is said to be higher concerning the surrounding environment. Exosmosis could be induced by placing the cell in a hypertonic solution. The movement of water molecules from the cell of the root hairs to the cells of the root cortex is an example for exosmosis. Both processes involve the movement of water molecules across the cell membrane. This is the difference between endosmosis and exosmosis.

Reference:

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