

In osmosis, it is only water that moves, in the following direction: - from a region of high water concentration to a region of lower water concentration

- from a region of high water concentration to a region of lower water concentration
- from a more dilute solution to a more concentrated one
- from a "weaker" solution to a "stronger" one
- from a hypotonic to a hypertonic solution.

Plasmolysis –

If a plant does not get enough water, then its cells may become PLASMOLYSED due to water leaving the vacuole. When the cell contents peel away from the cell wall the cell membrane becomes visible (under the microscope), and the plant wilts.

The principle of osmosis is used in the preservation of food, kept in strong solutions of salt (brine), or sugar (syrup), any bacteria which gain access to the food become plasmolysed as above, and are effectively killed by dehydration!

Osmosis is the passage of water from a region of high water concentration through a semi-permeable membrane to a region of low water concentration.

The definition contains three important statements:

1. Osmosis is **the passage of water** from a region of high water concentration **through a semi-permeable membrane** to a region of low water concentration.
2. Osmosis is **the passage of water from a region of high water concentration** through a semi-permeable membrane to a region of low water concentration.

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Firstly what happens to plant cells:

Plant cells always have a strong cell wall surrounding them. When they take up water by osmosis they start to swell, but the cell wall prevents them from bursting. Plant cells become "turgid" when they are put in dilute solutions. Turgid means swollen and hard. The pressure inside the cell rises, eventually the internal pressure of the cell is so high that no more water can enter the cell. This liquid or hydrostatic pressure works against osmosis. Turgidity is very important to plants because this is what makes the green parts of the plant "stand up" into the sunlight.

When plant cells are placed in concentrated sugar solutions they lose water by osmosis and they become "flaccid"; this is the exact opposite of "turgid". If you put plant cells into concentrated sugar solutions and look at them under a microscope you would see that the contents of the cells have shrunk and pulled away from the cell wall: they are said to be plasmolysed.

When plant cells are placed in a solution which has exactly the same osmotic strength as the cells they are in a state between turgidity and flaccidity. We call this incipient

plasmolysis. "Incipient" means "about to be". When I forget to water the potted plants in my study you will see their leaves droop. Although their cells are not plasmolysed, they are not turgid and so they do not hold the leaves up into the sunlight.

Osmosis and turgidity

Osmosis is very important in root hair cells. Providing that the soil is moist, it is possible for water to enter the root hair by osmosis. (See my [Osmosis Page](#) if you have forgotten about this.) Water passes from a region of high water concentration (wet soil) through a semi-permeable membrane (the cell membrane) to a region of lower water concentration (the cytoplasm). This makes the cell turgid. As these cells develop they absorb water by osmosis and the hair can be pushed between soil particles.

The most important thing to remember about root hairs is that they increase the surface area between the root and the soil: this is necessary for the absorption of water and mineral salts.