

Solution, Hypotonic Encyclopedia Article

Solution, Hypotonic

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Solution, Hypotonic

A solution is hypotonic if it tends to lose water to a reference solution (or colloidal suspension) separated from it by a semipermeable membrane. This usually results from of a lower concentration of dissolved or dispersed substances (and a higher effective concentration of water) in the hypotonic solution. The membrane is assumed to be freely permeable to the solute (water) but impermeable, or nearly so, to substances in solution or suspension in the two fluids. If a living cell is immersed in a hypotonic solution, water will move into the cell from the solution, causing the cell to expand. Animal cells may eventually burst if they are unable to contain all of the incoming water. Plant cells, with a rigid cell wall, will exert turgor pressure on the wall that normally will be balanced by a counteracting wall pressure, and the cell is said to be fully turgid. Microorganisms such as amebas and paramecia, which live in pond water that is hypertonic to their intracellular fluid, have evolved contractile vacuoles that are able to collect excess water from the protoplasm and pump it to the outside. Without this mechanism, the cells would quickly burst from the pressure developed by the entering water. This pumping mechanism requires energy, and the entering water will destroy cells that are poisoned, or for some other reason lose their ability to actively metabolize.