

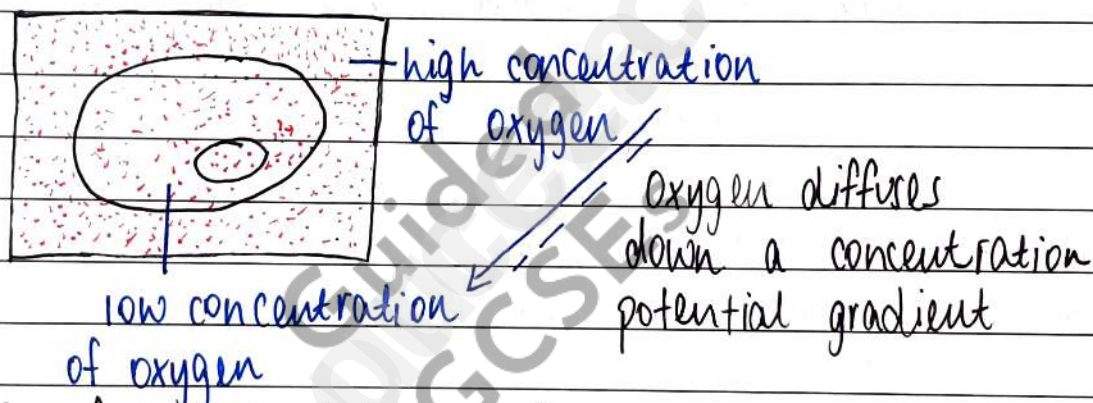


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B2 MOVEMENT IN & OUT OF CELLS

B2.01 Diffusion

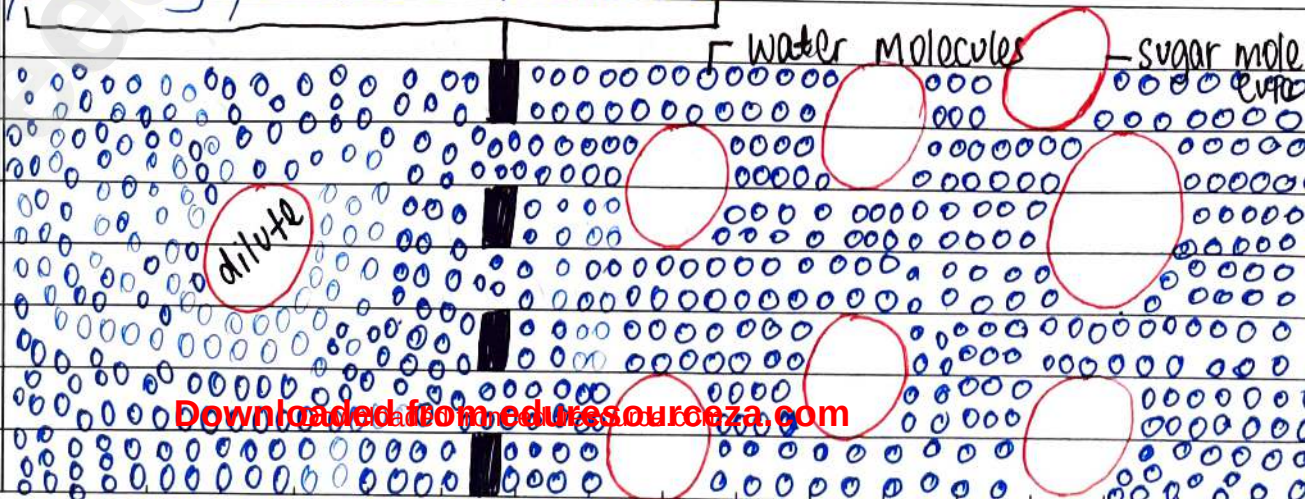
Diffusion the net movement of molecules and ions from a region of their higher concentration to a region of their lower concentration down a concentration gradient, as a result of their random movement.



* Size of molecule, distance, surface area, temperature, concentration gradient.

B2.02 Osmosis

Osmosis is the net movement of water molecules from a region of higher water potential to a region of lower water potential, through a partially permeable membrane.



- On the right hand side, the concentration of water molecules is lower because a lot of space is taken up by sugar molecules.
- Because there are more water molecules on the left-hand side, at any one moment more of them will 'hit' a hole in the membrane and move through to the other side, overtime, there will be net movement of water from left to right. This is called osmosis.
- Solute particles cannot pass through the membrane.

Water potential ↓

- We say that a dilute solution has a high water potential. Whereas, a concentrated solution has a low water potential.

Cell Membranes

- Behave much like a visking tube.
- They allow some substances to pass through. They are partially permeable membranes.
- There is always cytoplasm on a side of the cell membrane. It is a solution of proteins and other substances in water.
- Cell membranes separate two different solutions - cytoplasm & solution around cell.
- If separated solutions are of different concentrations, osmosis will then occur.

Pure water
outside cell

Cell Membrane

More concentrated
solution inside cell

Osmosis takes place. Water diffuses into the cell through the partially permeable cell membrane.

Animal cells burst in pure water.

More and more water enters the cell, it swells.

Concentrated
solution outside cell

Cell
Membrane

More dilute
solution inside cell

Osmosis takes place. Water diffuses out of the cell through partially permeable cell membrane.

Animal cells shrink in a concentrated solution.

The cell shrivels up.



→ This condition is said to be turgid. The outward pressure of cytoplasm on the cell wall is called turgor pressure.

The turgidity of the cell helps a plant that has no wood in it to stay upright and keep the leaves firm.

→ Plant cells are usually turgid.

Plant cells become swollen and firm in pure water.

Osmosis takes place. Water diffuses into cytoplasm and vacuole through partially permeable cell surface membrane.

The cell swells and becomes firm.

Plant cells lose water by osmosis. The cytoplasm shrinks and stops pushing outwards on the cell wall.

The cell becomes floppy.

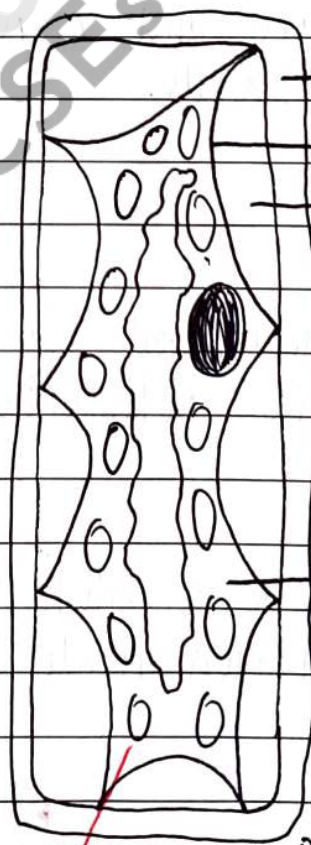
It is said to be flaccid.

The cell begins to lose its firmness and will wilt.

If the solution is very concentrated, then lot of water will diffuse out.

The cell membrane will tear.

This is plasmolysis.



cell wall
cell membrane
Space X

Concentrated solution outside cell

less concentrated solution inside cell

Plant cells become flaccid and may plasmolyse.

Osmosis takes place. Water diffuses out of

cytoplasm and vacuole through the partially permeable cell membrane. — concentrated solution —