**B2 CELLS**

**2.2 Movement into & out of Cells**

1. **Define Diffusion.**

Diffusion is the net movement of molecules 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.

1. **Describe the importance of diffusion of gases and solutes and of water as a solvent.**

Factors that help diffusion are as follows:

* Distance (the shorter the better) e.g. thin walls of alveoli and the capillaries.
* Concentration gradient (the bigger the better). This can be maintained by removing the substance as it passes across the diffusion surface.
* Size of the molecules (the smaller the better).
* Surface area for diffusion (the larger the better) e.g. there is millions of alveoli in a lung, giving a huge surface area for diffusion of oxygen.
* Temperature (molecules have more kinetic energy at higher temperatures).

Importance of diffusion of gases and solutes:

|  |  |
| --- | --- |
| **Substance diffused** | **Site of diffusion** |
| Oxygen | From the alveoli into blood capillaries |
| Carbon dioxide | From blood capillaries into the alveoli.  From air, through stomata & into the leaf for photosynthesis. |
| Soluble products of digestion | From small intestine to the blood capillaries. |
| Scent made of tiny molecules | From flowers into the bee’s body. |

Importance of water as a solvent:

* Most cells contain about 75% of water;
* Many important metabolic reactions take place in aqueous solution;
* Many substances move around a cell dissolved in water (and also around organisms, e.g. in blood, xylem & phloem).

1. **Define Osmosis**

Osmosis is the diffusion of water molecules from a dilute solution to a more concentrated solution through a partially permeable membrane.

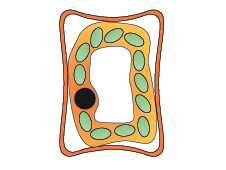
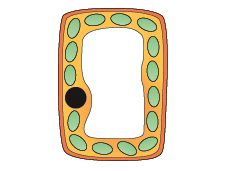
1. **Describe the importance of osmosis in the uptake of water by plants, and its effect on plant and animal tissues.**

*Importance of osmosis in the uptake of water by plants:*

* Usually, the water in the soil is more dilute than that in root hair cells
* So water enters root hair cells by osmosis (a passive process – requiring no energy)

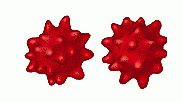
*Effects of osmosis on plant and animal tissues:*

* When placed in pure water, plant and animal cells will take in the water by osmosis;
* This is because there is a higher concentration of water molecules outside the cell than inside it;
* Plants become **turgid**, but do not burst because of their tough cell wall;
* Animal cells will **burst**, because they have no cell wall;
* The reverse happens when plant and animal cells are placed in a concentrated sugar or salt solutions. This is because there is a higher concentration of water molecules inside the cell than outside it;
* Plant cells become **flaccid** and the cytoplasm is no longer pressed against the cell wall;



Turgid plant cell Flaccid plant cell

* Animal cells also become flaccid and their shape changes- they can become **crenated**.

RBC burst Crenated RBC

1. **Describe and explain the importance of a water potential gradient in the uptake of water by plants.**

* Water potential is the correct term for saying ”water concentration” a high water potential is equivalent to a low solute concentration and vice versa;
* For plants to take in water through their roots they must have a high solute concentration or low water potential in the roots and low solute concentration or high water potential outside the roots.
* In osmosis, water molecules diffuse down a water potential gradient.