

Very small molecules and molecules that dissolve in lipids can easily pass through the bilayer. Water-soluble substances must pass through pores in protein molecules throughout the membrane.

Some proteins move freely in the bilayer of the membrane and others are attached to the cell surface membrane and structures in the cytoplasm.

Functions of membrane proteins:

- Enzymes that can digest carbohydrates found in the cell surface membrane of epithelial cells that line the small intestine.
- Carrier proteins that transport substances into and out of the cell.
- Receptors for hormones.

Carbohydrates are attached to lipids and proteins of cell surface membrane to form glycolipids and glycoproteins. These allow cells to recognise one another.

Diffusion

The movement of molecules from a high concentration to a low concentration. They move down a concentration gradient.

Rate of diffusion – the amount diffused through a surface divided by time taken.

Factors that affect rate of diffusion:

- Temperature – the higher the temperature the more kinetic energy the molecules have which means that they move at a faster rate, increasing the rate of diffusion.
- Surface area – larger the surface area the faster the rate of diffusion.
- Concentration gradient – the steeper the concentration gradient the faster the rate of diffusion.
- Thin exchange surface – this increases the rate of diffusion too.

Facilitated Diffusion

Molecules, like glucose, cannot pass through the bilayer alone so they need to be moved across by carrier proteins. Carrier proteins have a binding site on the surface with a specific shape. Diffusing molecules, like glucose, bind to the carrier protein – the protein changes shape and takes the molecule through the membrane.

Water potential and Osmosis

Water molecules move around randomly and some of them will hit the membrane; this collision creates pressure on the membrane. Pressure = water potential.

The more water molecules, the greater the water potential. Distilled water is the highest water potential of 0. All other values have a negative value.

Cell surface membrane separates cytoplasm of the cell from surrounding water. Cell surface membrane is partially permeable – this allows smaller molecules to pass through but not larger ones. Cytoplasm contains many soluble molecules and ions – they attract water to form a shell around them, these water molecules can no longer freely move. Now the water potential is higher outside the cell so water will move via osmosis into the cell.

Osmosis is the net movement of water from a high to low water potential through a partially permeable membrane.