

OCR (A) Biology A-level

2.1.5 - Biological membranes

Flashcards

This work by [PMT Education](https://www.pmt.education) is licensed under [CC BY-NC-ND 4.0](https://creativecommons.org/licenses/by-nc-nd/4.0/)



Describe the fluid mosaic model of membranes.



Describe the fluid mosaic model of membranes.

Fluid: phospholipid bilayer in which individual phospholipids can move = membrane has flexible shape.

Mosaic: extrinsic & intrinsic proteins of different sizes and shapes are embedded.



Explain the role of cholesterol & glycolipids in membranes.



Explain the role of cholesterol & glycolipids in membranes.

Cholesterol: steroid molecule in some plasma membranes; connects phospholipids & reduces fluidity to make bilayer more stable.

Glycolipids: cell signalling & cell recognition.



Explain the functions of extrinsic proteins
in membranes.



Explain the functions of extrinsic and transmembrane proteins in membranes.

- Binding sites/ receptors e.g. for hormones & drugs
- Antigens (glycoproteins)
- Bind cells together
- Involved in cell signalling



Explain the functions of intrinsic transmembrane proteins in membranes.



Explain the functions of intrinsic transmembrane proteins in membranes.

- Electron carriers
(respiration/photosynthesis).
- Channel proteins (facilitated diffusion).
- Carrier proteins (facilitated diffusion / active transport).



Explain the functions of membranes within cells.



Explain the functions of membranes within cells.

- Provide internal transport system.
- Selectively permeable to regulate passage of molecules into / out of organelles or within organelles.
- Provide reaction surface.
- Isolate organelles from cytoplasm for specific metabolic reactions.



Explain the functions of the cell-surface membrane.



Explain the functions of the cell-surface membrane.

- Isolates cytoplasm from extracellular environment.
- Selectively permeable to regulate transport of substances.
- Involved in cell signalling / cell recognition.



Name and explain 3 factors that affect membrane permeability.



Name and explain 3 factors that affect membrane permeability.

- **Temperature:** high temperature denatures membrane proteins / phospholipid molecules have more kinetic energy & move further apart.
- **pH:** changes tertiary structure of membrane proteins.
- Use of a **solvent:** may dissolve membrane.



Outline how colorimetry could be used to investigate membrane permeability.



Outline how colorimetry could be used to investigate membrane permeability.

1. Use plant tissue with soluble pigment in vacuole. Tonoplast & cell-surface membrane disrupted = \uparrow permeability = pigment diffuses into solution.
2. Select colorimeter filter with complementary colour.
3. Use distilled water to set colorimeter to 0. Measure absorbance / % transmission value of solution.
4. High absorbance/ low transmission = more pigment in solution.



Define osmosis.



Define osmosis.

Water diffuses across semi-permeable membranes from an area of higher **water potential** to an area of lower water potential until a **dynamic equilibrium** is established.



What is water potential (ψ)?



What is water potential (ψ)?

- Pressure created by water molecules measured in kPa
- Ψ of pure water at 25°C & 100 kPa: 0
- More solute = ψ more negative



How does osmosis affect plant and animal cells?



How does osmosis affect plant and animal cells?

osmosis **INTO** cell:

plant: protoplast swells = cell turgid

animal: lysis

osmosis **OUT** of cell:

plant: protoplast shrinks = cell flaccid

animal: crenation



Define simple diffusion.



Define simple diffusion.

Passive process requires **no energy** from ATP hydrolysis.

Net movement of **small, lipid-soluble** molecules directly through the bilayer from an area of high concentration to an area of lower concentration (i.e. **down a concentration gradient**).



Define facilitated diffusion.



Define facilitated diffusion.

Passive process.

Specific **channel or carrier proteins** with complementary binding sites transport **large and/or polar molecules/ ions** (not soluble in hydrophobic phospholipid tail) **down concentration gradient.**



Explain how channel and carrier proteins work.



Explain how channel and carrier proteins work.

Channel: hydrophilic channels bind to specific ions = one side of the protein closes & the other opens.

Carrier: binds to complementary molecule = conformational change releases molecule on other side of membrane; in facilitated diffusion, passive process; in active transport, requires energy from ATP hydrolysis.



Define active transport.



Define active transport.

Active process: ATP hydrolysis releases phosphate group that binds to carrier protein, causing it to change shape.

Specific carrier protein transports molecules/ ions from area of low concentration to area of higher concentration (i.e. **against concentration gradient**).



Define exocytosis and endocytosis.



Define exocytosis and endocytosis.

- **Active process**
- Involved in bulk transport & transporting large particles
- Vesicles fuse with cell surface phospholipid membrane



Name 5 factors that affect the rate of diffusion.



Name 5 factors that affect the rate of diffusion.

- Temperature
- Diffusion distance
- Surface area
- Size of molecule
- Difference in concentration (how steep the concentration gradient is)

