Facilitated Diffusion

by Sophia

WHAT'S COVERED

In this lesson, you will learn about facilitated diffusion. Specifically, this lesson will cover:

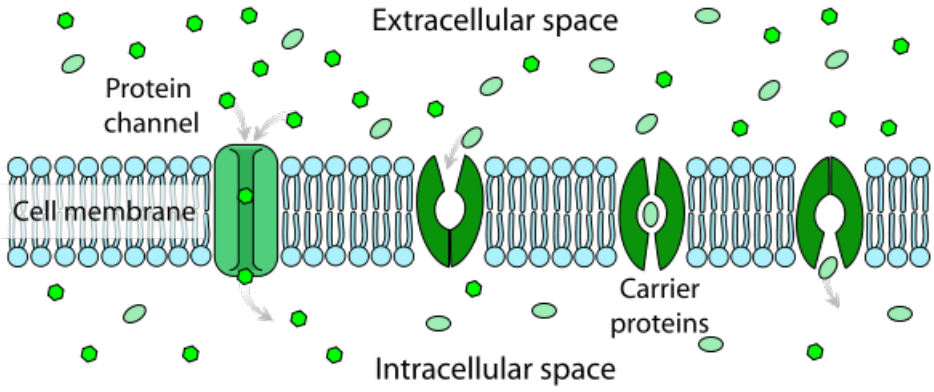
1. Facilitated Diffusion Process

To start off, **facilitated diffusion** is a type of **passive transport**.

If you think back to osmosis and diffusion, passive transport is just a way to transport molecules across a cell membrane without the use of ATP or cellular energy. Facilitated diffusion also does not require cellular energy.

Facilitated diffusion uses **transport proteins** to transport molecules across a cell membrane.

In regular diffusion, you have molecules that would just be able to pass through the cell membrane. However, there are some molecules that would like to diffuse across the membrane from areas of high concentration to areas of low concentration, but the molecules are too big or too hydrophilic (water-attracting) to pass easily through the hydrophobic (water-repelling) plasma membrane. Some transport proteins act like doors, allowing molecules to pass through the plasma membrane and diffuse as they usually would—this is facilitated diffusion.



BIG IDEA

Facilitated diffusion is the use of transport proteins to move molecules across the cell membrane without the use of ATP.

TERMS TO KNOW

Facilitated Diffusion

Diffusion that uses transport proteins to move molecules across a membrane.

Passive Transport

A form of cell transport that does not require energy in the form of ATP.

Transport Proteins

Proteins in the cell membrane that move molecules across the membrane.

2. Active Transport

Another way that molecules can get across a cell membrane is through**active transport**. Active transport is when a molecule is moving across a cell membrane but requires the use of ATP. Unlike passive transport (facilitated diffusion, diffusion, and osmosis), active transport is using ATP to move molecules across a cell membrane.

TERM TO KNOW

Active Transport

Cell transport that uses energy in the form of ATP.

3. Sodium-Potassium Pumps

A good example of this is sodium-potassium pumps. Sodium-potassium pumps are transport proteins that move sodium and potassium ions against their concentration gradient. Think back again to passive transport (facilitated diffusion, diffusion, and osmosis). Passive transport involves molecules moving from an area of high concentration to an area of low concentration--from where there's a lot to where there are fewer—so ATP isn't needed.

In active transport, you're moving against the concentration gradient, which means you're moving from an area where there's a low concentration to an area where there's a high concentration. Since it's moving against what is natural, it's going to require energy from the cell to push it in that direction.

In the case of sodium-potassium pumps, energy is needed to move sodium and potassium not just from areas of low concentration to high concentration, but moving positive charges towards an area that is already positively charged (an electrochemical gradient).

HINT

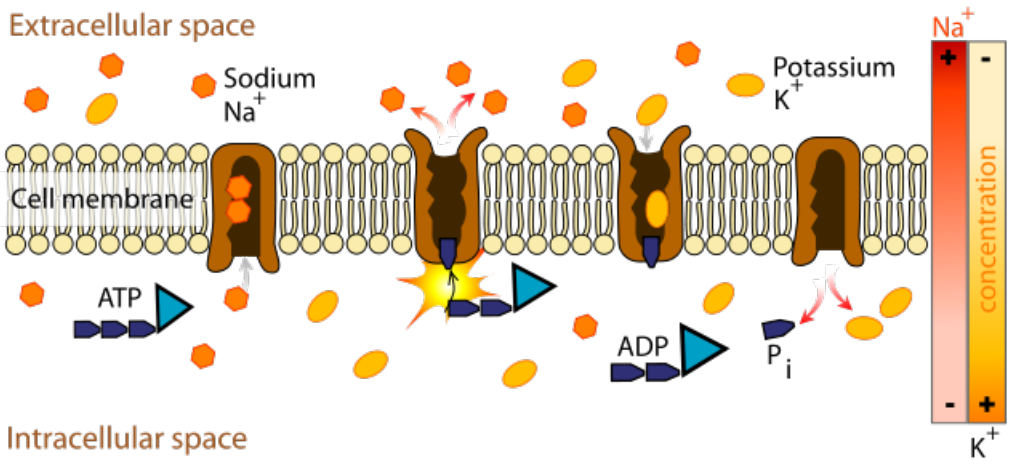
When you to take two magnets, the north pole of one magnet is naturally attracted to the south pole of the other magnet; this is a lot like passive transport. But if you try to force the two north poles together, they naturally repel each other, and you need to use your muscles to shove them close together. Just as it takes energy to force the same poles of two magnets together, it takes energy to force the same charged molecules together.

Sodium-potassium pumps move three positively-charged sodium molecules out of the cell (where there's already a lot of sodium) and two positively-charged potassium ions into the cell. In other words, you're moving

sodium from low concentration (inside the cell) to high concentration (outside the cell), potassium from low concentration (outside the cell) to high concentration (inside the cell) and making the cell negatively charged:

3 Na+ out of the cell (-3) plus 2 K+ (+2)

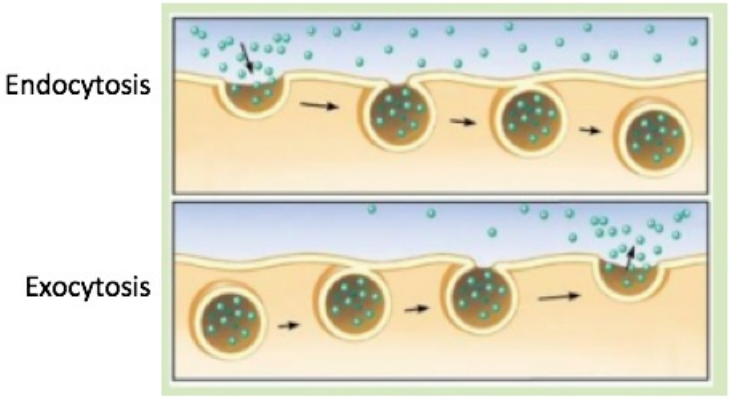
-3 + 2 = -1 charge inside the cell



This readies nerve and muscle cells for an action potential, something we'll discuss in a later tutorial.

4. Endocytosis & Exocytosis

Another type of active transport is through endocytosis and exocytosis; This is another way to move molecules across the plasma membrane. Endocytosis and exocytosis are used to move larger particles that wouldn't be able to move through on their own.



In endocytosis, the particles are on the outside of the cell. The cell membrane will start to form a vesicle. That vesicle will then pinch off and move those particles into the cell.

In exocytosis, you have a vesicle that's moving towards the plasma membrane, attaching to it, and then expelling whatever the contents are out of the cell. It's a means of moving larger particles either into or out of the cell.

HINT

Endocytosis means moving molecules into the cell, whereas exocytosis means moving them out. Those

prefixes should help you remember what each process is responsible for. Endo- is moving in. Exo- is moving out or exiting the cell.

SUMMARY

This lesson has been a brief overview of the **process of facilitated diffusion**, as well as active transport. Specifically, you learned about two types of active transport processes: **sodium-potassium pumps** and **endocytosis and exocytosis**.

Keep up the learning and have a great day!

Source: THIS WORK IS ADAPTED FROM SOPHIA AUTHOR AMANDA SODERLIND

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TERMS TO KNOW

Active Transport
Cell transport that uses energy in the form of ATP.

Facilitated Diffusion
Diffusion that uses transport proteins to move molecules across a membrane.

Passive Transport
A form of cell transport that does not require energy in the form of ATP.

Transport Proteins
Proteins in the cell membrane that move molecules across the membrane.