

Active transport is: **The movement of molecules or ions in or out of a cell from a region of lower concentration to a region of higher concentration using ATP and carrier proteins.**

In active transport ATP is used to:

Directly move molecules

Individually move molecules using a concentration gradient which has already been set up by (direct) active transport. This is known as co-transport.

It differs from passive forms of transport in the following ways:

Metabolic energy in the form of ATP is needed.

Substances are moved against a concentration gradient, that is from a lower to a higher concentration.

Carrier protein molecules which act as 'pumps' are involved.

The process is very selective, with specific substances being transported.

Need to tell the difference between facilitated diffusion and active transport as they both use carrier proteins:

Facilitated diffusion: DOWN a concentration gradient / doesn't require metabolic energy

Active transport: AGAINST (up) a concentration gradient/ requires metabolic energy

Direct Active Transport:

1. The carrier proteins span the plasma membrane to bind to the molecule or ion to be transported on one side of it.
2. The molecule or ion binds to receptor sites on the carrier protein.
3. On the inside of the cell/organelle, ATP binds to the protein, causing it to split into ADP and a phosphate molecule. As a result, the protein molecule changes shape and opens to the opposite end of the membrane.
4. The molecule or ion is then released to the other side of the membrane.
5. The phosphate molecule is released from the protein which causes the protein to revert to its original shape, ready for the process to be repeated. The phosphate molecule then recombines with the ADP to form ATP during respiration.

Active Transport

Sometimes **more than one molecule or ion may be moved in the same direction at the same time by active transport.** Occasionally, the molecule or ion being moved into a cell/organelle at the same time as a different one is being removed from it. = the **sodium-potassium pump** is an example.

Within this, **sodium ions are actively removed from the cell/organelle while potassium ions are actively taken in from the surroundings.** This process is essential to a number of important processes in the organism, including the creation of a nerve impulse.

