



HOW I TEACH... ENZYMES

Dr Jo Castelino is a secondary science teacher based in West Yorkshire, UK, with a PhD in genetics.

Research and Anticipate

Misconceptions

I take common misconceptions into account when I teach. For the enzymes topic, these include the below examples.

Misconceptions

Substrates have active sites.

An enzyme and substrate have the same shape.

Enzymes only break down substrates.

Enzymes work best at 37 °C.

Enzymes are killed at high temperatures.

Enzymes are used up or destroyed in reactions.

Enzymes are only involved in digestion

Correction

Only enzymes have active sites.

The substrate's shape is complementary to the enzyme's.

Enzymes can also build up substrates.

Optimum temperature differs for different enzymes.

Enzymes are denatured, not killed, and this is sometimes reversible.

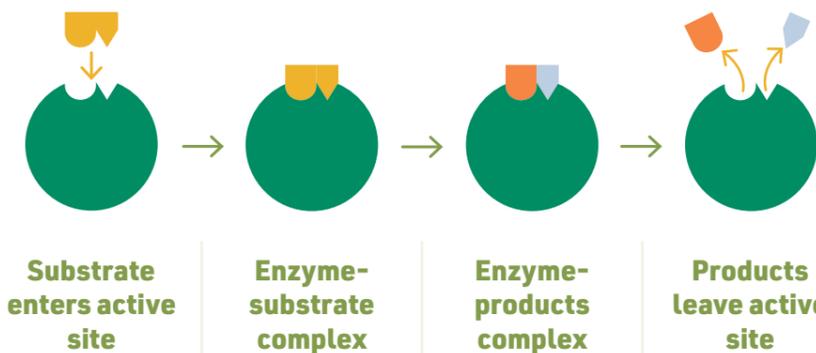
Enzymes are catalysts and are not chemically changed or used up in reactions.

Enzymes are involved in a range of biological processes.

Diagnose and Address

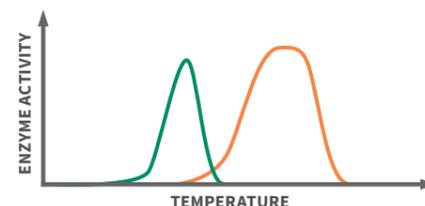
Using models to support conceptual understanding

I use the lock and key model to help students understand how enzymes work. Diagrams and animations clarify the ideas of specificity and the role of the active site.

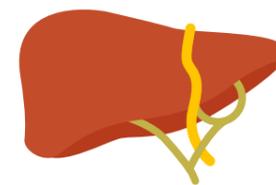


I take care when using models because they can generate misconceptions themselves, like the substrate 'knows' or 'wants' to interact with the enzyme.

Examples to demonstrate how enzymes work



I use a range of graphs showing how optimal temperature varies for different enzymes.



I use examples of enzymes found in processes other than digestion, for example those found in the liver.

Assess and Review

Refutation texts

I get students to write refutation texts to see if they still hold misconceptions.

Some people think enzymes work by binding to a substrate with the same shape and breaking it down to smaller products. We know that...

...the active site of the enzyme has a shape that is complementary to the shape of the substrate. We also know that enzymes do not always break down substrates but that they can build them up too.

Written summaries

Written summaries are useful to check that students understand how to use key vocabulary and ideas correctly.

products rate of reaction
 active site enzyme-substrate complex
 complementary substrate catalyst