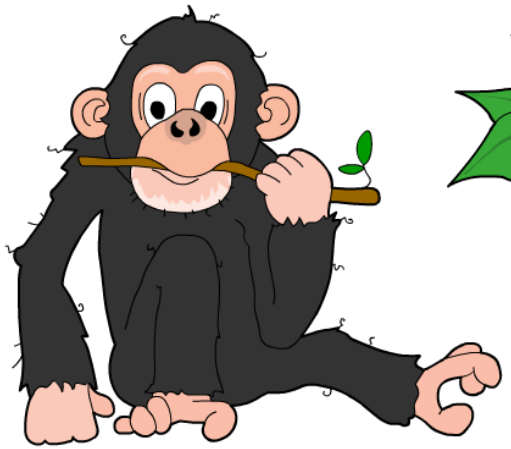
Enzymes

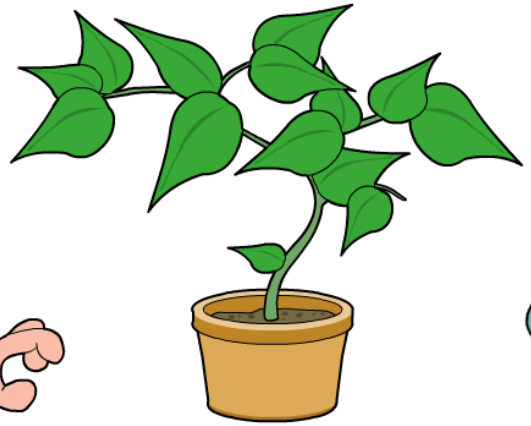
What are enzymes?

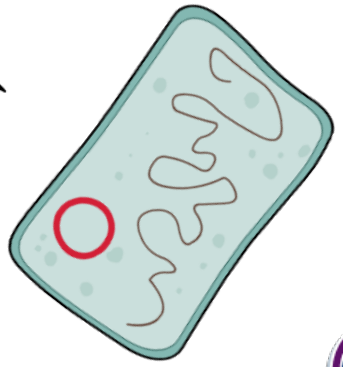
Enzymes are **biological catalysts** – they speed up the chemical reactions that take place inside all cells, but without being used up in the process.

There are many thousands of different types of enzyme, and each one catalyzes a different reaction.

Enzymes occur naturally in all organisms, but they are increasingly being used in industrial processes.



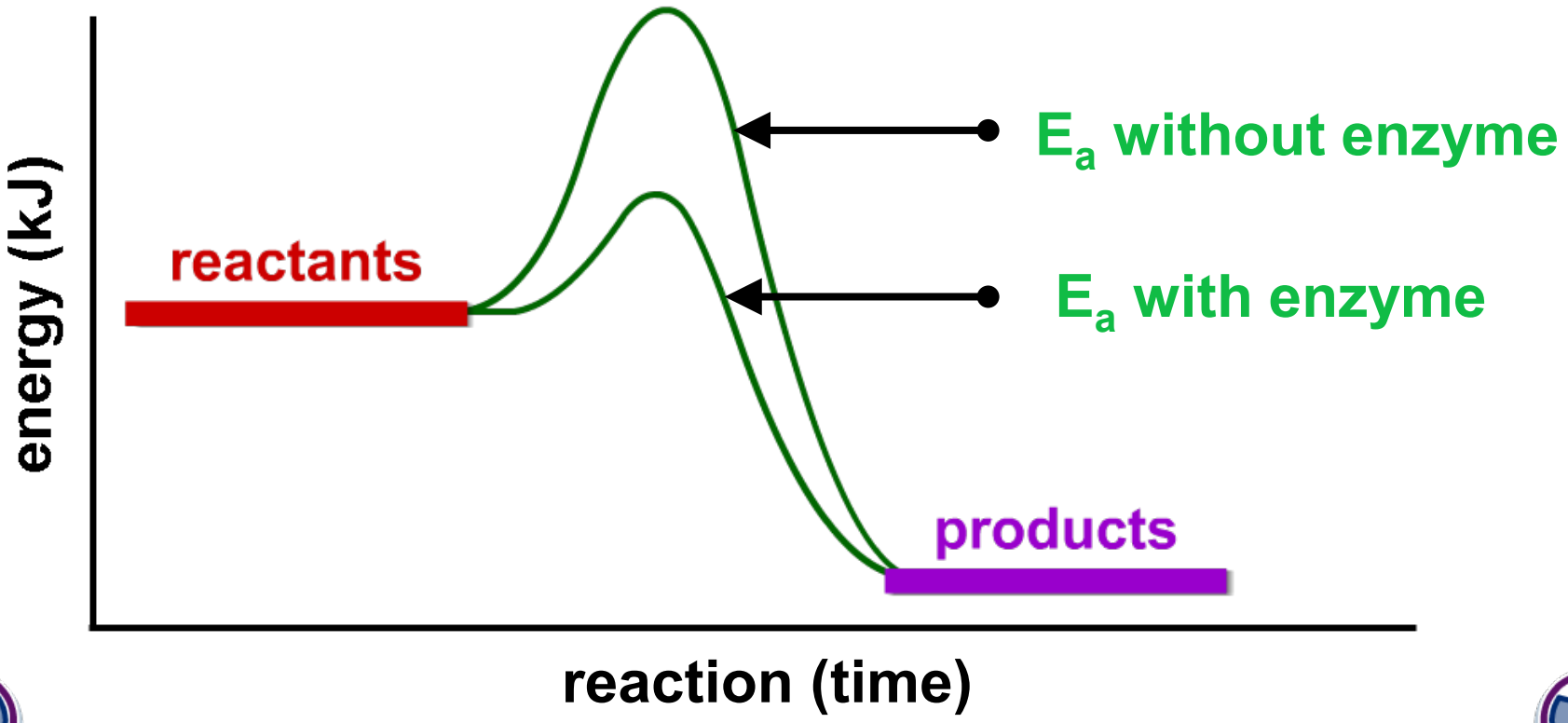




Why do enzymes speed up reactions?

Enzymes speed up reactions by lowering the **activation energy** (E_a) of a reaction. The activation energy is the energy needed to start a reaction.

Different reactions have different activation energies.



Factors affecting enzymes

The rate of enzyme-catalyzed reactions depends on several factors. What are some of these?

Factors that affect the rate of a reaction include:

- temperature
- pH
- enzyme concentration
- substrate concentration
- surface area
- pressure.

All enzymes work best at only one particular temperature and pH: this is called the **optimum**.

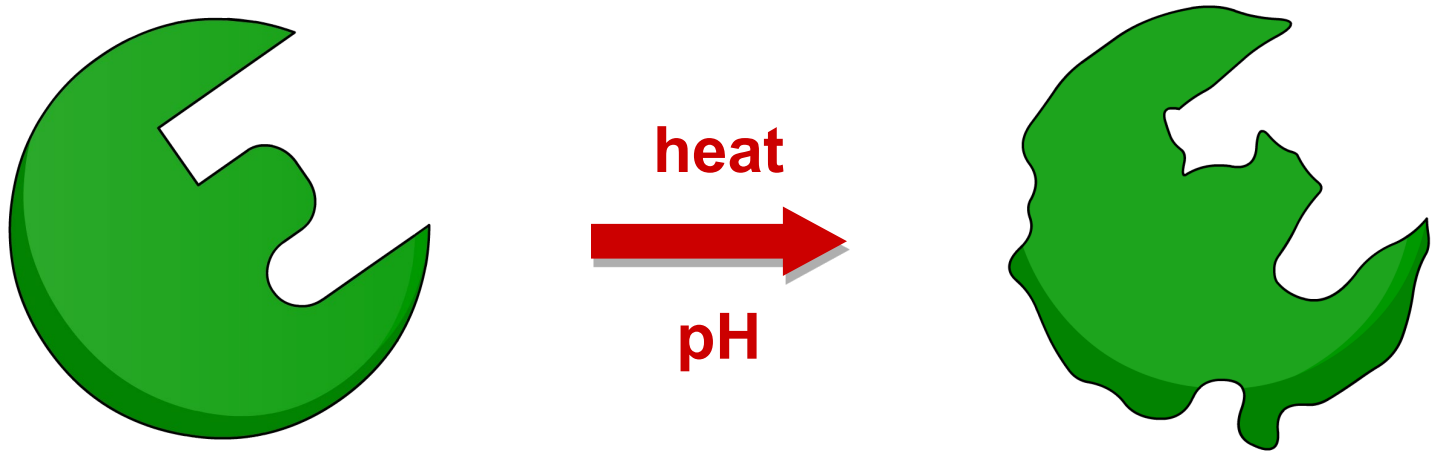
Different enzymes have different optimum temperatures and pH values.

Factors affecting enzymes

If the temperature and pH changes sufficiently beyond an enzyme's optimum, the shape of the enzyme irreversibly changes.

This affects the shape of the active site and means that the enzyme will no longer work.

When this happens the enzyme is **denatured**.

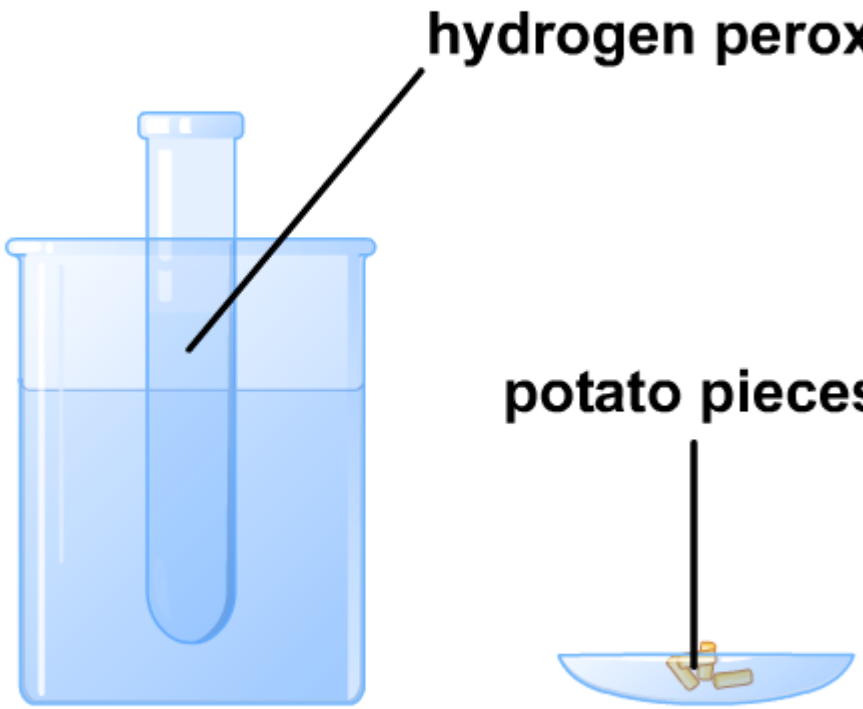


normal

denatured

Enzymes and temperature

How does temperature affect catalase activity?



Potatoes contain an enzyme called catalase. Catalase catalyzes the breakdown of hydrogen peroxide into oxygen and water.

Click "**start**" to find out more.

start