

Enzymes

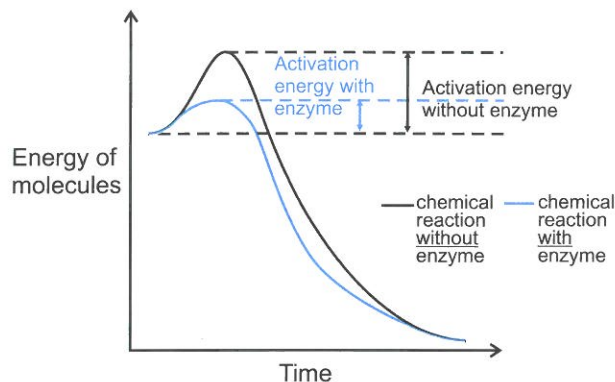
Enzymes Help to Speed up Biochemical Reactions

- 1) In a living cell, thousands of **biochemical reactions** take place every second. The sum of these reactions is called **metabolism**. A single chain of these reactions is called a **metabolic pathway**.
- 2) Without enzymes, these reactions would take place very **slowly** at normal body temperature.
 - 1) Enzymes are **biological catalysts**.
 - 2) They **increase** the **rate** (speed) of reactions.

How do Enzymes Act as Catalysts?

- 1) Even reactions that release energy require an **input of energy** to get them going, e.g. the gas from a Bunsen burner doesn't burn until you provide heat energy from a match.
- 2) This input energy is called the **activation energy**. A reaction that needs a high activation energy can't start at a low temperature of 37 °C (i.e. body temperature).
- 3) Enzymes **reduce** the activation energy.

This graph shows the activation energies of a reaction **with** and **without** an enzyme:



Enzymes are Proteins

- 1) All enzymes are **globular proteins** (because they're roughly spherical).
- 2) It's the order of amino acids in an enzyme that determines its **structure**, and so how it works.
- 3) Enzymes can be involved in **breaking down** molecules or **building** molecules. For example:
 - **Digestive enzymes** are important in the digestive system, where they help to break down food into smaller molecules, e.g. carbohydrases break down carbohydrates.
 - Enzymes involved in **DNA replication** help to build molecules, e.g. DNA polymerase.

I could really use a catalyst to help me write this gag...

- 1) What is the function of enzymes?
- 2) What is activation energy?
- 3) What do digestive enzymes do?