

## Unit 1 Key Area 4     Proteins

### (a) Variety of Proteins

The variety of **protein shapes and functions** arises from the **sequence of amino acids**.

Proteins have many functions such as:

**Structural**

**Enzymes**

**Hormones**

**Antibodies**

**Receptors**

### (b) Enzymes

Enzymes function as **Biological Catalysts** and are made in living cells.

They **speed up** cellular reactions and are unchanged in the process.

The shape of the **active site** of an enzyme molecule is **complimentary** to its **specific substrate(s)**.

Enzymes are therefore said to be **SPECIFIC** because they only react with one substrate.

Enzyme action results in **product(s)**.

| Substrate           | Enzyme               | Product        | Type of Reaction |
|---------------------|----------------------|----------------|------------------|
| Starch              | <b>Amylase</b>       | Maltose        | Degradation      |
| Hydrogen Peroxide   | <b>Catalase</b>      | Water + Oxygen | Degradation      |
| Glucose-1-phosphate | <b>Phosphorylase</b> | Starch         | Synthesis        |

Clue :

**Substrate**

**Enzyme**

**Product(s)**

S

A

M

HAPPY

C

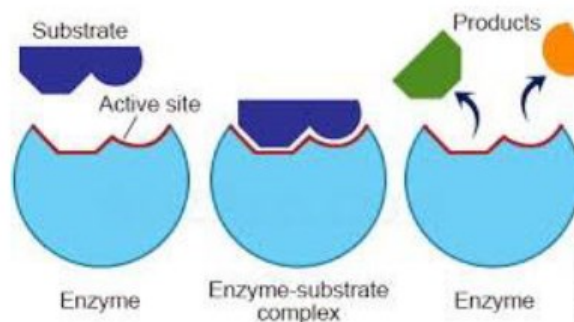
OW (happy Cow)

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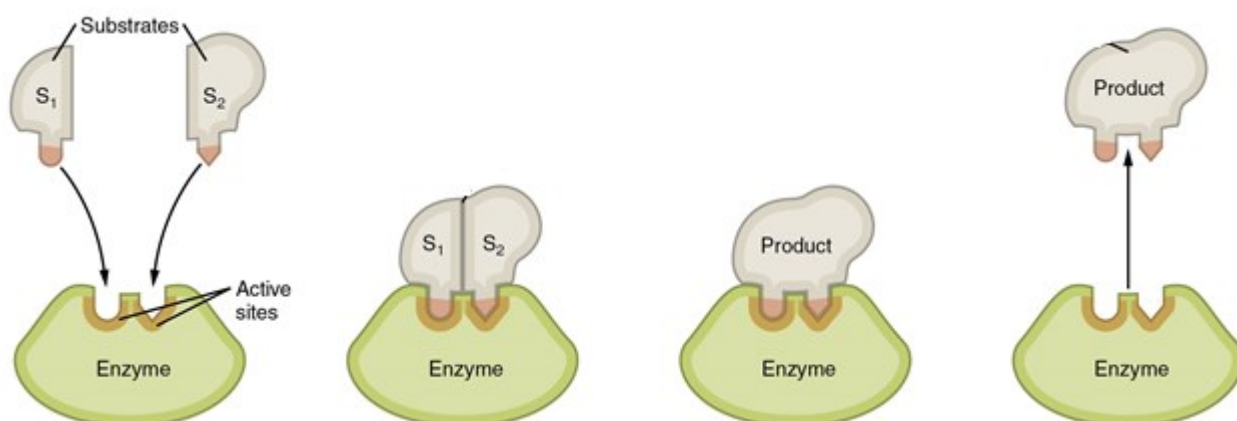
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Enzymes can be involved in **degradation** (breaking down a large substrate into small molecules) and **synthesis** (making a large product from small molecules) reactions.



**Degradation reaction**



**Synthesis reaction**

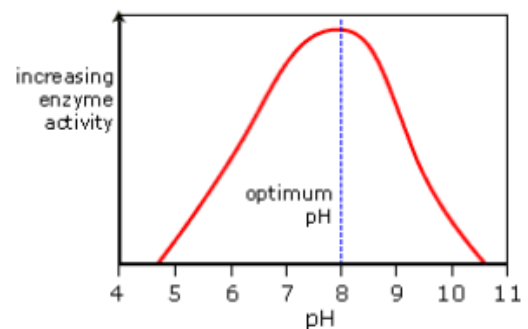
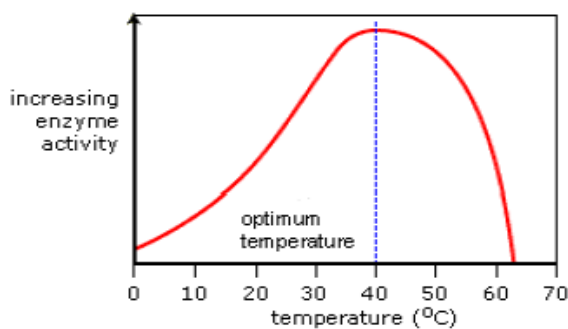
### (c) Factors affecting enzymes

Each enzyme is **MOST ACTIVE** in its **OPTIMUM CONDITIONS**.

Enzymes, and other proteins, can be affected by **TEMPERATURE** and **pH**.

Enzymes can be **DENATURED**, resulting in a change in their shape which will affect the rate of reaction.

**Enzyme activity** will **decrease** as conditions move away from the optimum as shown in the graphs below.



As **temperature increases** above the optimum temperature, or as pH changes outwith the optimum **pH range**, the **active site** may undergo a permanent **change in shape** and can no longer fit its substrate. The enzymes is said to be **denatured**.

