

ENZYMES

- **A catalyst** increases the rate of a reaction and is not changed in the reaction.
- **Enzymes** are proteins, produced that act as biological catalysts.
- **Enzymes are important in all living organisms in terms of reaction speed necessary to sustain life:**
Many chemical reactions take place in organisms. These reactions happen too slowly to keep organisms alive unless they are speeded up by enzymes.

The reactions that enzymes catalyse can be divided into three types.

1 Breaking large molecules into small ones

- Bacteria and fungi release enzymes on their substrates to break them down.
- Animals release enzymes to breakdown the food

Example:

- ✓ Stomach releases protease to breakdown the proteins into polypeptides
- ✓ The pancreatic juice released by pancreas contains amylase, lipase and trypsin that breakdown the **starch, fats** and **proteins** into **sugars, fatty acids & glycerol** and **peptides** respectively.

2 Building up large molecules from small ones

- ✓ Starch is a storage molecule formed by joining small glucose molecules via glycosidic bonds.
- ✓ Cellulose is a structural molecule present in the cell walls of plants that is formed by joining

(Note: Starch is formed from alpha glucose, while cellulose is made of beta glucose.-Not required for you to know. But this point has been stated to make you understand the difference)

3 Converting one small molecule into another

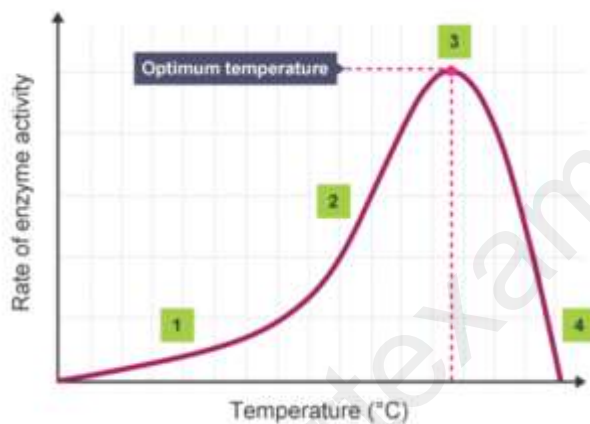
- ✓ Many of the chemical reactions that occur inside cells involve small changes to molecules, such as adding or removing atoms or groups of atoms.
- ✓ For example, there are enzymes that remove hydrogen from compounds during respiration.

Properties of enzymes:

- 1 they are all proteins
- 2 each enzyme catalyses one reaction
- 3 they can be used again and again
- 4 they are influenced by temperature
- 5 they are influenced by pH

Optimum temperature:

The temperature at which the maximum rate of reaction occurs is called the **optimum temperature**.



Some examples of optimum temperatures are given below:

- Fungal and plant enzymes: approximately 20°C
- Human enzymes: 37°C (body temperature)
- Some of the enzymes produced by bacteria for use in industry: 90°C.