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Vby - Sem - VI

MTC - II (T)

Unit - 2

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## Enzyme Action, Specificity & Inhibition

### 1] Factors Affecting Enzyme Action :

Enzyme activity depends on several physical and chemical factors:

#### i] Enzyme concentration

- Rate of reaction increases with increase in Enzyme concentration.
- Provided substrate is present in excess.
- More enzyme  $\rightarrow$  more active sites  $\rightarrow$  faster reaction.

#### ii] Substrate concentration

- Rate increases with substrate concentration initially.
- After a certain point, enzyme becomes saturated.
- Maximum velocity is called  $V_{max}$ .

#### iii] Temperature

- optimum temperature:  $37^{\circ}C$  for most human enzymes.
- Low temperature  $\rightarrow$  enzyme denaturation  $\rightarrow$  activity decreases.

#### iv.] pH

- Each enzyme has optimum pH.
- Examples:

Pepsin  $\rightarrow$  pH 1.5 - 2

Trypsin  $\rightarrow$  pH 7.5 - 8

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## V] Presence of Inhibitors :

Inhibitors decrease enzyme activity.

Types :

### a] Competitive Inhibitor

- competes with substrate

- Example : Malonate inhibits succinate dehydrogenase.

### b] Non-competitive Inhibitor

- Binds at another site

- Examples : Cyanide inhibits respiratory enzymes.

## vi] Presence of Activators/cofactors :

Some enzymes need cofactors like metal ions.

Examples —  $Mg^{+2}$  activates Kinases.

$Zn^{2+}$  activates carbonic anhydrase.

## vii] Time of Reaction :

- Rate increases with time initially.

- later becomes constant due to substrate depletion.

## Specificity of Enzyme Action

Enzyme specificity means enzymes act only on specific substrate.

This is due to specific active site structure.

Lock and key ~~matched~~ model explains specificity.

## Types of specificity

- i] Absolute specificity: Enzymes acts only on one substrate.  
eg - Urease acts only on urea.
- ii] Group specificity: Acts on group of similar compounds.  
eg - Alcohol dehydrogenase acts on alcohols.
- iii] Optical specificity: Acts on specific optical isomers.  
eg - L-amino acid oxidase acts only on L-amino acid.
- iv] Linkage specificity: Acts on particular bond.  
eg - Amylase acts on glycosidic bond.

## Enzyme Inhibitors

Inhibitors are substances that decrease enzyme activity.  
They interfere with enzyme function.

## Importance of enzyme Inhibitors

- i) Used as medicine. eg - Penicillin inhibits bacterial enzyme.
- ii) Used in poisoning - eg: cyanide inhibits respiration.
- iii) Used in research:  
to study enzyme mechanism.