2. Factor affecting rate of Enzyme.

↦ Effect of P_H.

There are a number of distinct effect that a change in Ph can have on enzyme catalysed reaction.

Inactivation of the enzyme outside a certain Ph range as a change in the ionization state of the substrate.

$$\text{Creatine} + \text{Mg ATP}^{2} \rightleftharpoons \text{Phosphocreatine}^{2} + \text{mg ADP} + H^{+}$$

→ Increasing the Ph will displace the equilibrium infavour of Phospho creatine synthesis.

→ Ph is changes then the activity of enzyme is also change.

→ At extremes of Ph, the tertiary structure of the protein may be disrupted and the protein denatured.

→ At moderate Ph values, the tertiary structure is not disrupted.

→ Enzyme activity depends on the degree of ionization of certain amino acid.

→ Effect of Ph on the velocity of an enzyme catalysed reaction can be complex.

$$EH^{+} \rightleftharpoons E + H^{+}$$

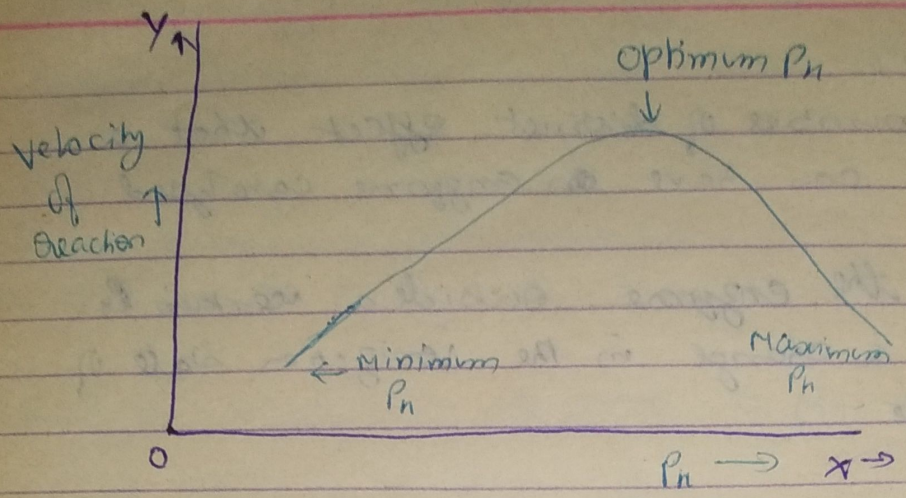
EH^{+} ⟶ is inactive

λE ⟶ is active form

Acid dissociation constant,

$$K_a = \frac{[E][H^{+}]}{[EH^{+}]}$$

$$\therefore EH^{+} = \frac{[E][H^{+}]}{K_a}$$

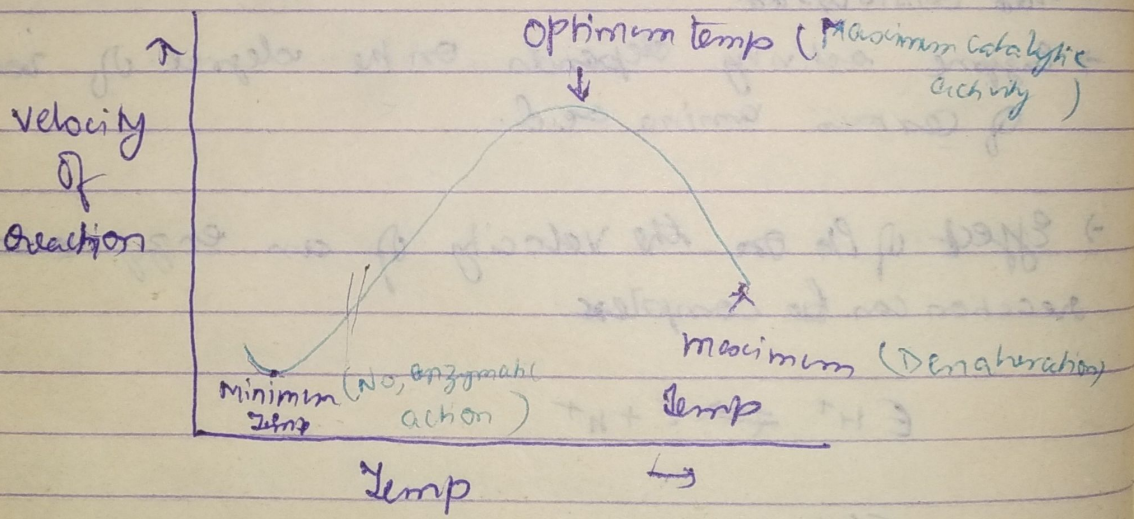


2. Effect of Temperature :—

→ Increase in Temperature on chemical reaction is such that normally for every 10°rise in temp., the rate of reaction is doubles.

→ If there is a drastic rise in temperature ~~is~~ there is denaturation of enzyme occur.

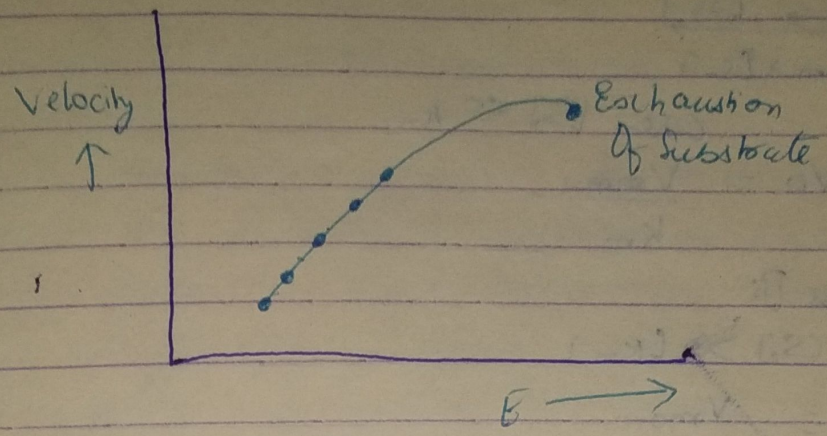
→ Optimum temperature at which enzyme work convienty is 25 to 37°C.



3) Effect of Concentration :—

→ Initial stage the rates may be proportional to the concentration of the enzyme. But after a critical concentration there is a steep and sudden decline in the rate of reaction. Explained by the fact that the substrate is completely

exhausted.



4) Effect of Substrate Concentration :-

→ Enzyme is mixed with substrate under proper condition of the reaction to proceed.

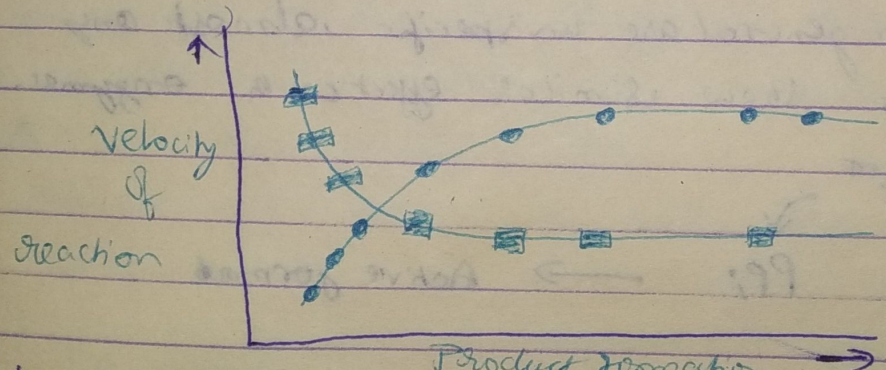
→ The loss of substrate and formation of product are rapid but with the passage of time these rates diminish and reach zero when all the substrate is exhausted.

$$[A] = [A_0] e^{-kt}$$

where :- A → Substrate concentration remaining at time t.

A_0 → Initial substrate concentration.

K → rate constant.



→ At low conc. of substrate the rate appears to obey first order kinetics.

→ At intermediate conc. it assumes a mixed order form

→ At very high conc. , it shows the kinetic of zero order reactions.

$$E + S \underset{K_{-1}}{\overset{K_1}{\rightleftharpoons}} ES \xrightarrow{K_2} E + P$$

$V_o = \frac{V_{max}[S_o]}{K_m + [S_o]}$

Case I. when $[S_o] \ll K_m$

$\therefore V_o = \frac{V_{max}}{K_m}$

Case II:

when $[S_o] \gg [K_m]$

$\therefore V_o = V_{max}$

Case III

when $[S_o] = K_m$

$V_o = \frac{V_{max}}{2}$

5) Effect of Activators:-

→ Enzyme activity is affected by ionic species. Certain ions are absolutely necessary for the activity of some enzyme.

→ Ions that act as an inhibitor for an enzyme can act as activator for others.

→ Anion in general are unspecific, almost any anion may show similar effect with enzymes.

Mg^{++}

$PP_i \longrightarrow$ Active formed

Fumarase (activated) by a number of different anions

→ 15 different metal cation are found to work as activators.

include - Na^{++}, K^+, Rb^+, Cs^+, Mg^{++}, Ca^{++}, Zn^{++}, Ca^{++}, Cr^{+++}, Cu^{++}, Mn^{++}, Fe^{++}, Co^{++}, Ni^{++}, Al^{+++}, NH_4^+, molybdenum