Michaelis — Menten kinetics. Mitchaelis—

Michaelis – menten kinetics →

Michaelis menten kinetic is a model of enzyme kinetics which explaining how the rate of reaction depends on the concentration of enzyme and substrates.

Lets consider a reaction with a substrates (S) binds reversibly to an enzyme (E) to form an enzyme substrate complex (ES), which then reacts irreversibly to form a product (P) and release the enzyme again.

$$E + S \rightleftharpoons ES \rightarrow E + P$$

Enzyme substrate — ES complex — Enzyme product

Two important term within micheal menten ~~curve~~ kinetics are —

① V_{max}
② K_m

① V_{max} ⇒ V_{max} is the maximum rate of reaction when all enzyme active sites are saturated with substrate.

② K_m ⇒ K_m is also known as the Michaelis constant. The substrate concentration at which reaction rate is 50% of V_{max}

phase	concentration E-S	Rate of product formation
pre-steady state	rapid burst of E-S complex form	initialy slow, waiting for E-S to form, then speed up
steady state	E-S come, remains constant as it being formed quickly as it breaks down	constant rate of formation faster than pre-steady state
post steady state	substrate depletes so fewer E-S complex form	slow as there are fewer E-S complexes, slow down as substrate runs out

The phase pre-steady state phase is very short as equilibrium is reached within micro second. Therefore if we mesure the rate in the first few seconds of a reaction, we measure the steady states. This is the rate used in

will be donar to another molliele that will be the acceptor. Most of the time the donear is a co-factor that is changed with the group about to transfer. Eg → Acetyl transferase, methylase, protein kinase and polymarase. The first 3 sub classess play majors rules in the regulation of cellular process.

Enzyme henokinase catalizes transfer of a phosphate group from ATP to glucose forming glucose 6 phosphate during glycolysis.

In addition to this 6 types of enzymes, some enzymes acts as guagulating enzymes, which brings about guagulation of substomee. Eg → ~~Glu Guagulation~~

Coagulase and ~~Renaze~~ Ranase. Coagulase which is found in muscle, which converts parmayosinogen and myosinogen into parmayosin and myosin respectively. ~~Re~~ Rennin converts soluble ca caseinogen into insoluble ca caseinate.

Mechanism of enzyme action ⇒

An enzyme can speed up only those reactions which occur to some extend even in the absence of the enzyme. Several theories we put forward to explain how an enzym speeds up the reaction.

① Enzyme substrate complex theory ⇒

This theory was proposed by Henery and mathematically formulated by Michaelis and Menten.

A/C to this theory an enzym combines with its substrate to form an unstable intermediate complex that is the enzyme substrate complex. This intermediate complex immidiately breaks down into the reaction products and the original enzyme. This maybe represented in the manner,

$$\underset{\text{(Enzyme)}}{E} + \underset{\text{(substrate)}}{S} \underset{K_2}{\overset{K_1}{\rightleftharpoons}} ES \text{ complex} \xrightarrow{K_3} \underset{\text{(enzyme)}}{E} + \underset{\text{(product)}}{P}$$

K_1, K_2, and K_3 are velocity constant. Since the enzyme substrate complex is a very transitory compound, some difficulty was faced in actually providing its existance. Direct evidence of the existance of enzyme substrate complex was

or other groups on the enzyme in the correct orientation for substrate binding and catalysis for both.

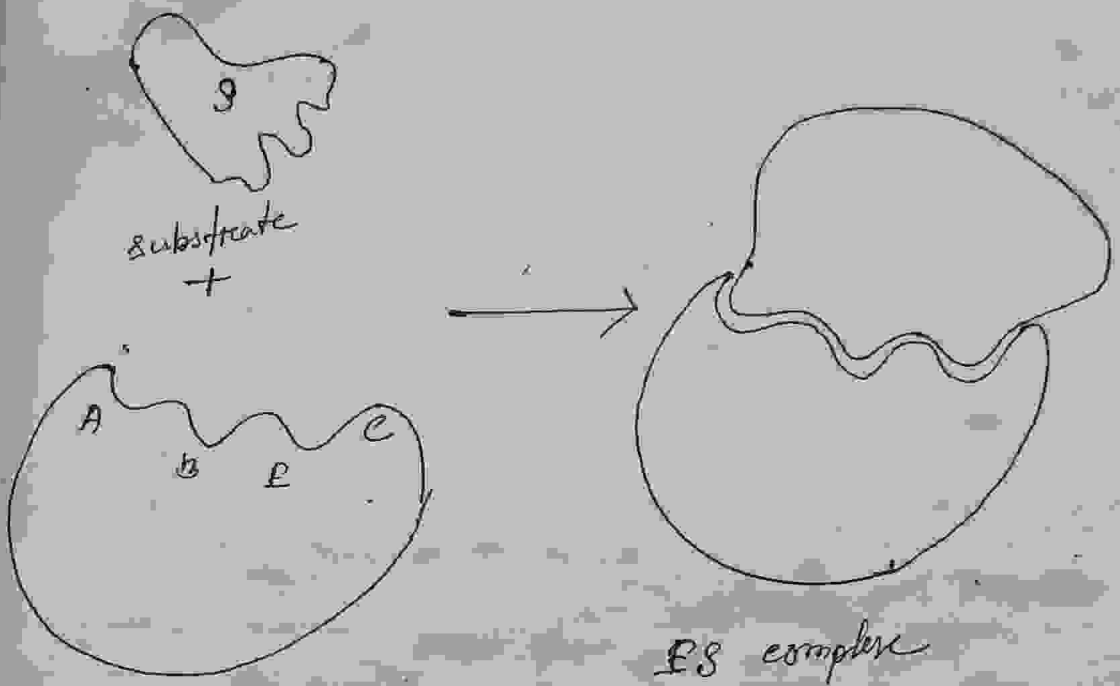

Figure ⇒ Induced fit model of interaction between enzyme and substrate

following 6 groups, which is based on types of chemical reaction they catalized.

① Hydrolase
② Oxido reductase
③ ligase or synthetase
④ Lyase
⑤ Isomerase
⑥ Transferase

① Hydrolase ⇒

Hydrolase catalize reaction that involves hydrolysis. It usually involves the transfer of functional group to water. When the hydrolase acts on amide, glycosyl, peptide, ester or other bonds, they not only catalized the hydrolytic removal of a group from the substrate but also transfer of the group to an acceptor compound.

Hydrolase catalize hydrolysis reaction where a molecule is split into two or more smaller molecule by the addition of water. Eg → Protease ⇒ protease splits protein molecules as hiv protease, where hiv protease is essential for hiv replication.

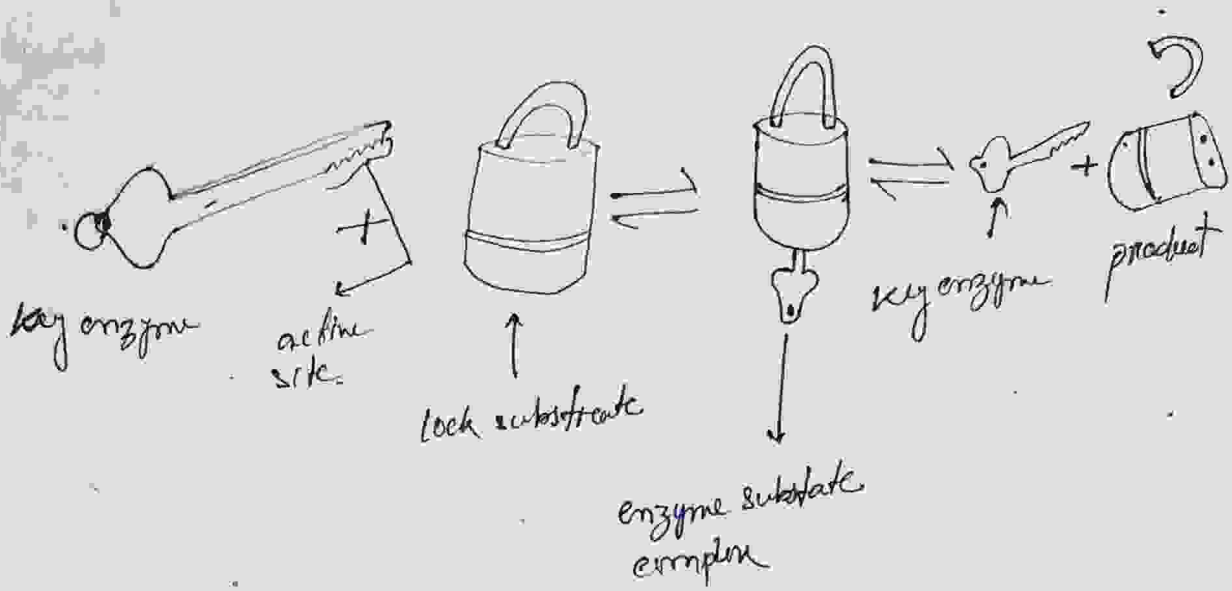

Fig → Lock and key model of the interaction of enzyme and substrate

② Induced fit theory ⇒

This theory also called. Flexible model of the catalytic site. In the fixture model The catalytic site is presumed to be preshape to fit the substrate. In induced fit model proposed Koshland, the substrate induces an conformation change in the enzyme. The catalytic site of certain enzyme are not rigid. Fixie shaped is modified the binding of substrate. The catalytic site has a shape complementary to that of the substrate only after the substrate is bounded. This process of dynamic recognation is called Induced fit. In brines amino acid residues