

- Unit 5 exam**
- 1- enzymes
 - 2- evaluation
 - 3- reactions for transport
 - 4- Population size
 - 5- ecosystem

tertiary structure

Properties

- Optimal proteins are
- Speed, lip. parts
- Not used up
- Not changed
- High turn over rate

metabolism - all body rxn

occur in square

1-5- enzymes

metabolic pathway - controlled by enzymes

Products = reactants

1st rxn.

order rxn rxn

without being part or changing

Key

enz - enzyme

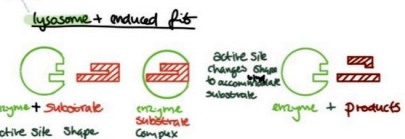
Sub - substrate

cat - catalyst

non - reaction

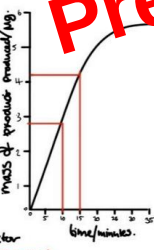
Ke - kinetic energy

example



Course of enzyme control

- With con + sub first added, many substrates
- enz + sub in constant motion. Collide.
- ESCP form. (Successful collisions)
- more active sites filled.
- Enzyme conc limiting factor.
- rely on free active sites
- optimal conditions.
- EXCESS substrate.
- Substrate limiting factor
- less substrate more products
- enzyme conc constant
- All substrate used
- no more products - line plateaus.

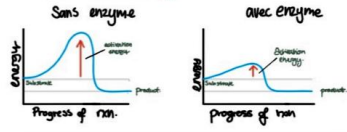


Site of action

- intracellular (occurs outside cell)
- some enzymes bound to substrates + catalyze intracellular reactions
- intracellular in solution
- enzymes act in solution in cells.
- of some breakdown in glycolysis
- intracellular membrane
- enzymes may be attached to membrane of transfer substrate + H⁺ from ATP

Activation energy

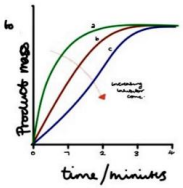
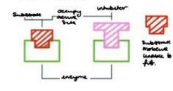
- minimum energy that must be put into a chemical system for a reaction to occur
- enzymes lower activation energy.
- substrate enters active site.
- reaction occurs at lower temp
- lower activation energy



enzyme inhibition

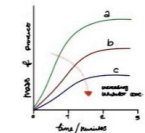
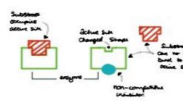
Competitive inhibition

- have a molecular shape similar to substrate.
- compete for active site.
- eg heart type
- fluoric acid + 2H⁺
- increasing conc of sub decreases effect of inhibitor.
- more sub fewer active sites available for inhibitor



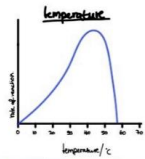
Non-competitive inhibitor

- bind to allosteric site.
- active shape changes shape.
- Substrate can not bind with active site to escape format.



Factors affecting enzyme action

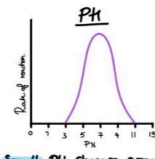
- temp
- pH
- substrate conc
- enzyme conc



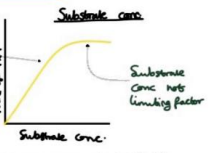
increased temp increases k_e of enz + sub molecules. Causes them to move + collide more frequently $\uparrow$ rate rxn.

at too high active site is denatured.

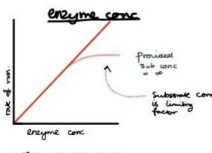
at lower temp enzyme is inactive as low k_e $\uparrow$ temp, $\uparrow$ rate of rxn.



- Small pH changes around the optimum cause reversible changes in enz structure $\downarrow$ activity
- observe changes in pH from optimum causes enz to denature.
- no escp format.
- enz activity lost.



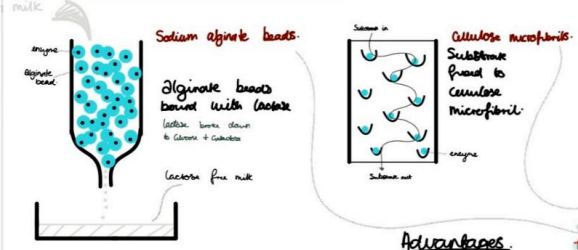
- if enz conc is constant rate of rxn increases as sub conc increases.
- At low sub conc, only few sub molecules for one enzyme with not all active sites full.
- more substrate, more active sites full.
- rate of rxn as more when all active sites full.
- more substrate added reactions can be catalyzed faster plateau.
- sub conc no longer limiting factor.



- When enzyme conc increases, more active sites are available, rate of reaction increases.
- more substrates can be processed, more products produced.

immobilised enzymes

- enzymes bound to an inert material over which be substrate molecules move.



rate of rxn is faster in membrane bound.

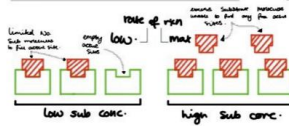
As active sites are inside alginate beads. Substrate takes time to diffuse into them and product out this does not happen for membrane bound enzymes.

Advantages

- do not contaminate product
- products easy to purify
- small beads or less diffusion distance
- enzymes easily added or removed
- gives control over reactions
- enzymes easily recovered for reuse
- reactions can occur at:
 - higher temp
 - more extreme pH
- enzymes are more stable.

USES

- lactase free milk
- lactose $\xrightarrow{\text{lactase}}$ glucose + galactose
- high-fructose corn syrup manufacture
- Starch $\xrightarrow{\alpha\text{-amylase}}$ Maltose $\xrightarrow{\beta\text{-amylase}}$ Glucose $\xrightarrow{\text{glucose isomerase}}$ Fructose



2 factor limiting when an increase in its value causes an increase in rate of rxn.