Enzyme Cheat Sheet

by rhettbro via cheatography.com/133961/cs/27509/

Enzymes

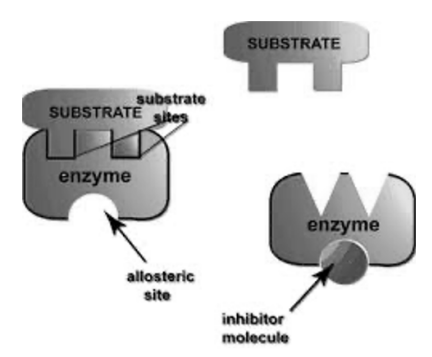
Enzyme	Biological molecules **(proteins)** that act **as catalysts** and **help complex reactions**.
	are specific to their substrates and each enzyme has its own optimum pH
Substrate	Material upon which an enzyme acts.
Enzyme inhibition	important in normal metabolism for control of pathways.
Reversible inhibitor	
compet-itive inhibition	(Raises Km only) Same size and shape with the substrate
noncom-petitive inhibition	(Lowers Vmax only) inhibitor doesn't mind whether there is a substrate or not. but when the inhibitor binds, it switches off catalysis.
uncomp-etitive inhibition	(Lowers Vmax and Km) the inhibitor can ONLY be on the surface of the enzyme if the substrate is there.
Irrever-sible inhibitor	acts by reacting with the enzyme protein, usually at the active site(substrate site), to permanently block activity.

Vmax is the maximum rate of an enzyme catalysed reaction i.e. when the enzyme is saturated by the substrate.

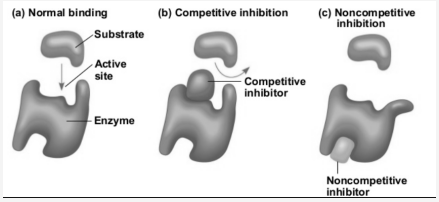
Km is measure of how easily the enzyme can be saturated by the substrate.

Km and Vmax are constant for a given temperature and pH and are used to characterise enzymes. They can be used to identify types of inhibitors i.e. competitive, non-competitive and uncompetitive.

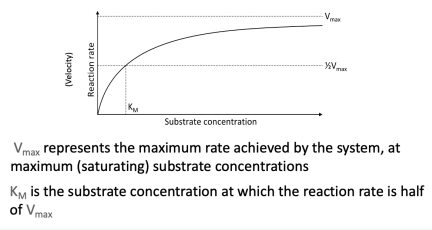
Allosteric site



Normal binding



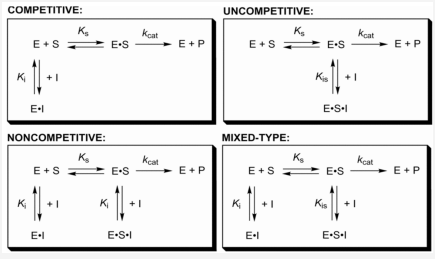
Enzyme kinetics



V_{max} represents the maximum rate achieved by the system, at maximum (saturating) substrate concentrations

K_M is the substrate concentration at which the reaction rate is half of V_{max}

Reversible inhibition



Enzyme in human digestion

Three main types of enzymes in human digestion:

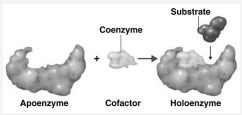
Amylases break down carbohydrates
Example: salivary amylase
Substrate: starch **Product:** maltose
Source: mouth (salivary glands)
Optimum pH: 7-7.8

Proteases break down polypeptides
Example: pepsin
Substrate: polypeptides **Product:** amino acids
Source: stomach
Optimum pH: 2

Lipases break down fats and lipids
Example: pancreatic lipase
Substrate: triglycerides **Product:** fatty acids & glycerol
Source: pancreas, delivered into small intestine
Optimum pH: 7.2 - 7.5

free energy, G

with co-enzyme



CoFactor

In the case of **metal ion cofactors**

Stabilise the structure, not directly involved in the chemistry	Ca++ with some proteinases
part of substrate	Mg++-ATP with some kinases
part of active site	Zn++ in alcohol dehydrogenase
Organic cofactors	
coenzymes	they do come on and off like other substrates (NAD+)
prosthetic groups	a cofactor that forms a permanent part of the enzyme's active site.
	Doesn't come on and off in a catalytic cycle (FAD,PLP)

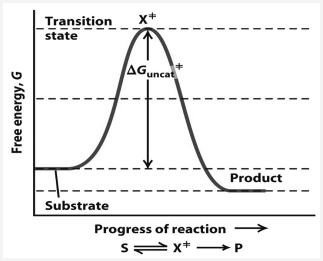
NAD+ is both a coenzyme and a substrate

Why use coenzyme in one case and not in the other case?

Metabolic point: NAD is one of a range of cofactor substances that is present in small concentration

They turn over and over again to process a large amount of substances

Pathway is to process large amount with tiny amount of coenzyme



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