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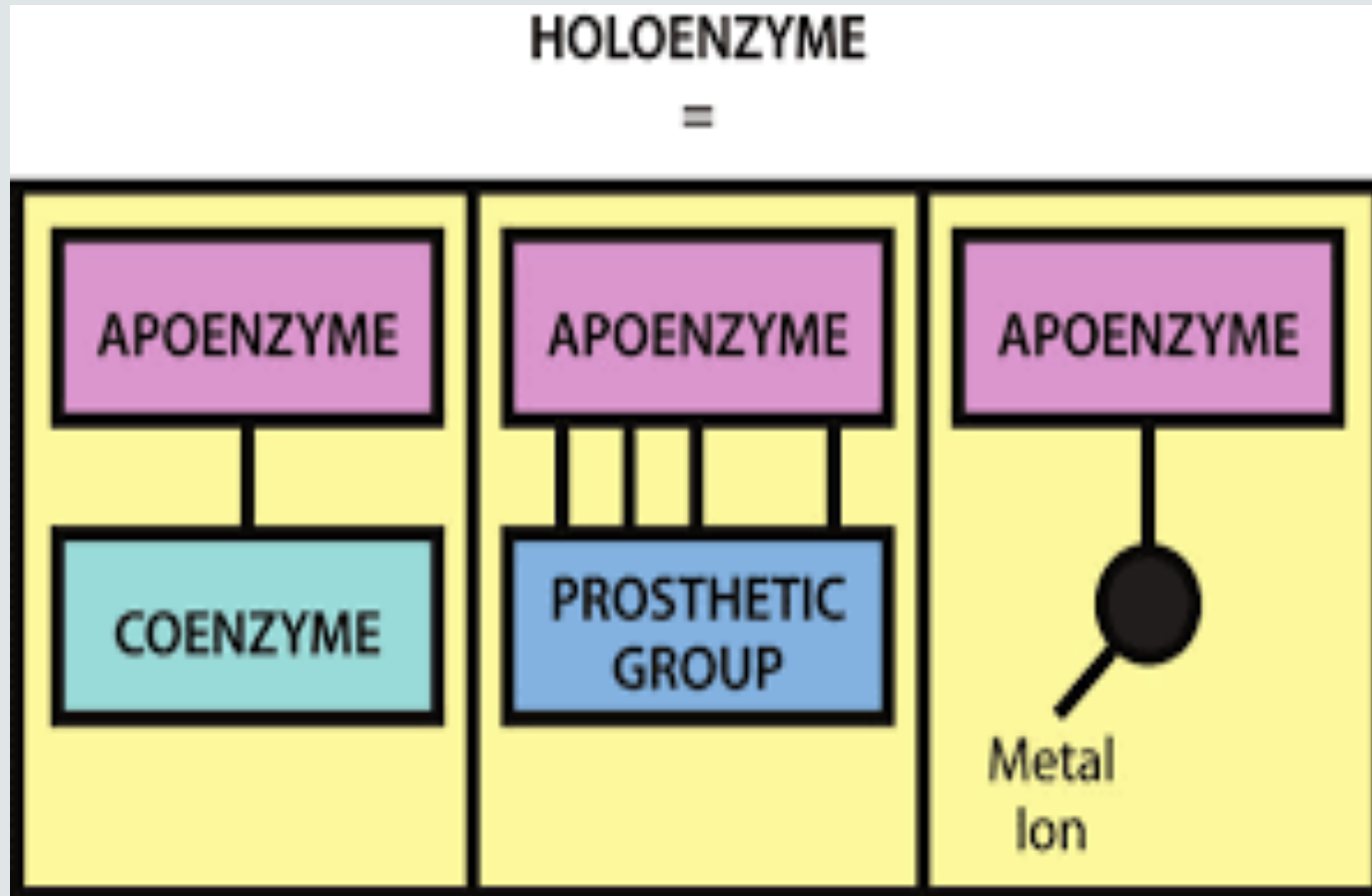
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# TOPIC-6: ENZYMES



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# HOLOENZYMES





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# Enzyme Specificity

**Absolute specificity** – the enzyme will catalyze only one reaction.

**Group specificity** – the enzyme will act only on molecules that have specific functional groups, such as amino, phosphate and methyl groups.

**Linkage specificity** – the enzyme will act on a particular type of chemical bond regardless of the rest of the molecular structure.

**Stereochemical specificity** – the enzyme will act on a particular steric or optical isomer.



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# International classification of enzymes

No.	Class	Types of reaction catalyzes
1	Oxidoreductases	Transfer of electrons
2	Transferases	Group transfer
3	Hydrolases	Hydrolysis reaction
4	Lyases	Addition of groups to double bonds or formation of double bonds by removal of groups
5	Isomerases	Transfer of groups within molecules to yield isomeric forms
6	Ligases	Formation of C-C, C-S, C-O, C-N bonds by condensation reactions coupled to ATP Cleavage



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# Enzyme Unit

One International Unit of enzyme is defined as ***the amount of enzyme that catalyses the formation of one micromole of product in one minute.***

One Katal is defined ***as the amount of enzyme that catalyses the conversion of one mole of substrate to product in one second.***

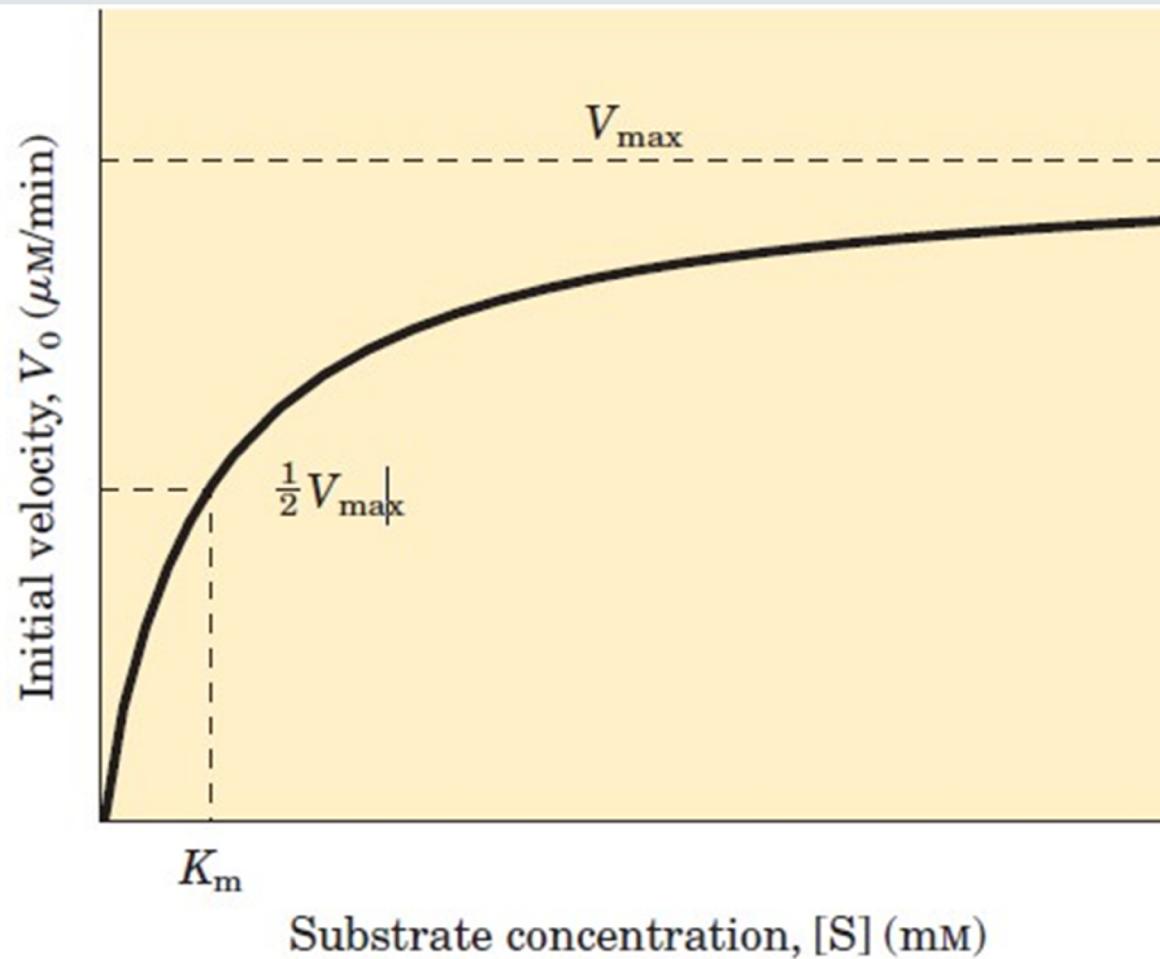
$$1 \text{ katal} = 6 \times 10^7 \text{ IU}$$



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# Michaelis–Menten Equation (1913)



$$V = \frac{V_{\text{max}}[S]}{K_m + [S]}$$

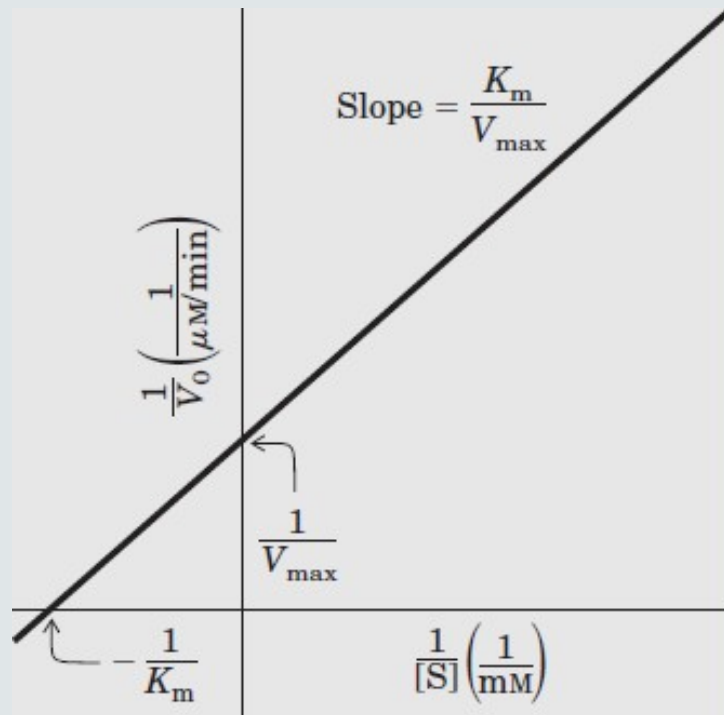


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# Lineweaver - Burke or double reciprocal plot

$$\frac{1}{v} = \frac{K_m}{V_{max}} \cdot \frac{1}{[S]} + \frac{1}{V_{max}}$$





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## REVERSIBLE INHIBITON

Inhibitor Type	Binding Site on Enzyme	Kinetic Effect
Competitive Inhibitor	Inhibitor binds specifically at active or catalytic site, where it competes with substrate for binding; inhibition is reversed by increasing substrate concentration.	$V_{max}$ unchanged; $K_m$ increased to reach a given velocity.
Noncompetitive Inhibitor	Inhibitor binds E or ES other than at the active or catalytic site; substrate binding unaltered but ESI complex cannot form due to structural change in the enzyme $\rightarrow$ $\downarrow$ catalytic power $\rightarrow$ no products formed; inhibition cannot be reversed by increasing substrate concentration since inhibitor cannot be driven from the enzyme.	$V_{max}$ decreased proportionately to inhibitor concentration; $K_m$ unchanged (since substrate can still bind to the enzyme).
Uncompetitive Inhibitor	Inhibitor binds only to ES complexes at locations other than catalytic site; substrate binding modifies enzyme structure, making inhibitor-binding site available; inhibition cannot be reversed by increasing substrate concentration; rare in occurrence.	$V_{max}$ decreased $K_m$ decreased