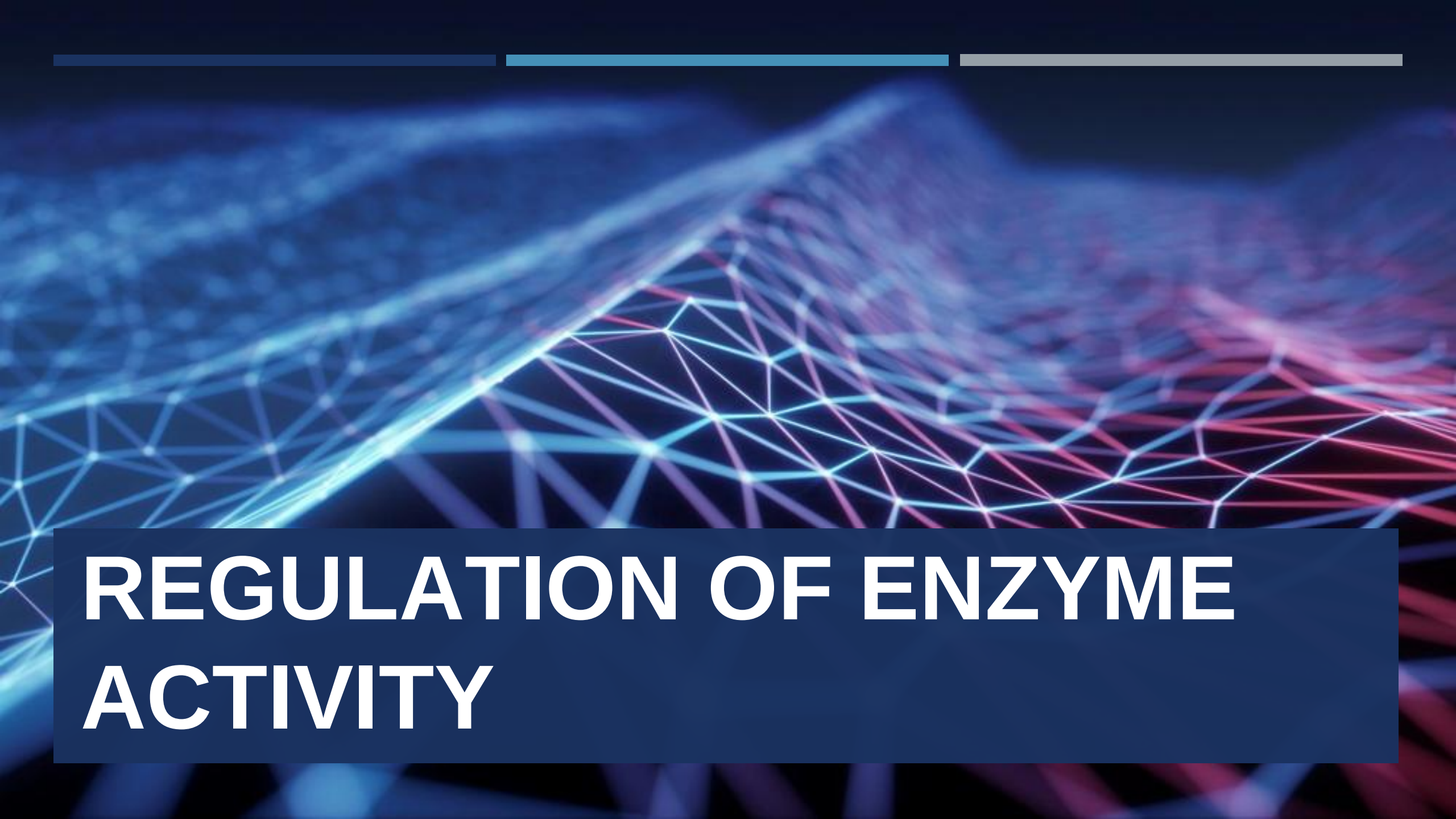

REGULATION OF ENZYME ACTIVITY

INTRODUCTION

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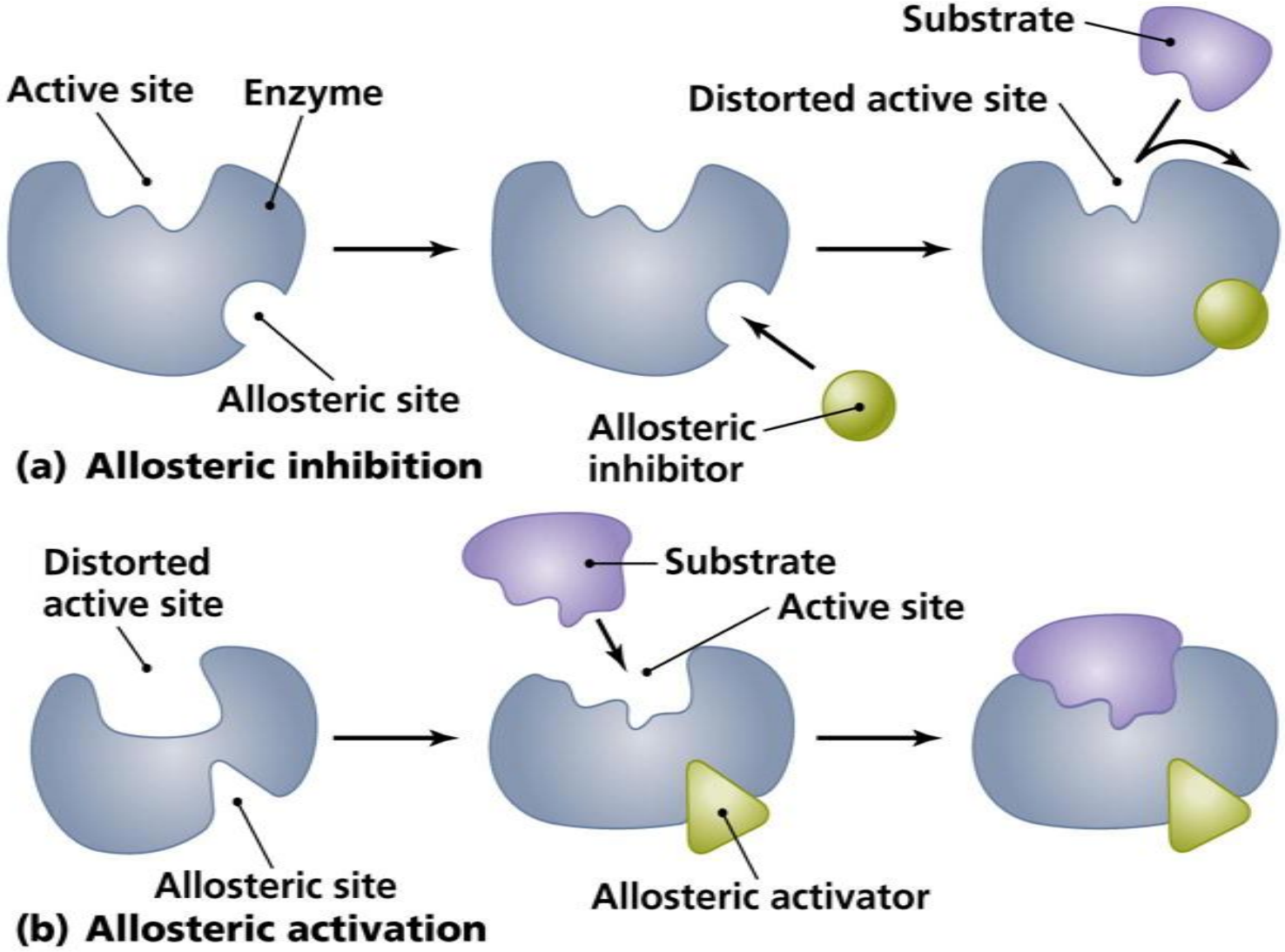
MECHANISM FOR REGULATING ENZYME ACTIVITY

A regulatory enzyme is an enzymes in a biochemical pathway which, through its responses to the presence of certain other biomolecules, regulates the pathway activity. This is usually done for pathways whose products may be needed in different amounts at different times, such as hormone production. Regulatory enzymes exist at high concentrations (low Vmax) so their activity can be increased or decreased with changes in substrate concentrations.

ALLOSTERIC ENZYMES

Allosteric enzymes are enzymes that change their conformational ensemble upon binding of an effector, which results in an apparent change in binding affinity at a different ligand binding site. ... The site to which the effector binds is termed the allosteric site.

ALLOSTERIC ENZYMES CONTINUED….



PROCESSES INVOLVING THE ALLOSTERIC ENZYME .

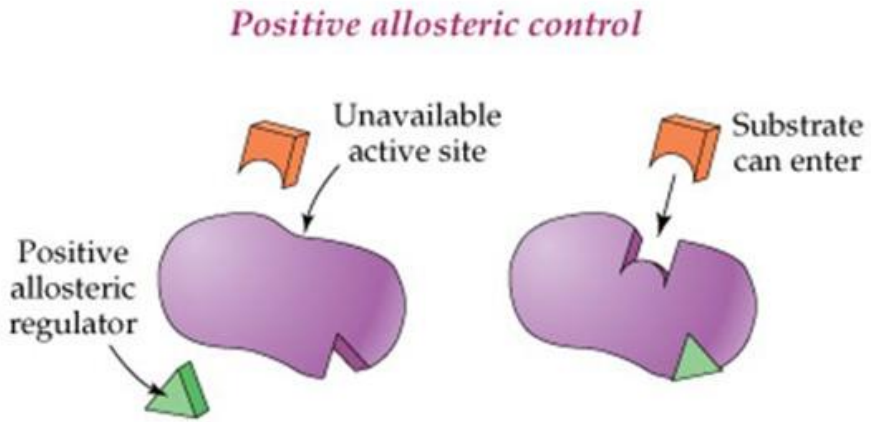
1. NEGATIVE ALLOSTERISM

Negative modulation. Negative allosteric modulation (also known as allosteric inhibition) occurs when the binding of one ligand decreases the affinity for substrate at other active sites. For example, when 2,3-BPG binds to an allosteric site on hemoglobin, the affinity for oxygen of all subunits decreases.

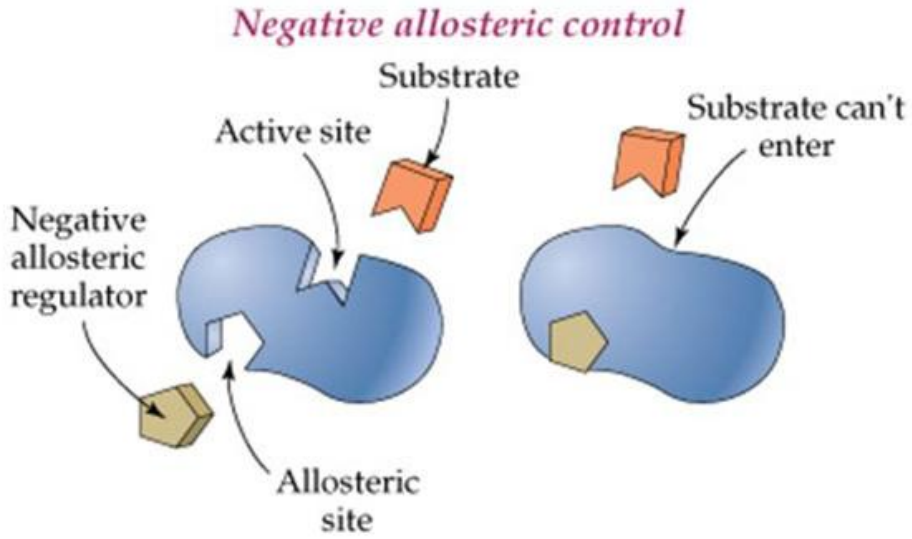
PROCESSES INVOLVING THE ALLOSTERIC ENZYME .

ii. POSITIVE ALLOSTERISM

Positive allosteric modulation (also known as *allosteric activation*) occurs when the binding of one ligand enhances the attraction between substrate molecules and other binding sites. An example is the binding of oxygen molecules to hemoglobin, where oxygen is effectively both the substrate and the effector. The allosteric, or "other", site is the active site of an adjoining protein subunit. The binding of oxygen to one subunit induces a conformational change in that subunit that interacts with the remaining active sites to enhance *their* oxygen affinity. Another example of allosteric activation is seen in cytosolic IMP-GMP specific 5'-nucleotidase II (CN-II), where the affinity for substrate GMP increases upon GTP binding at the dimer interface



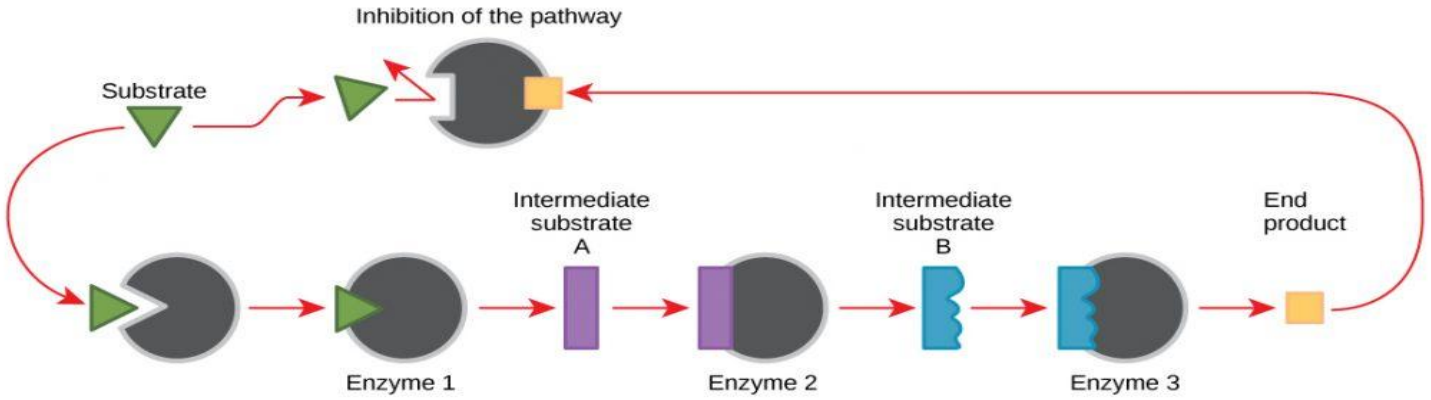
A **positive regulator** changes the activity site so that the enzyme becomes a better catalyst and rate accelerates.



A **negative regulator** changes the activity site so that the enzyme becomes less effective catalyst and rate slows down.

FEEDBACK INHIBITION

feedback inhibition is the phenomenon where the output of a process is used as an input to control the behavior of the process itself, oftentimes limiting the production of more product. Although negative feedback is used in the context of inhibition, negative feedback may also be used for promoting a certain process.



PROENZYMES(ZYMOGEN)

A zymogen also called a proenzyme is an inactive precursor of an enzyme. A zymogen requires a biochemical change (such as a hydrolysis reaction revealing the active site, or changing the configuration to reveal the active site) for it to become an active enzyme. The biochemical change usually occurs in Golgi bodies, where a specific part of the precursor enzyme is cleaved in order to activate it. The inactivating piece which is cleaved off can be a peptide unit, or can be independently folding domains comprising more than 100 residues. Although they limit the enzyme's ability, these n-terminal extensions of the enzyme or a “prosegment” often aid in the stabilizing and folding of the enzyme they inhibit.

Zymogens or proenzymes

Zymogen	Activator	Active enzyme
Pepsinogen	H^+, pepsin	pepsin
Trypsinogen	trypsin, enterokinase	trypsin
Chymotrypsinogen	trypsin	chymotrypsin
Procarboxypeptidase	trypsin	carboxypeptidase
Proelastase	trypsin	elastase
Prorennin	H^+, rennin	rennin

AAYUSH SINGH