Name: Period: _____

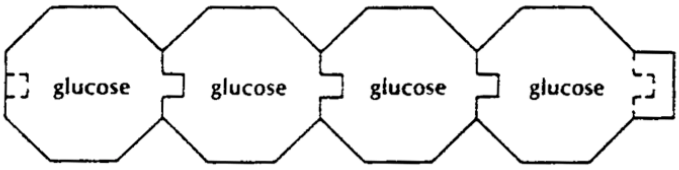
Enzymes Note taking Sheet

INTRODUCTION: ENZYME DEMONSTRATION

substance	original color of the solution	color with Benedicts **before** heating	color with Benedicts **after** heating for 2 min.
Tube 1. starch with saliva (let sit for 10 min.)			
Tube 2. simple sugar (glucose or fructose)			
Tube 3. starch solution ONLY			
Tube 4. saliva ONLY			

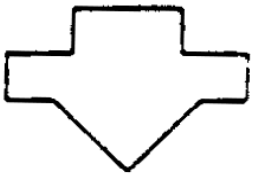
Reading and Analysis:

The image below represents a starch molecule. Starch is a polymer consisting of multiple glucose molecules that are covalently bonded together, forming a chain.



Starch molecule

An enzyme in your saliva called sa*livary amylase* can change starch into glucose (a monosaccharide) by removing glucose molecules from the end of the chain (note: the actual reaction is somewhat more complicated, but thinking of it this way is useful for learning about how enzymes work). One way to envision this is to imagine this enzyme closely fitting together with starch at the point where the glucose monomers connect. The enzyme stresses the bonds between the monomers, causing them to break, releasing the monomer (glucose) into the solution. As a result, a starch solution which initially has no glucose can be changed into a solution of that contains glucose. The enzyme, in other words, frees the glucose monomers from the starch polymer.



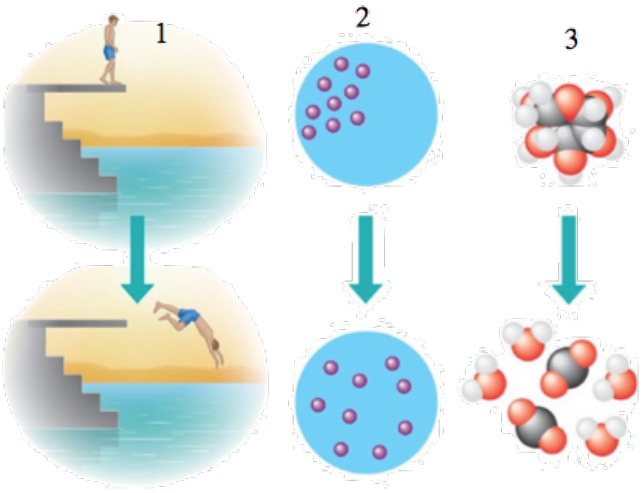
Using the shape shown at left to represent the enzyme in saliva, draw a series of diagrams to accompany the text in the table below.

1. Starch Molecule		*2. Enzyme in saliva*	
3. Enzyme fitting together with the starch molecule and stressing the bonds between the glucose monomers.		*4. Glucose molecules freely floating the in the solution*	

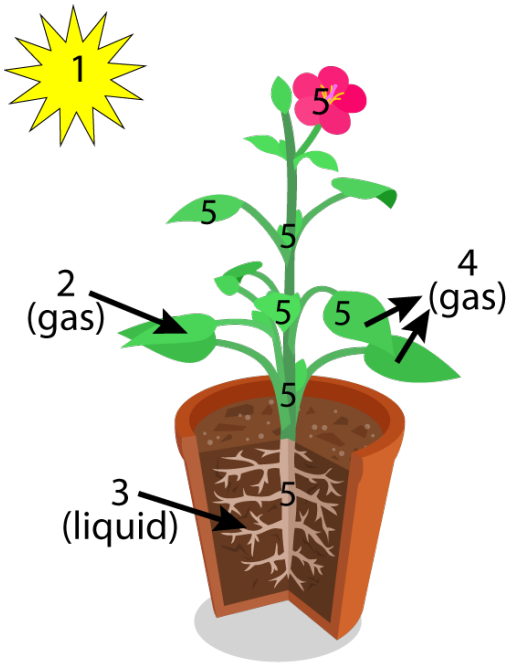
CLAIM/EVIDENCE/REASONING: Amylase and starch

Part I. Energy and Metabolism

Spontaneous Reactions



Life requires free energy input from the _____.

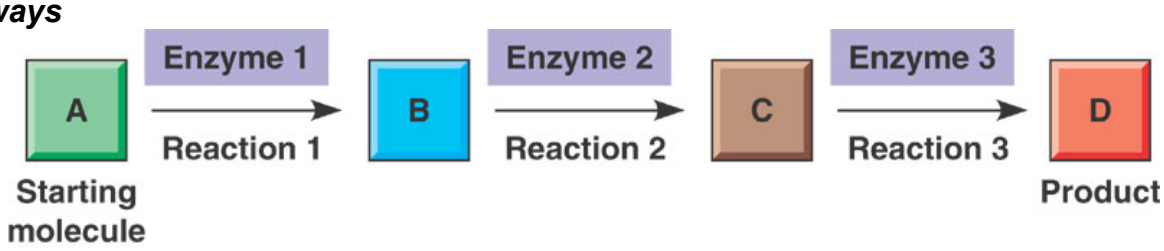


Cellular Respiration

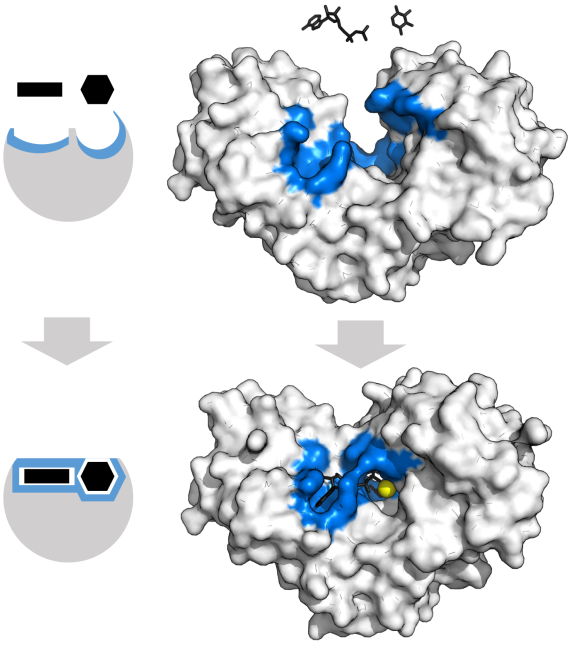
Equation: _____ + _____ ➔ _____ + _____ + _____

Similarities with Combustion	Differences from Combustion

Metabolic Pathways



Enzymes Overview



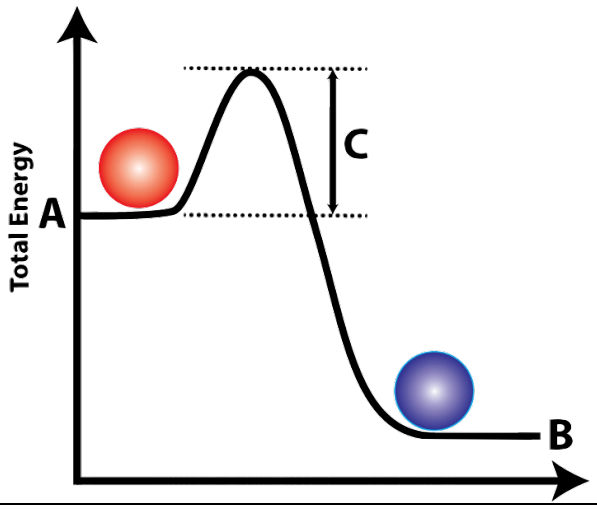
Metabolism:

Anabolism	Catabolism

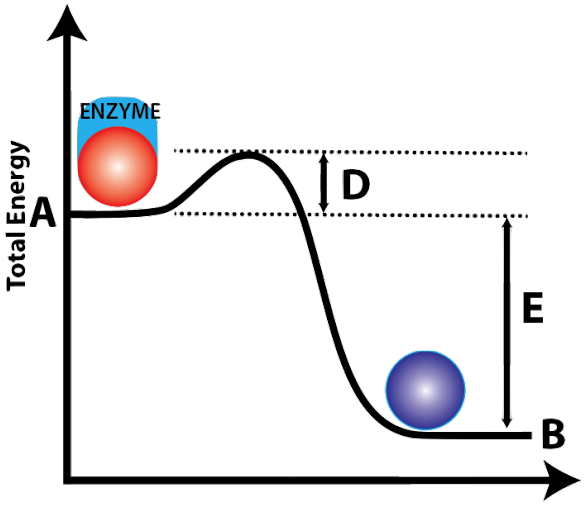
EVERYTHING YOU'VE LEARNED SO FAR

Part 2: Understanding Enzymes

Enzymes and Activation Energy



Key:



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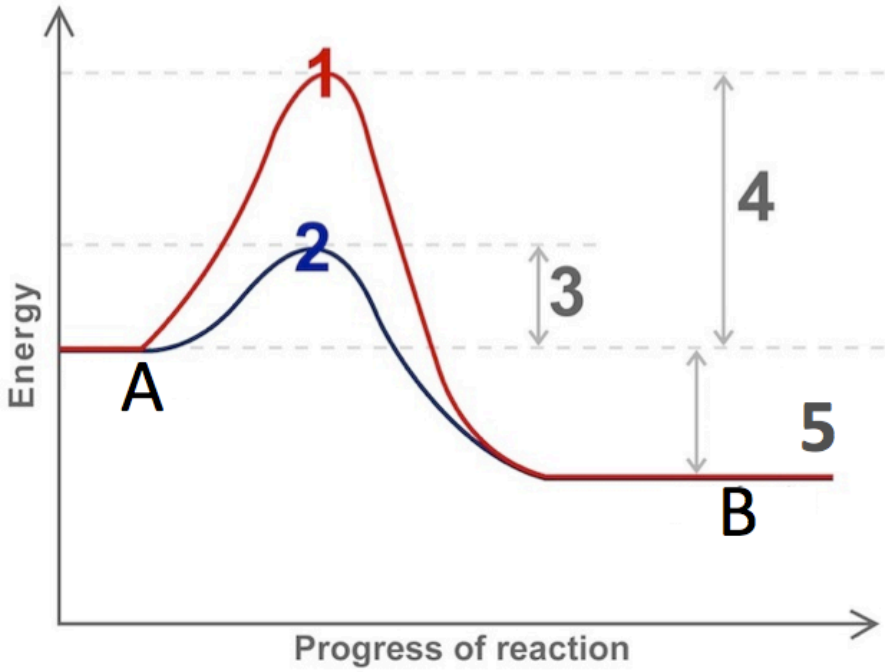
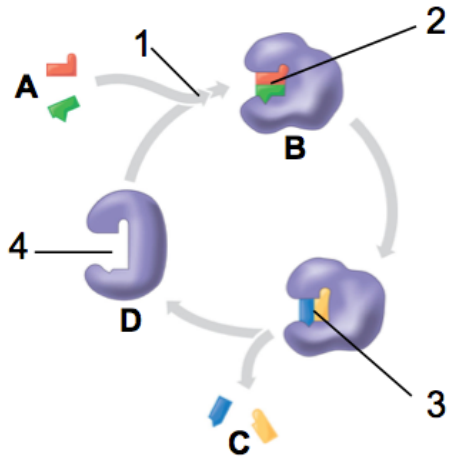


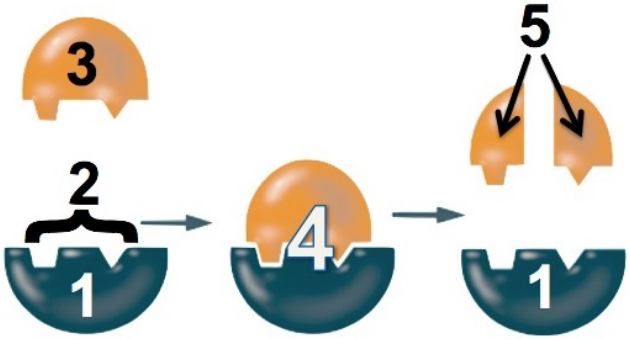
Key:

***Enzymes are substrate specific*:**
Examples:

Enzyme substrate interaction

-
-
-



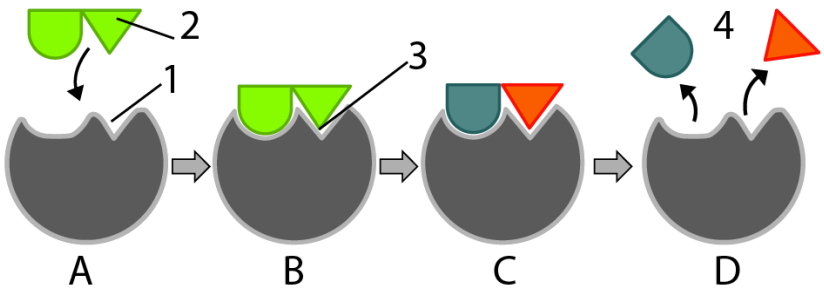


:

Possible enzyme mechanisms:

-
-

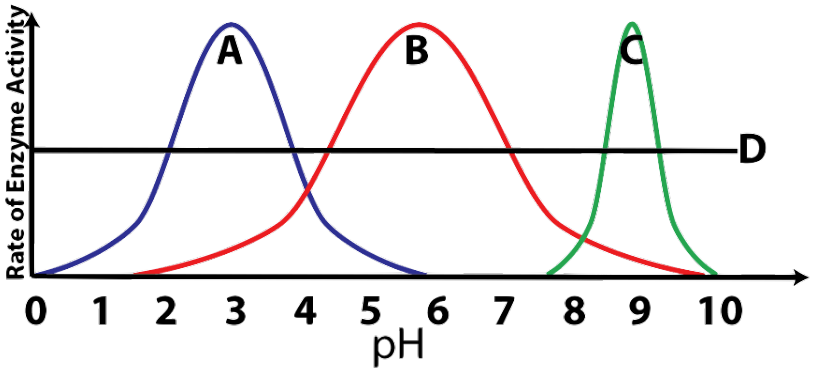
Another image of Induced fit:



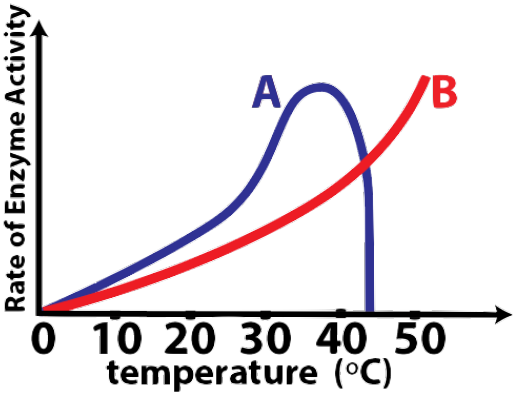
key:

Part 3: Enzymes and Their Environment

Enzymes and pH

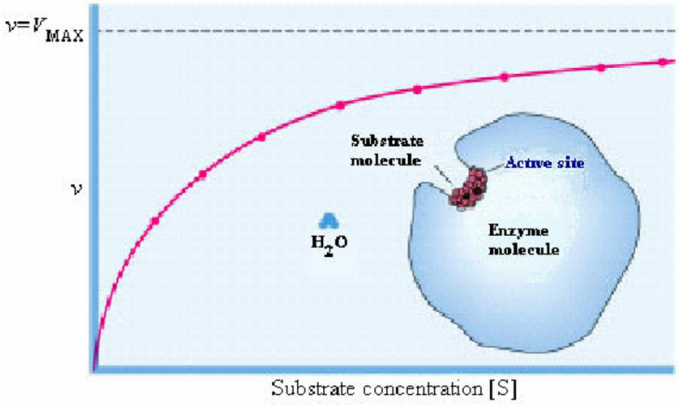


Enzymes and Temperature



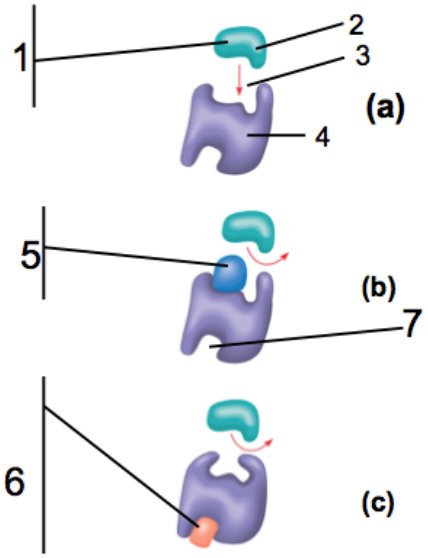
Enzymes and Substrate Concentration

X axis: substrate concentration Y axis: rate of conversion of substrate into product

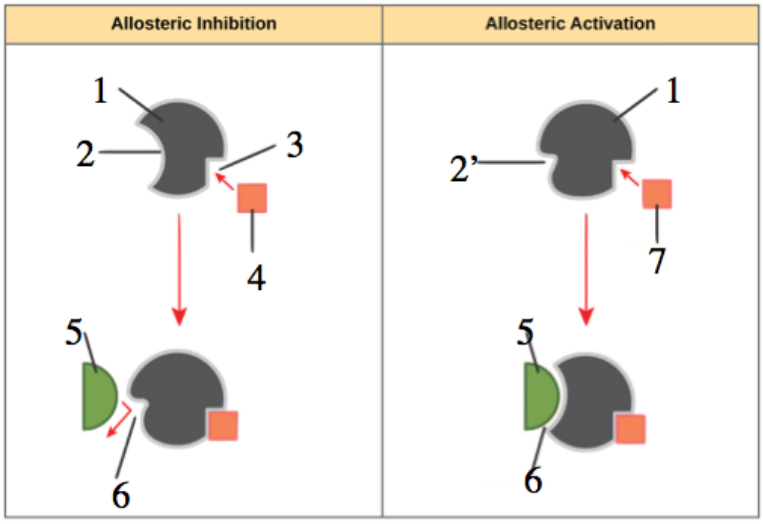


Part 4. Enzyme Inhibition and Regulation

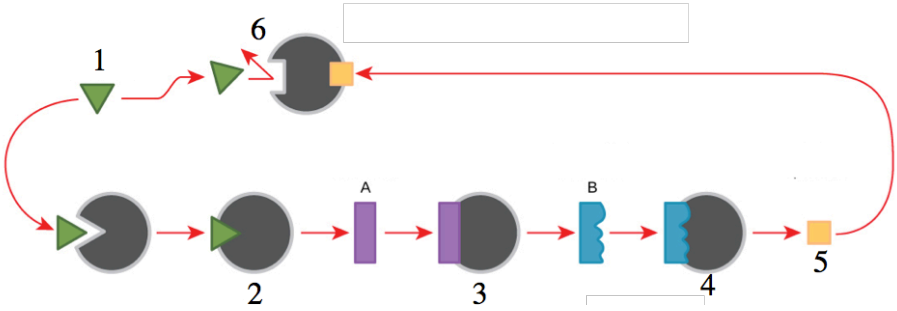
Enzyme inhibition:



Allosteric Regulation



Feedback Inhibition



Enzymes!

Glenn Wolkenfeld © 2012

They're the protein catalysts in every organism: ENZYMES!
Through enzymatic action your metabolism's driven: ENZYMES!
In *staphylococcus*, jellyfish, tarantulas and trees,
They lower activation energy
Enzymes, in you and me now, ENZYMES!

You got 'em in your cells where they do cellular digestion: ENZYMES!
You got 'em in your mouth and in your stomach and intestines: ENZYMES!
The thing an enzyme acts upon is called a substrate.
They fit like lock and key with complementary shape
Enzymes, speed up reaction rates: ENZYMES!

An enzyme binds its substrate at its active site: ENZYMES!
Bound together in a complex where they snuggle so tight: ENZYMES!
New bonds will form and break due to the active site's chemistry
Reactants become products, it's the enzyme's specialty,
Product gets release enzyme repeats its action readily: ENZYMES!

Like any molecule an enzyme's shape defines its function: ENZYMES!
Environmental change that changes shape leads to malfunction: ENZYMES!
Every enzyme has a pH where it catalyzes best,
a pH change will set enzyme activity to rest.
Enzymes are so sensitive they're easily upset: ENZYMES!

More heat until a certain point increases their efficiency: ENZYMES!
But too much heat denatures them destroying their activity: ENZYMES!
That's why a fever running high's a dangerous situation,
All that heat can alter enzymatic conformation.
Keep it 98.6 for enzyme optimization: ENZYMES!

Enzymes in saliva will break starch into glucose: ENZYMES!
If you lack the enzyme lactase then you won't enjoy milk lactose: ENZYMES!
Tay-sachs, galactosemia and PKU disease,
All caused by inherited enzyme deficiencies
ENZYMES, they're what everybody needs: ENZYMES!