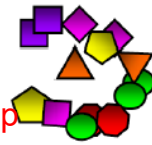


PROTEINS: made up of a long chain amino acids chemically bonded by peptide bonds

amino acids have an amino group, a carboxyl group, and another group (R) that makes them unique

there are 20 different amino acids

our bodies make 12 of them but we must obtain 8 through our diet



animal proteins contain all 20 amino acids "complete proteins" (beef, fish, milk, eggs)

plant proteins are missing one of the 20 amino acids "incomplete proteins"

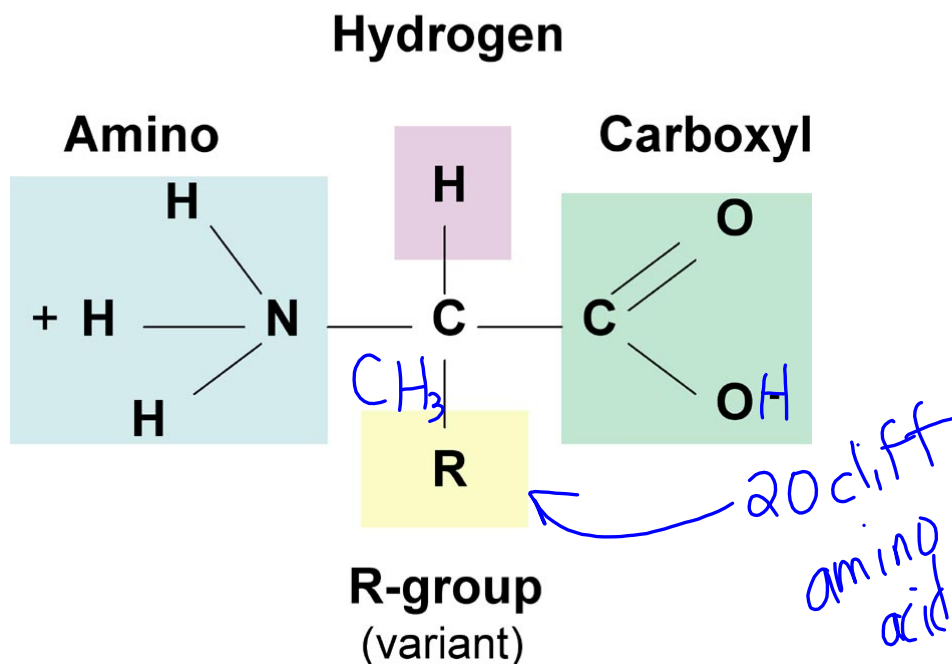
What is protein denaturation? proteins lose their shape when subjected to high temperatures or a change in pH (more acidic or basic)

this prevents the protein from functioning normally

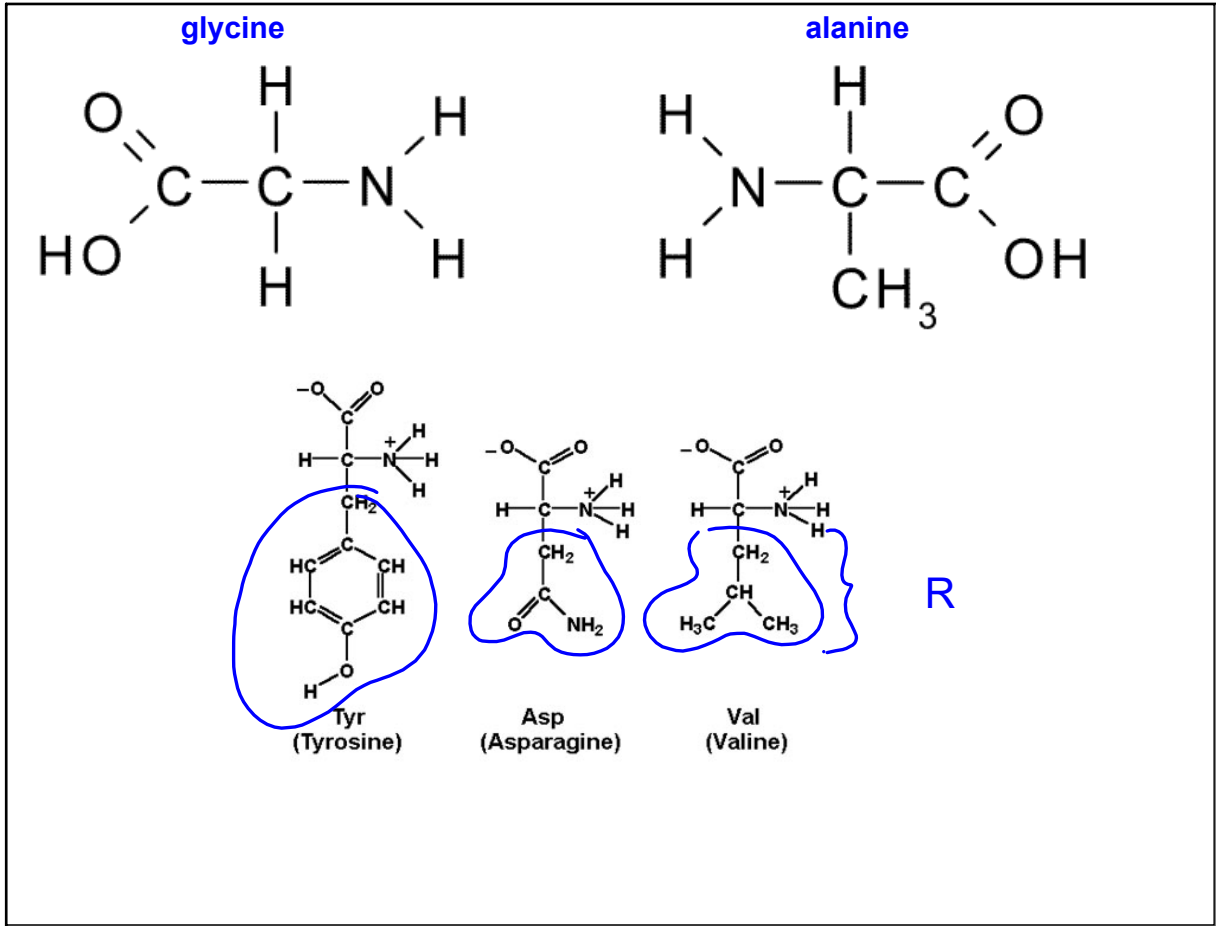
Why are prolonged fevers dangerous? since proteins are enzymes, prolonged high temperatures may denature critical enzymes in the brain causing seizures and death

Feb 22-11:56 AM

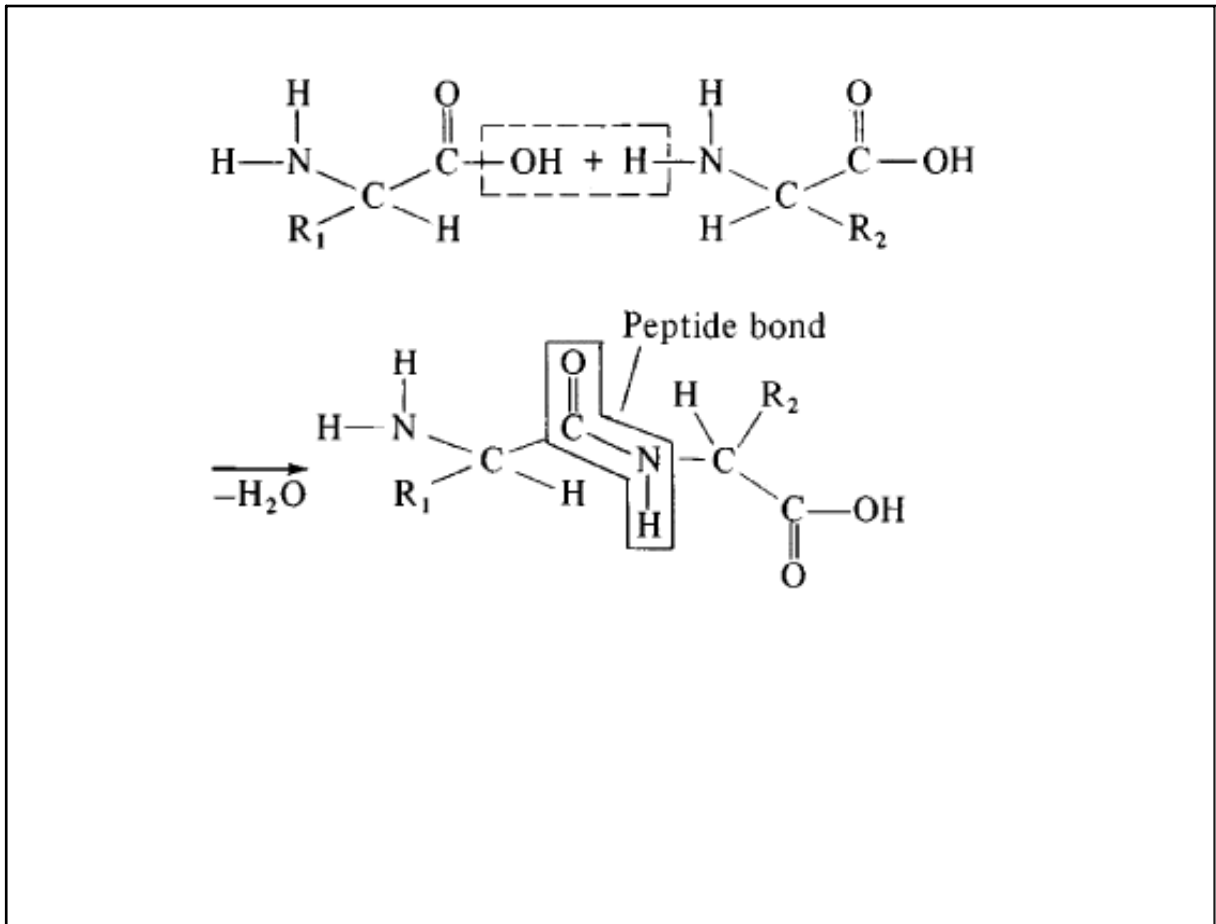
Amino Acid Structure



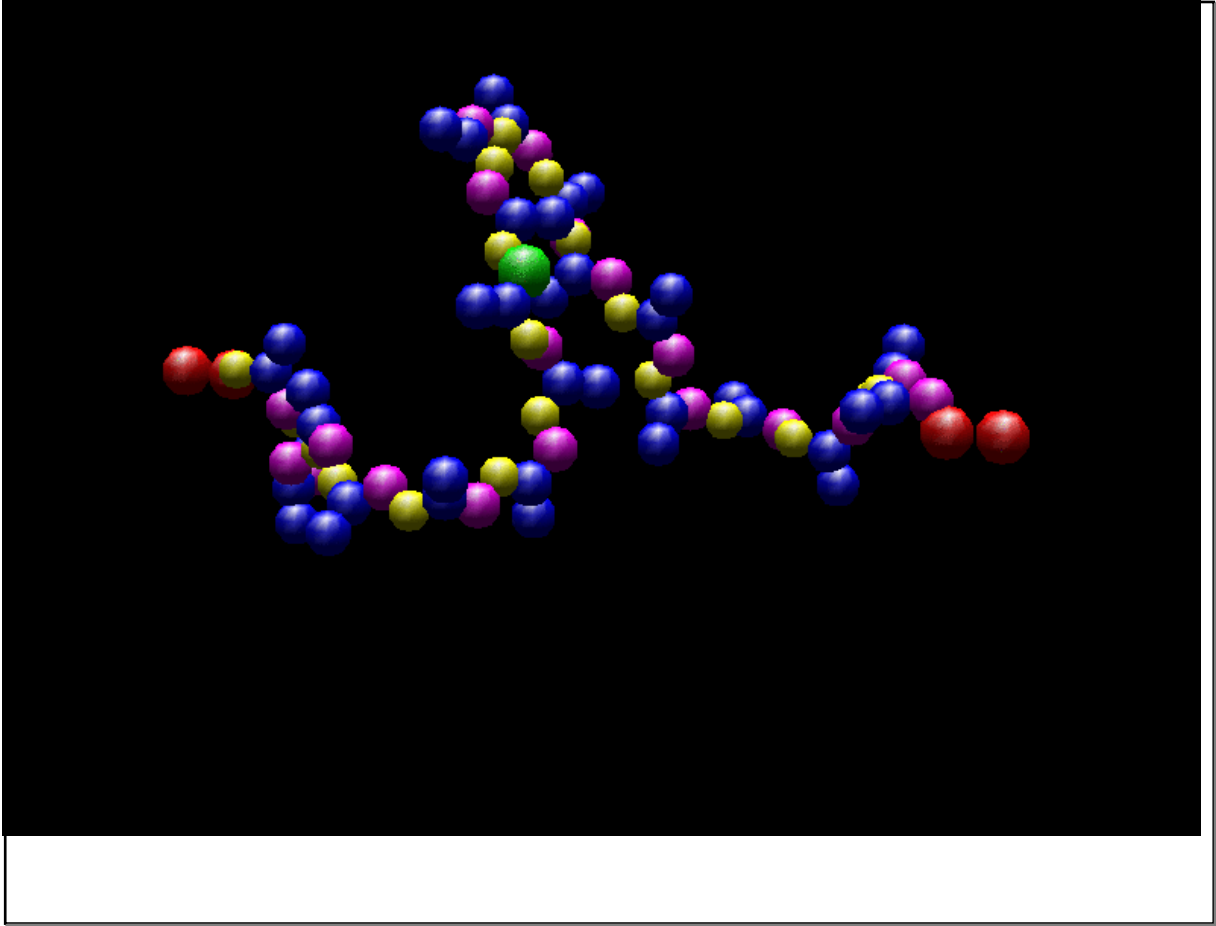
Feb 22-12:04 PM



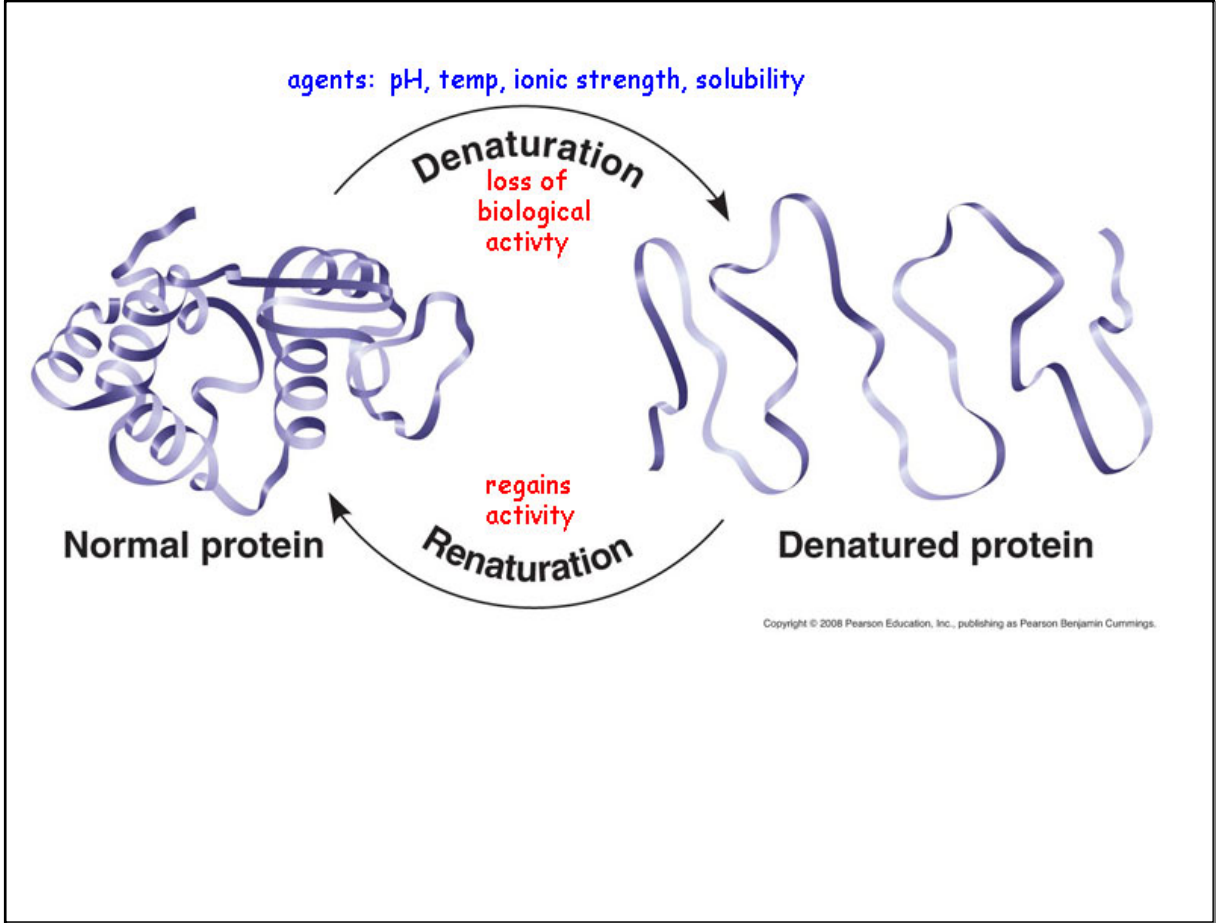
Feb 23-4:55 PM



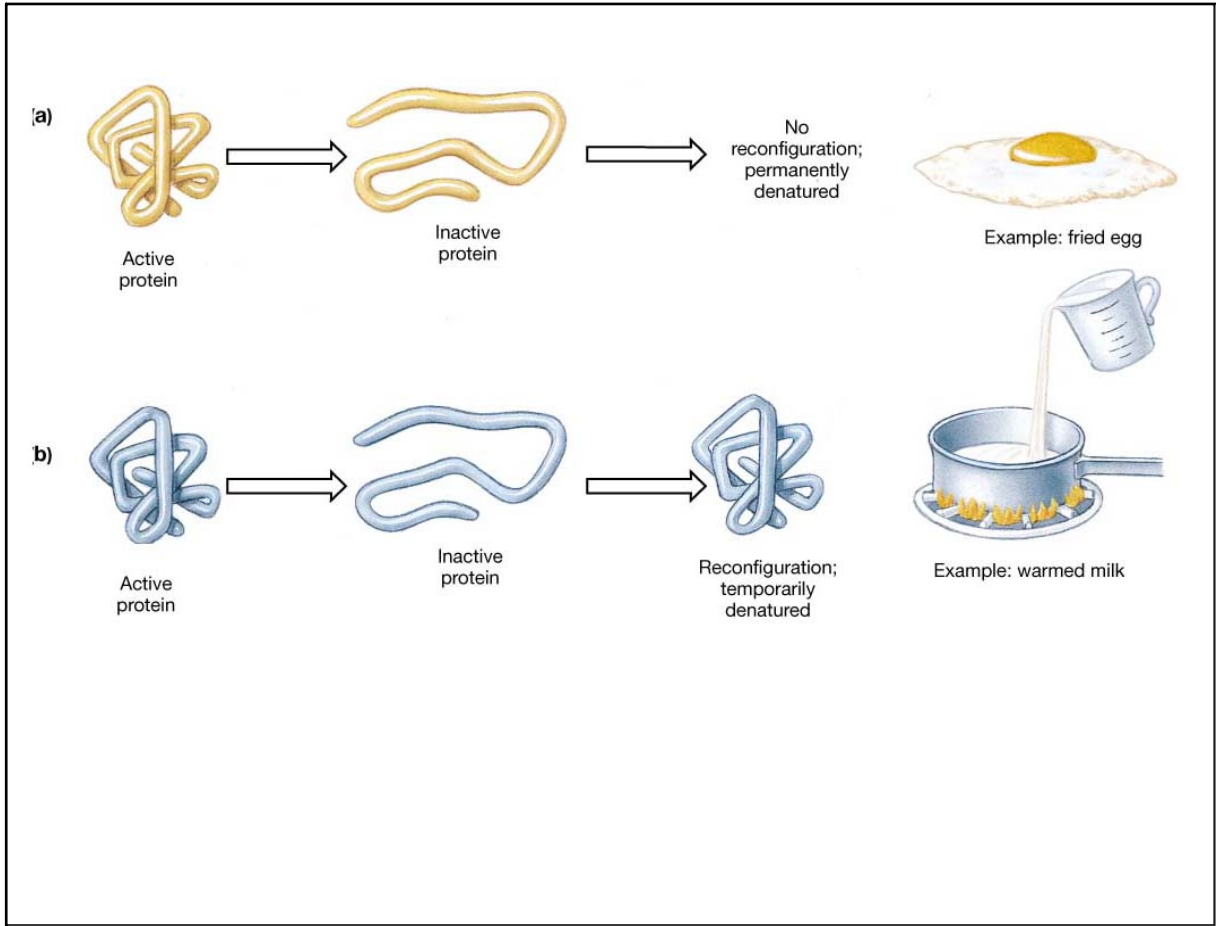
Feb 23-10:14 AM




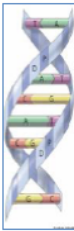
Feb 22-12:06 PM



Feb 23-10:21 AM



Feb 23-10:22 AM

<p>NUCLEIC ACIDS:</p> 	<p>DNA</p> 	<p>RNA</p>
<p>2 similarities:</p> <p>2 differences:</p>		

Feb 22-11:57 AM

Proteins: Enzymes pages 51 - 54

What are enzymes?

enzymes are proteins that speed up biological chemical reactions they are not changed by the reaction - so can be used over again

How are enzymes named? Provide two examples.

enzymes end with the suffix - "ase" and are named after the substrate they act on

Example 1: **amylase**

Example 2: **maltase**

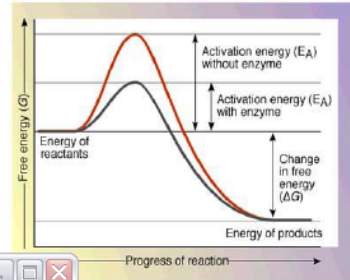
other examples: **lipase, alcohol dehydrogenase (liver)**

Activation Energy

all chemical reactions require energy to "kick start" them

enzymes lower the "activation energy" required for a chemical reaction

this allows the reaction to proceed faster



Feb 20-7:46 AM

Protein Denaturation

most common source of activation energy is heat

an increase in heat (temperature) will change the shape of the protein and prevent it from binding to the substrate (substance enzyme acts on)

if the enzyme changes shape it will not be able to function properly

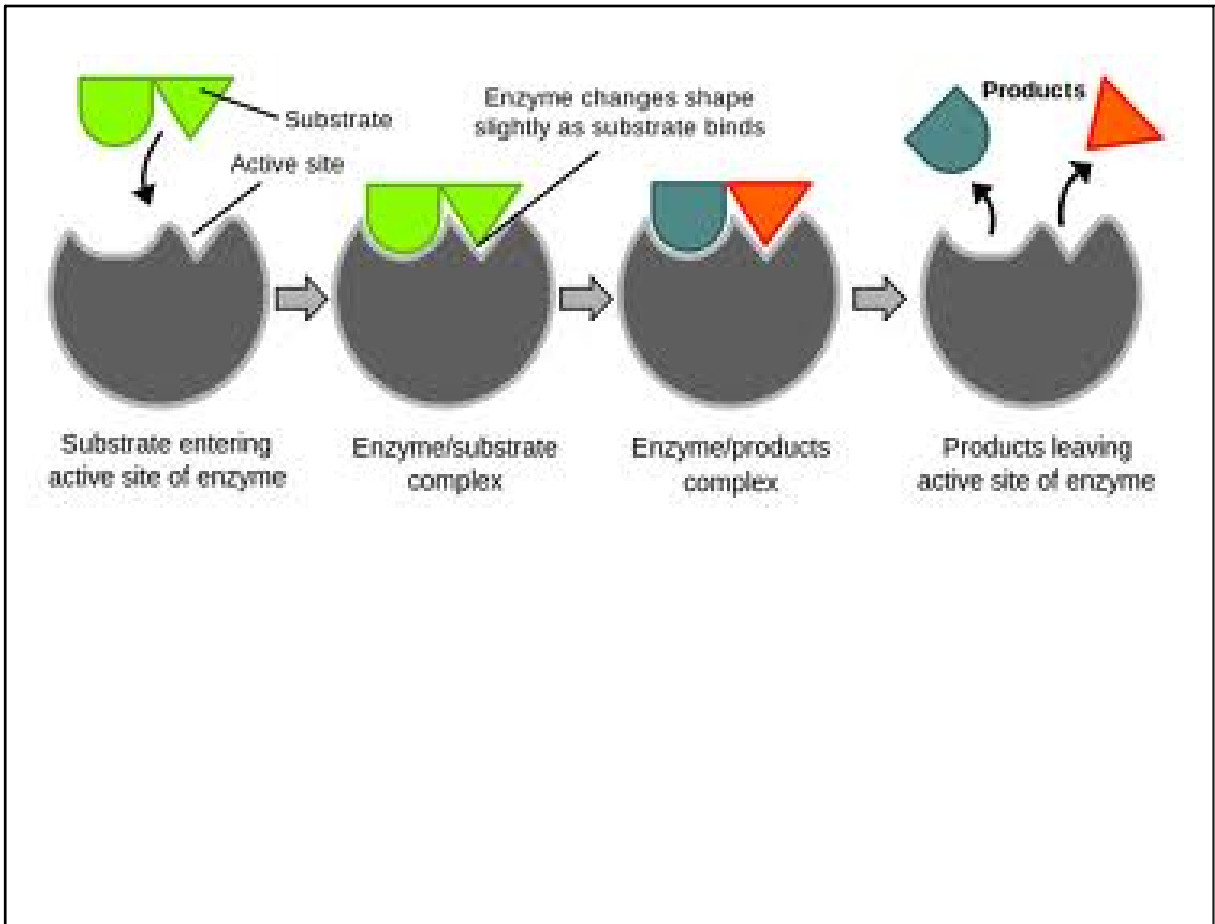
Chemical Reaction, example:



Feb 20-7:49 AM

<p>Enzyme-Substrate Complex a.k.a. <u>lock and key model</u></p> <ol style="list-style-type: none"> 1. on the surface of the enzyme is a space called the active site 2. the substrate must fit into this site 3. the enzyme can break bonds or join 2 molecules 4. the product is released <p>substrate enzyme</p>	<p>Induced-fit Model</p> <p>the enzyme changes shape to better fit the substrate</p> <p>Result: enzyme-substrate complex</p>

Feb 20-7:49 AM

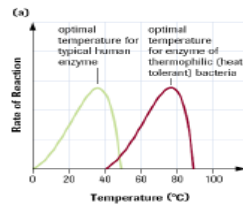


Feb 20-8:35 AM

Enzyme activity can be affected by environmental factors, such as:

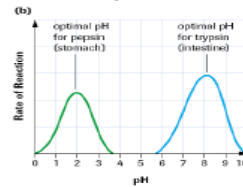
1. temperature

human enzymes work best at 37°C



2. pH

each enzyme works best at a specific pH



What are 3 Industrial Uses of Enzymes?

1. **brewing**

4. **cleaning industry (soaps, detergents)**

2. **baking**

5. **obtaining glucose from starch to be used as a sweetener in foods and beverages**

3. **winemaking**

6. **using lactase enzyme to break down lactose for "lactose-free" milk products**

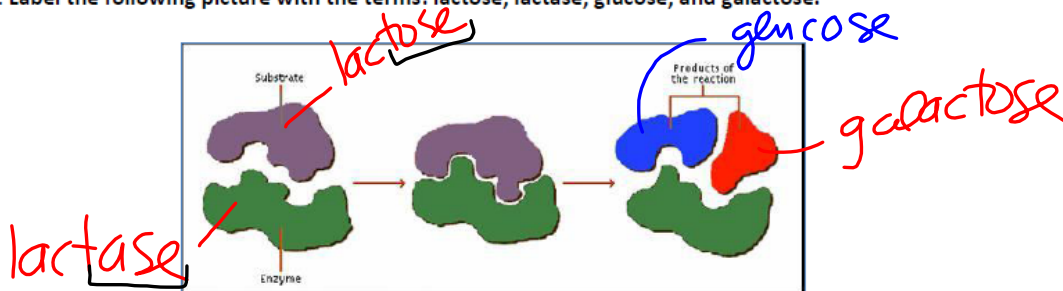
Feb 20-7:49 AM

Enzyme-Controlled Reactions

Communication	/10	TOTAL MARK	/22 (wt-3)
Thinking & Investigation	/12		

Background Information:

Millions of people suffer from an enzyme related condition called **lactose intolerance**. Lactose is a disaccharide that is commonly referred to as a dairy sugar. In normal individuals who eat lactose, their digestive system produces the enzyme lactase which breaks down the sugar into two monosaccharides – glucose and galactose which can be used by the body. **Label the following picture with the terms: lactose, lactase, glucose, and galactose.**



In a person with lactose intolerance, there is not enough of the lactase enzyme produced to break down the substrate lactose. When this individual eats lactose, it cannot be broken down sufficiently in their digestive tract. This leads to discomfort associated with lactose intolerance such as cramps, bloating, gas, and diarrhea.

Please visit http://www.mhhe.com/biosci/genbio/virtual_labs/BL_11/BL_11.html to begin the virtual lab.

Feb 20-8:15 AM

Purpose: In this investigation you will determine the effects of **substrate concentration** and **pH** on the rate of an enzyme-catalyzed reaction.

Questions: What is the effect of lactose (substrate) concentration on the rate of enzyme activity?

Hypothesis: I think that the more substrate the
the reaction.

Part 1: Effect of lactose concentration on enzyme activity

Procedure:

1. To conduct a controlled experiment, you must determine:

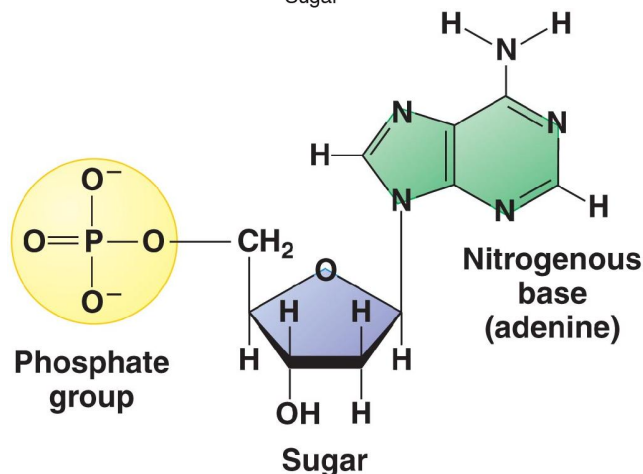
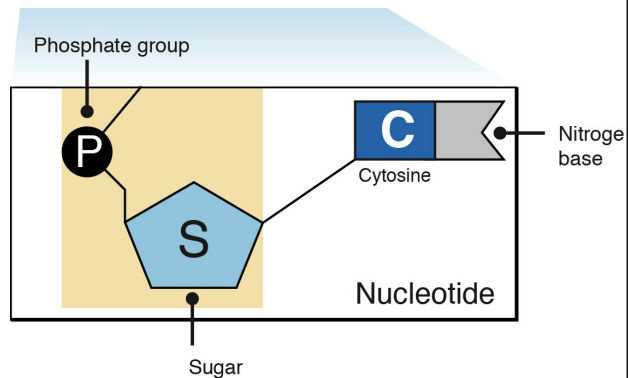
Independent variable: substrate concentration
Dependent variable: rate of reaction: (enzyme activity)
Controls: pH and temperature remain constant

Independent variable is purposefully and steadily manipulated (WHAT ARE YOU TESTING?)
Dependent variable is what you are MEASURING
All other variables are kept constant.

- In each of the 5 test tubes, a lactase solution (the enzyme) is already added.
- Click and drag to add a different concentration of the lactose (the substrate) into each of the five test tubes. You should end up with each test tube containing a different concentration of lactose.
- Click on the 'computer screen' and the experiment will run, and an observation table will pop up.
- Record the results in the observation table found in the "Observations" part of the lab report.
- Create a graph to plot the results in the "Observations" part of the lab report. Make sure your graph has a title, with the axis labelled properly.
- Report to your teacher when you finish Part 1 before starting Part 2

Feb 24-12:25 PM

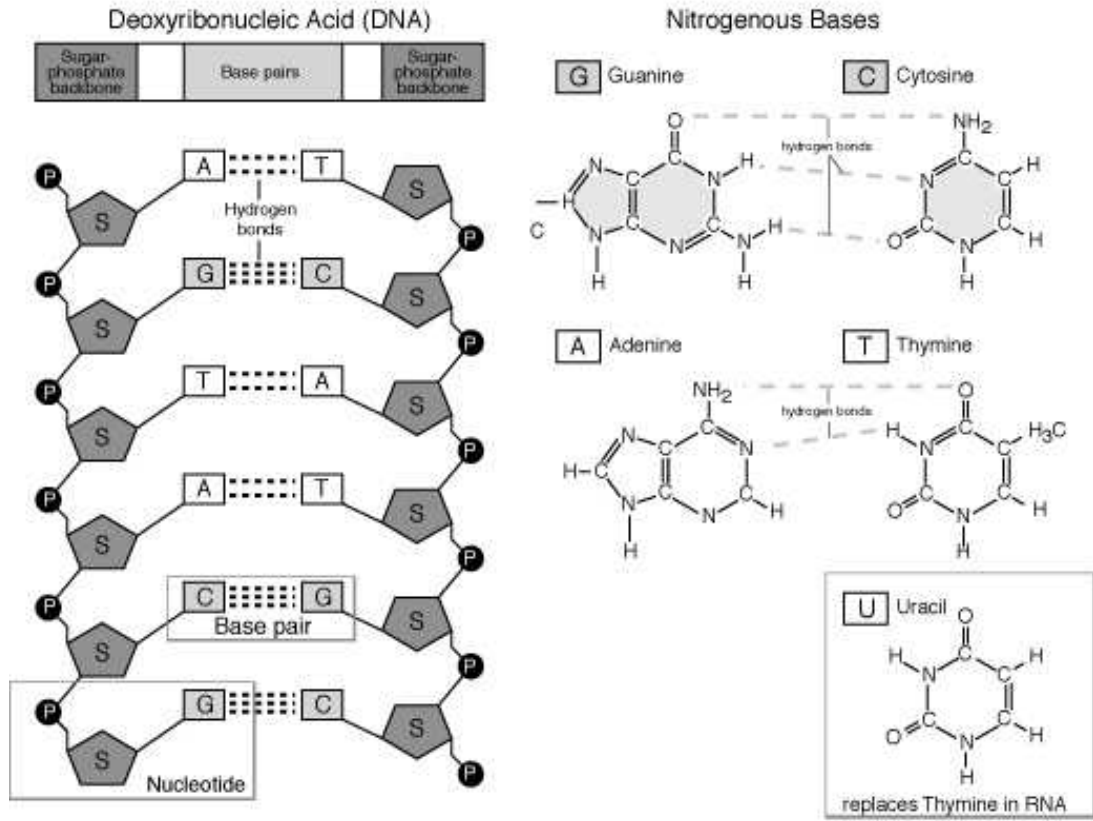
Nucleotide:



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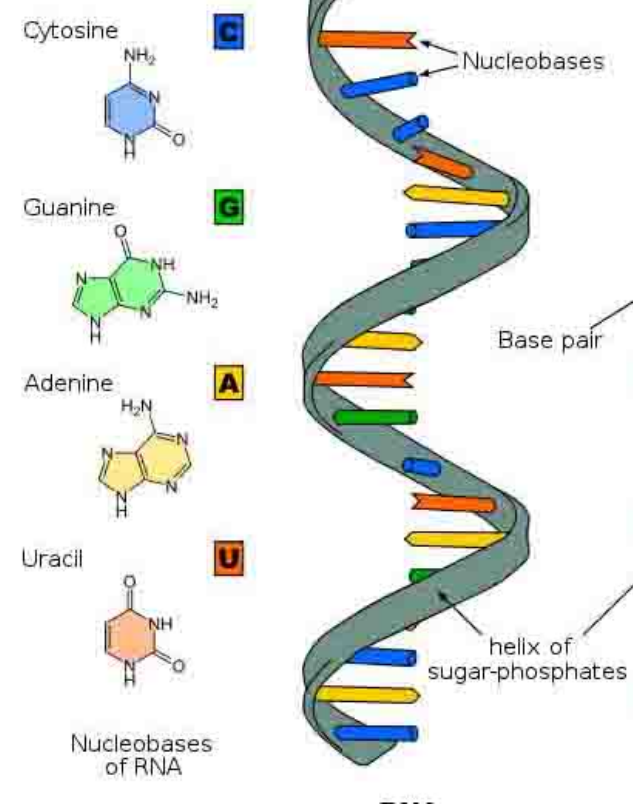
Feb 26-10:22 AM

DNA - stores genetic information



Feb 22-11:48 AM

RNA - codes information to build proteins



Feb 26-10:13 AM

Table: Similarities and Differences between DNA and RNA

Feature	DNA	RNA
Number of strands in molecule	2	1
Type of sugar in nucleotide	Deoxyribose	Ribose
Nitrogenous bases contained	A, C, G, T	A, C, G, U
Subunits	Nucleotides	Nucleotides
Nucleotide components	Sugar, base, phosphate	Sugar, base, phosphate

Feb 26-10:16 AM

Mar 1-12:30 PM