Unit 1: Macromolecules

Learning Target	I could be the teacher for this.	Yeah, I could pass a test on this now.	50/50	I could use a lot of help.	Ummm…Is this English?
1.**Explain** why the special properties of water make it essential for life, including: Polarity, Hydrogen Bonding, cohesive and adhesive behavior, ability to moderate temperature, universal solvent behavior, and expansion upon freezing					
2. **Identify** basic molecular structures and **describe** the primary functions of the four major categories of biological macromolecules, including: Carbohydrates, lipids, proteins, and nucleic acids					
3.**Predict** the effect pH, temperature and enzyme concentration have on enzyme activity					
4.**Explain** how an enzyme increases the rate of a biological reaction: Enzymes decrease the activation energy of reactions by acting as a catalyst which is not consumed during the course of the reaction					
5. **Analyze graphs** from an experience to **draw conclusions** on activation energy					

Exam score:

What did I do to prepare for this exam?

Was my method of preparation successful for me? What did I do that was helpful? What did I NOT do that I should have?

What would I like to do next time to prepare for my exam?

Explain why the special properties of water make it essential for life.

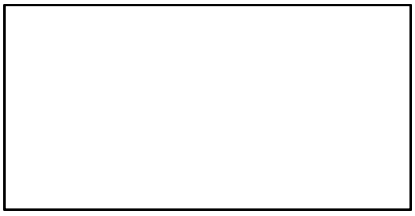
Polarity: One end of a molecule is slightly positive and one end is slightly negative. The polarity gives water its stickiness!!

Oxygen end has a – Charge
Hydrogen end has a + Charge

Hydrogen Bonds: Weak bonds that holds water molecules to other substances and itself.
Universal Solvent: Water is an excellent Solvent.

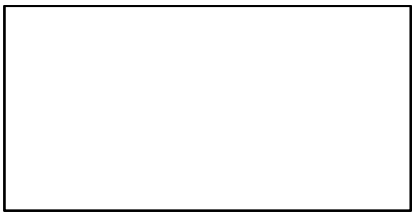
Solute +	***Solvent*** =	***Solution***
Material added to the liquid that will dissolve (The smaller amount)	Liquid that items are added to (The Larger amount)	Liquid that all materials are distributed equally

Cohesion: Water is attracted to itself. Cohesion is the attraction of molecules of the same substance.



Surface Tension: Cohesion at work. Water attraction (cohesion) forms a thin skin barrier on surface.

Adhesion: Attraction of water to OTHER materials



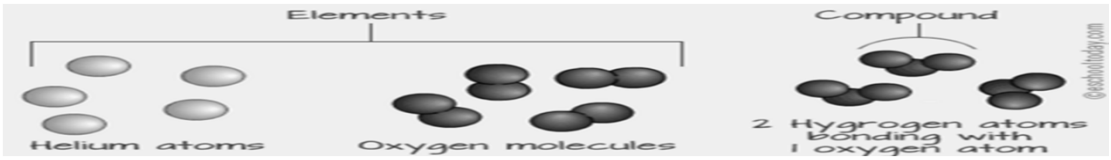
Capillary Action: Adhesion and cohesion together cause water to move against gravity

Density: Water expands upon freezing→ making it less dense→ so it floats

High Specific Heat: Water absorbs a lot of heat before it is affected. Retains heat/energy longer.
Maintains temperature of organisms (homeostasis) and the Earth.

Identify the basic molecular structures and describe the primary functions of the four major categories of biological macromolecules, including: *carbohydrates, lipids, proteins, and nucleic acids.*

→ **Compound**: A substance in which two or more different elements (atoms) are chemically bonded together



→ All compounds can be classified into 2 main categories:

Organic	Inorganic
-produced by living things -contains **carbon (C)** -important organic compounds 1. carbohydrates 2. lipids 3. proteins 4. nucleic acids	-nonliving -does not contain carbon (exceptions) -plants organize inorganic compounds into organic compounds -H_2O, O_2, CO_2

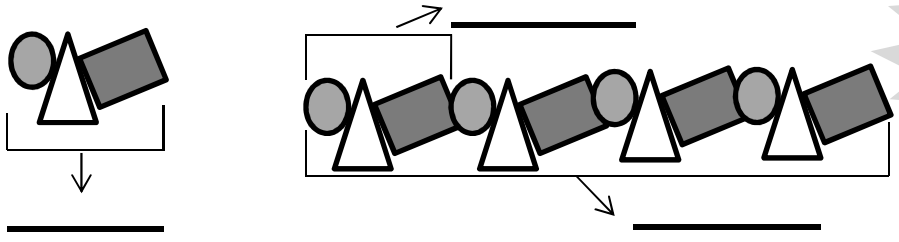
4 Main Macromolecules:
- -make up all living things
- -large molecules (macro)
- -composed of varying amounts of **carbon (C)**, hydrogen (H), oxygen (O), nitrogen (N)

→ In many carbon-based molecules, like macromolecules, small molecules are subunits of an entire molecule (example: **links** in a *chain* or **bricks** in a *wall*) .

-MONOMER: a small molecule or subunit in the complete chain (**link** or **brick**)

-POLYMER: a large molecule made of many monomers (*chain* or *wall*)

Each smaller molecule is a subunit called a _____. A _____ is a molecule that contains many monomers bonded together.



Mono- = one
Poly = many

Identify the basic molecular structures and describe the primary functions of the four major categories of biological macromolecules, including: *carbohydrates, lipids, proteins, and nucleic acids.*

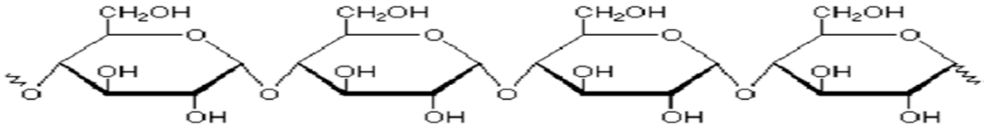
1. Carbohydrates:

Function – provides short term chemical energy; makes up the cell wall and supports plants

Monomer – saccharides

Saccharide = sugar

*Below is a molecule of amylose, highlight a monomer (saccharide) in the polymer:

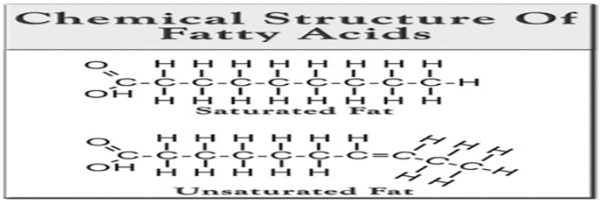


2. Lipids:

Function – stores long term energy; makes up cell membrane (phospholipid)

Monomer – fatty acids

→Fatty acids are either classified as saturated or unsaturated



3. Proteins:

Function – forms enzymes; provides structure; fights infection; movement; eyesight; digestion; carries oxygen; builds and repairs tissues

Monomer – amino acids

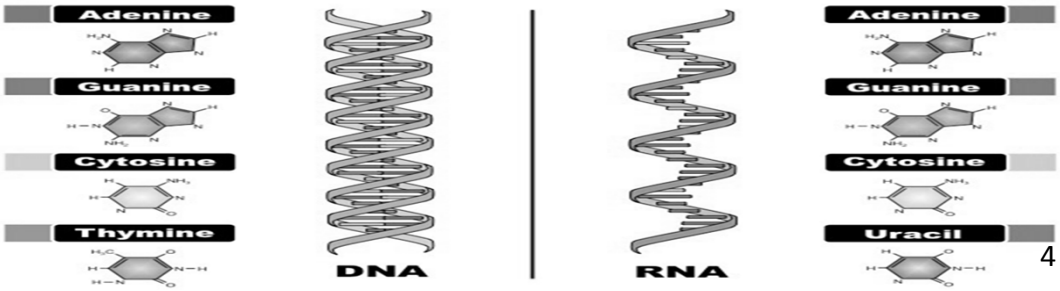
→ ENZYMES are one very important group of proteins that help control chemical reactions by acting as catalysts.

4. Nucleic Acids:

Function – carries genetic information; makes proteins

Monomer – nucleotides

→ Make up DNA and RNA



Carbon-Based Molecules

Text Chapter 2.3

MACROMolecules

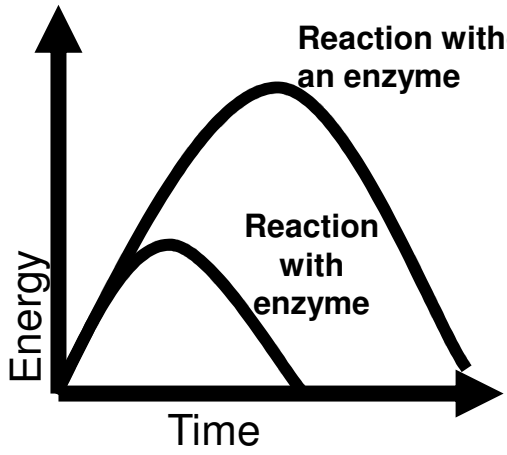
All are made up of C,H,O,N

	Food Examples	Function/ Purpose in Body	Molecular Structure (What does it look like chemically)	Building Blocks/SubUnits /Mononers
Carbohydrate Elements:				
Lipids Elements:				
Proteins Elements:				
Nucleic Acids Elements:				

Explain how an enzyme increases the rate of a biochemical reaction.

Enzymes: - Protein that LOWERS the energy it takes to start a reaction
- Starts and speeds up chemical reactions
- NOT used up in reaction, Enzymes are used over and over again in your body
- Without enzymes reactions would slow down

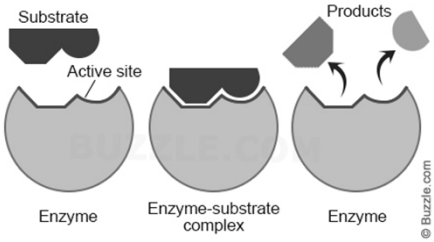
Catalysts: A chemical that initiates and increases the rate of reaction
ex. Enzymes!!!



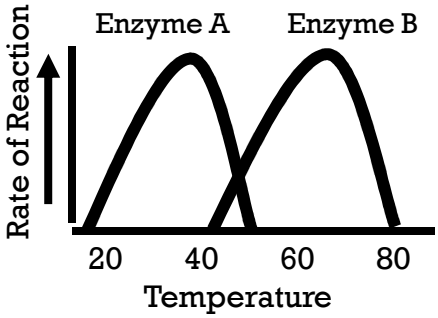
Enzymes LOWER the activation energy!!

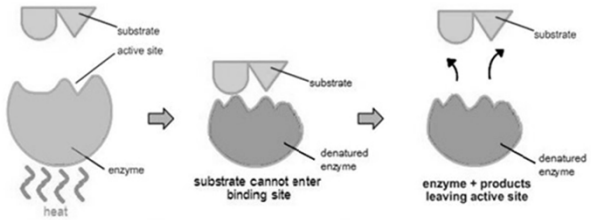
Enzymes are Vital to life!!
- Without enzymes, no activation of chemical reactions would take place… Vitamins, minerals or hormones could not do any work without enzymes.
- Enzymes control Metabolism→ Maintain homeostatis

Enzymes structure/shape determines its function.



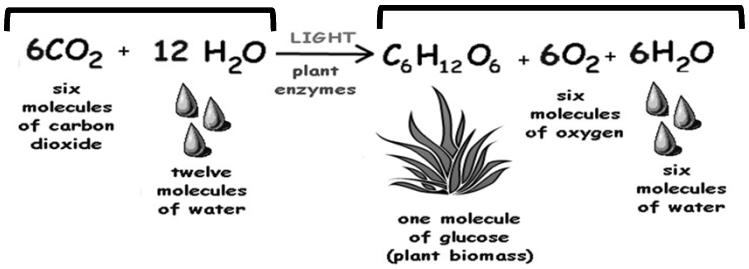
Enzymes work best in a small range (Temp, pH). The enzyme will change shape (denature) outside of that range.





Identify the parts of a Chemical Reaction

Chemical Reaction: Process that changes a substance into different substances by breaking and forming chemical bonds.



Reactant: Substance changed in chemical reaction. (What's going in)

Reactants are found on the_____ of the equation

Reactants are like_____

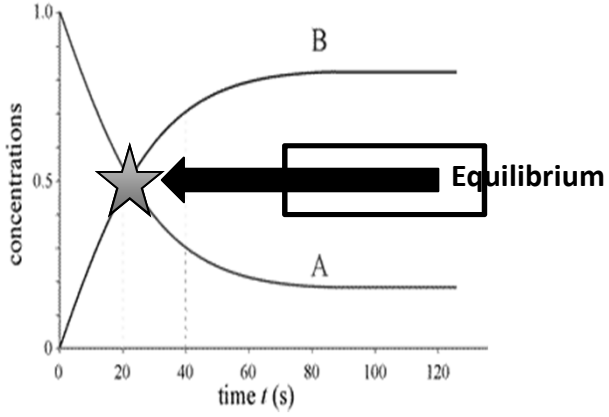
Product: The end result of a chemical reaction (What's being made)

Products are found on the _____ of the equation

Products are like_____

Equilibrium: Both reactants and products are made at the same rate

Concentration stays the same



Metabolism: All the chemical reactions that take place (in our body)

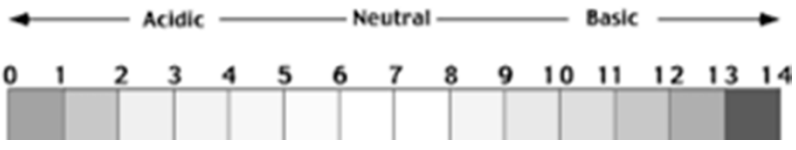
Ex: **1.**

2.

3.

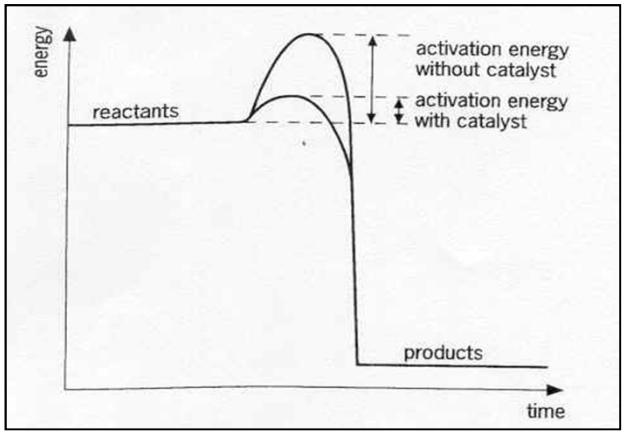
Denature: To alter the shape of an enzyme so it won't function properly

Small Changes in pH makes a HUGE difference



ACTIVATION ENERGY

Graph Practice



Refer to the graph at the left for questions 1-5.

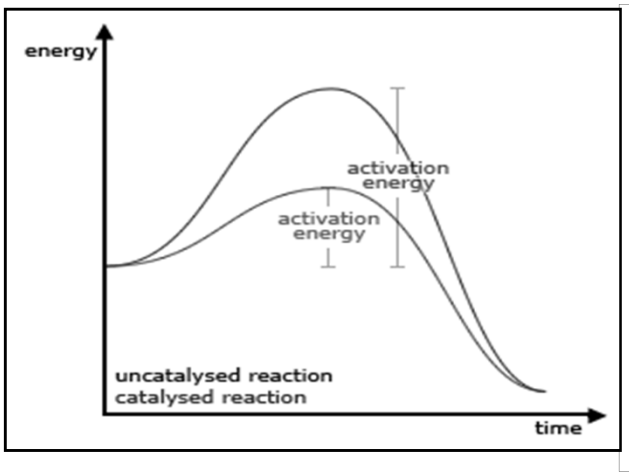
1. What is the independent variable?_____

2. What is the dependent variable?_____

3. Does activation with OR without a catalyst use more energy?

4. What is a catalyst?_____

5. In a written chemical reaction, reactants are on the _____ of an equation and products are on the _____ of an equation..



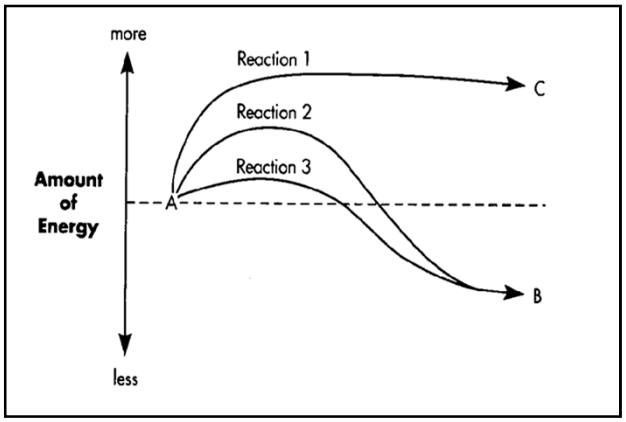
Refer to the graph at the left for questions 6-9.

6. What is the independent variable?_____

7. What is the dependent variable?_____

8. What does the phrase 'uncatalysed reaction' mean?_____
_____
_____

9. Does an enzyme raise OR lower the activation energy required to initiate a chemical reaction?
_____



Refer to the graph at the left for questions 10 & 11

10. Which of the following statements regarding the graph is true?

A. Reaction 2 occurs faster than Reaction 3 because Reaction 2 requires more energy than Reaction 3.

B. The difference between the graphs shown for Reaction 2 and Reaction 3 is because of a difference in the activation energy of these reactions.

C. Reactant A contains more energy at the beginning of the reaction than product C has after the reaction.

D. All of the above

11. Reaction 3 in the graph…

A. Probably occurred in the presence of a catalyst

B. Requires more activation energy than Reaction 2

C. Is the same as Reaction 1, but faster

D. Is slower than Reaction 2