

You should be able to identify each macromolecule by its structure and functional group.

1. Match the definitions to the terms.

Study Guide for Biochemistry Unit

Name: _____

Key

Period: _____

Date: _____

- | | | |
|---|---|--|
| 1. <input type="checkbox"/> Macromolecule | 1. <input checked="" type="checkbox"/> O | a. when elements or molecules are brought together broken apart forming new elements or molecules |
| 2. <input checked="" type="checkbox"/> Monomer | 2. <input checked="" type="checkbox"/> G | b. Fat, oil, wax, or steroid, made of fatty acids and glycerol |
| 3. <input checked="" type="checkbox"/> Polymer | 3. <input checked="" type="checkbox"/> P | c. RNA or DNA polymer, important in transferring hereditary information |
| 4. <input checked="" type="checkbox"/> Carbohydrate | 4. <input checked="" type="checkbox"/> E | d. Monomer of carbohydrate |
| 5. <input checked="" type="checkbox"/> Monosaccharide | 5. <input checked="" type="checkbox"/> D | e. Made of C, H, O; source of short term energy |
| 6. <input checked="" type="checkbox"/> Disaccharide | 6. <input checked="" type="checkbox"/> N | f. Monomer of protein |
| 7. <input checked="" type="checkbox"/> Polysaccharide | 7. <input checked="" type="checkbox"/> I | g. Monomer of nucleic acid |
| 8. <input checked="" type="checkbox"/> Lipid | 8. <input checked="" type="checkbox"/> B | h. When two monomers are brought together and form a polymer and a water molecule |
| 9. <input checked="" type="checkbox"/> Nucleic Acid | 9. <input checked="" type="checkbox"/> C | i. molecules or elements present before a chemical reaction |
| 10. <input checked="" type="checkbox"/> Nucleotide | 10. <input checked="" type="checkbox"/> G | j. Molecules or elements present after a chemical reaction |
| 11. <input checked="" type="checkbox"/> Protein | 11. <input checked="" type="checkbox"/> M | k. protein that regulates speed of chemical reaction |
| 12. <input checked="" type="checkbox"/> Amino Acid | 12. <input checked="" type="checkbox"/> F | l. polymer of carbohydrate |
| 13. <input checked="" type="checkbox"/> Enzyme | 13. <input checked="" type="checkbox"/> K | m. macromolecule that functions in the regulation of chemical reactions, muscle & bone formation, fights disease, and control movement of substance into and out of cells. |
| 14. <input checked="" type="checkbox"/> Dehydration Synthesis | 14. <input checked="" type="checkbox"/> H | n. two monomers of a carbohydrate added together. |
| 15. <input checked="" type="checkbox"/> Chemical Reaction | 15. <input checked="" type="checkbox"/> A | o. very large molecule |
| 16. <input checked="" type="checkbox"/> Reactants | 16. <input checked="" type="checkbox"/> I | p. made of many small monomers |
| 17. <input checked="" type="checkbox"/> Products | 17. <input checked="" type="checkbox"/> J | q. building blocks of macromolecules, makes up a polymer |

2. Saturated fatty acids and unsaturated fatty acids differ from each other in which of the following ways?

- A) They may have different numbers of carbons in their chains.
- B) The consistency at room temperature is different.
- C) For equal length chains they have a different number of hydrogens present.
- D) They differ in whether or not they have double-bonded carbon atoms.
- E) All of the choices are differences between saturated and unsaturated fatty acids.

best answer to remember

3. A peptide bond is found in which type of biological molecule?

- A) carbohydrate
- B) lipid
- C) nucleic acid
- D) protein
- E) hydrocarbon

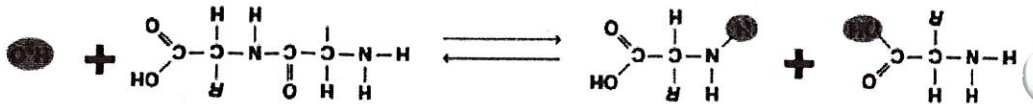
4. Fats, phospholipids, and sterols are

- A) proteins.
- B) nucleic acids.
- C) polysaccharides.
- D) lipids.
- E) carbohydrates.

5. A saturated fat is

- A) solid at room temperature.
- B) has fatty acids with no double bonds between the carbon atoms.
- C) is almost always of animal origin.
- D) holding the maximum number of hydrogens possible.
- E) All of the choices are correct.

Use the following to answer questions 6-7:



6. The two molecules on the left side of the above equation are

- A) simple sugars
- B) fatty acids
- C) amino acids
- D) lipids
- E) proteins

7. What type of bond is formed between the two molecules?

- A) disaccharide bond
- B) peptide bond
- C) disulfide bond
- D) hydrogen bond
- E) ionic bond

8. Describe the four levels of protein structure

primary - linear chain of amino acids (polypeptide)

secondary - hydrogen bonds form between the amino acids causing ~~main~~ folding, bending, and spiraling.

tertiary - Additional bonds form causing the protein to take on a complex 3-D shape

quaternary - 2 or more polypeptide chains bonded together.

9. Describe the difference between a monosaccharide, disaccharide, and polysaccharide in terms of structure and available energy.

mono - one monomer like glucose, fructose
 Breaks down easy, less hydrocarbon bonds, so less energy (give burst)

disaccharide = two monomers like sucrose

more bonds, so will provide more energy when a monosaccharide

polysaccharide = 3 or more monomers like starch, glycogen, or cellulose

large molecule with many bonds/hydrocarbon, will take longer for body to break it down and release energy, so

energy is sustained

see Question # 13 - same answer.

energy in your answer?)

2. What is a catalyst and why is an enzyme considered a biological catalyst (refer to activation

1. What type of organic molecule is an enzyme? protein

Enzymes Review

form water.

dehydration synthesis is the combining of monomers to create a polymer. For example glucose and fructose combine to make sucrose, in the process a hydrogen is ~~not~~ removed from glucose and a hydroxyl (OH) is removed from fructose. OH + H combine to

12. What does dehydration synthesis mean? List the substances that are present before and after dehydration synthesis.

- a. Reactants
- b. Building blocks of life
- c. Small molecules that make up polymers
- d. All of the above

11. Monomers could be called the:

- a. Starch - energy storage for plants
- b. Glycogen - energy storage for animals - excess glucose is stored as glycogen for our body to use later.
- c. Cellulose - provides structure for plants

all 3 or more monomers } polymers

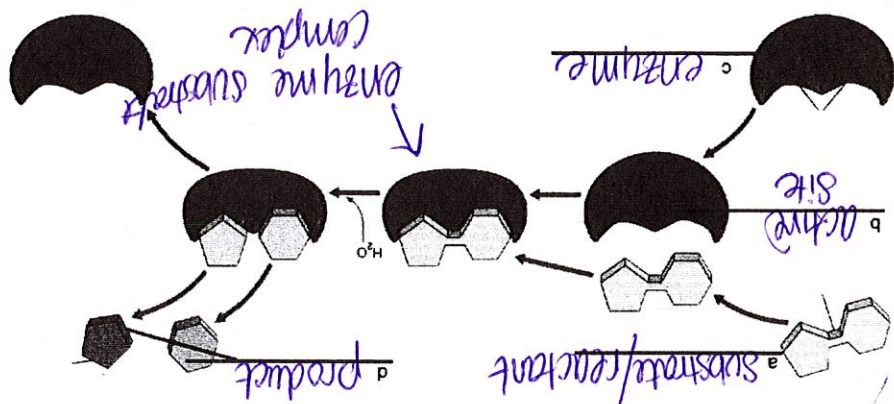
10. Describe the uses of the three complex carbohydrates listed below:

6. Circle the correct effect.
- a. Raising the temperature slightly will _____ the rate of reaction. increase | decrease | not change
 - b. Boiling temperature will _____ the rate of reaction. decrease | increase | not change
 - c. Changing the pH toward the optimal pH will _____ the rate of reaction. increase | decrease | not change

5. Answer true or false to the following statements:
- a. T Enzymes interact with specific substrates
 - b. F Enzymes change shape after a reaction occurs
 - c. T Enzymes speed up reactions.
 - d. F One enzyme can be used for many different types of chemical reactions.

4. Describe the diagram above using the terms you used to fill in the diagram with.

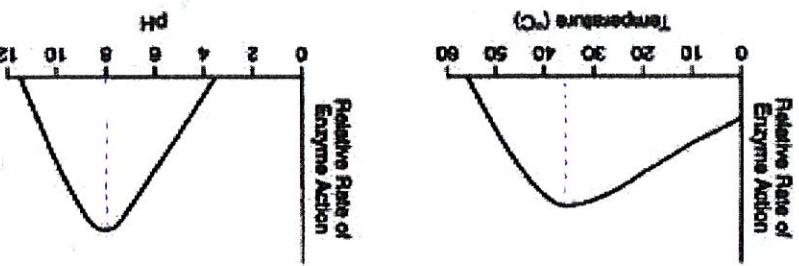
The enzyme attaches to the substrate (piced food like a disaccharide) at the active site. The enzyme assists in the reaction and the substrate breaks down into the product (two monosaccharides). The enzyme will be reused so will attach to another substrate.



3. Label enzyme activity below:

7. What four factors can affect the activity of an enzyme?

- a. \downarrow or \downarrow in pH
- b. extreme temperature
- c. concentration
- d. activators or inhibitors



Use the 2 graphs below to answer Questions 8, 9, and 10.

8. What is the optimal pH that this enzyme functions at? 8
9. What is the optimal temperature that this enzyme functions at? 36°C

10. What happens when the pH is 2? it denatures

11. What does it mean when an enzyme is denatured?

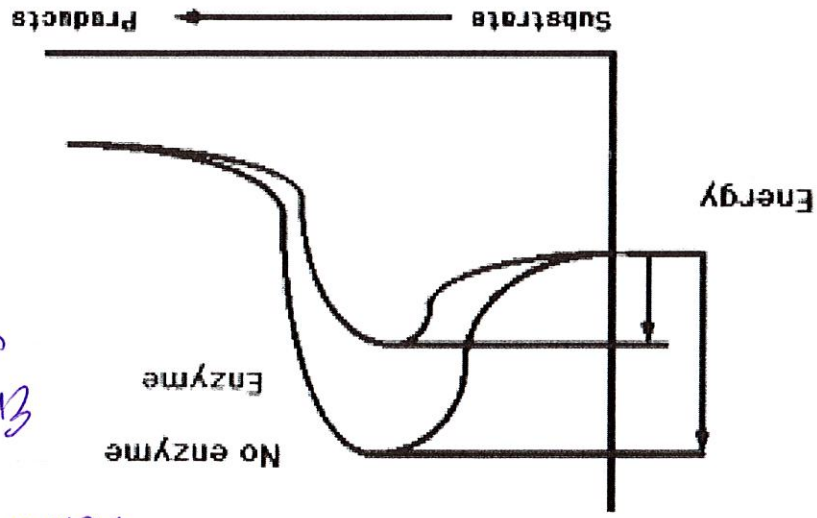
When an enzyme is denatured from extreme high heat or extreme ends of the pH scale, the bonds break causing the shape to be altered. When the shape is changed, the enzyme will not larger work or function less.

12. Why are the active site and the substrates in an enzyme-catalyzed reaction often compared to

a lock and key?

It is compared to a lock and key because enzyme are specific to the type of substrate that it will attach to. For example the enzyme sucrase will only break down sucrose and not lactose.

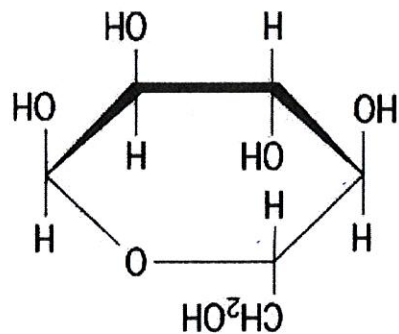
- a. Stressing, bending, or stretching chemical bonds
 - b. Participate in the reaction
 - c. Create a micro habitat that is conducive to the reaction (pH + temp is adjusted)
 - d. Orient or hold substrate molecules so they can be modified
15. What are the four ways that an enzyme can reduce the activation energy?



Enzymes are catalysts, they reduce the activation energy needed to start a chemical reaction. Its shown, without an enzyme it takes 2x more energy than with an enzyme.

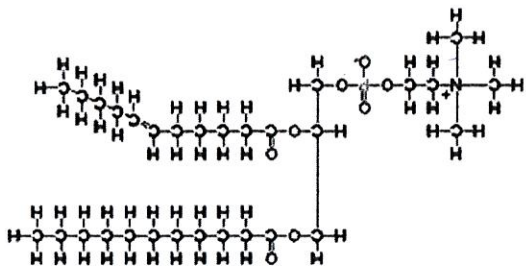
13. Describe the graph below, what is it comparing? - Activation Energy

Directions: In the space provided, identify the following molecules:



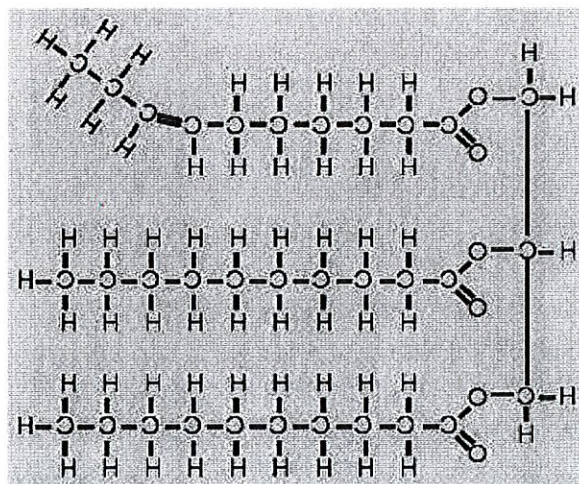
glucose

1.



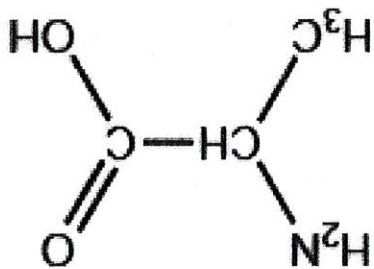
phospholipid

2.



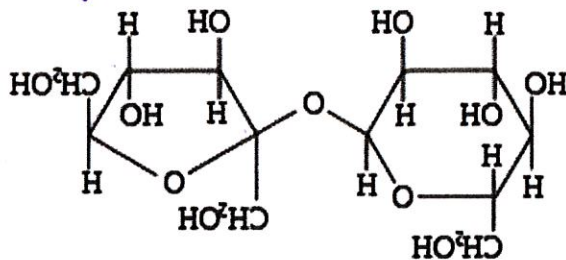
triglyceride

3.



amino acid

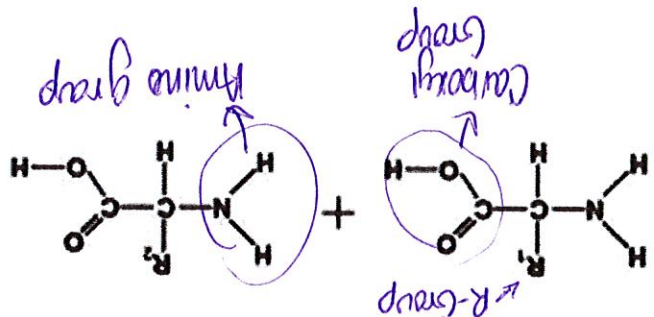
4.



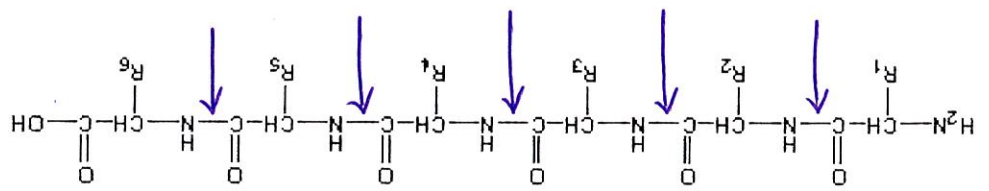
disaccharide (sucrose)

5.

Dehydration Synthesis.
 The OH is removed from the carboxyl group in the first amino acid and the hydrogen is removed from the Amino Group of the other amino acid. OH + H combine to form water and the two amino acids combine to make a dipeptide. The bond is between the carbon in the carboxyl group and the nitrogen in the Amino group.



7. Explain how the two amino acids would join together to form a dipeptide and draw the final molecule. Be detailed.



6. Draw an arrow to indicate the peptide bonds in the molecule below:

