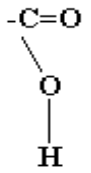


Biochemistry Remedial Test Opportunity 2022

- **Do not open this booklet until you are instructed to do so.**
- Print your name at the top of the BACK PAGE of this booklet.
- Indicate all of your answers to the questions on the separate Response Form. No credit will be given for anything written in this booklet, but you may use the booklet for notes or rough work. No additional time will be given after the exam to transfer your answers to the Response Form.
- After you have decided which of the suggested answers is best, fill in the corresponding answer on the Response Form. Give only one answer to each question. If you change an answer, be sure that the previous mark is erased completely. Print neatly using UPPER CASE letters, ambiguous answers will not be marked.
- Use your time effectively. Do not spend too much time on questions that are too difficult. Go on to other questions and come back to the difficult ones later if you have time. This is a timed test, you need to work efficiently.

1. The structural formula on the right is representative of which functional group?

- a. sulfhydryl d carboxyl
- b. hydroxyl e amino
- c. carbonyl



2. Many nutrients are a source of energy for the body. Which of these energy supplying nutrients provides the most energy per gram of material?

- a. carbohydrate d. vitamins
- b. lipids e. all provide the same amount of energy
- c. proteins

3. Which statement is **false**?

- a. Glucose and galactose are isomers.
- b. All monosaccharides taste sweet.
- c. Fructose and maltose are isomers.
- d. The function of monosaccharides is to provide quick energy.

e. The formula of galactose is $C_6H_{12}O_6$

4. Of the following, which is **not** considered to be a polymer?

- a. cellulose d. protein
- b. RNA e. glycerol
- c. starch

5. Which of these statements is **false**?

- a. Lipids store energy.
- b. Lipids aid in mineral absorption.
- c. Lipids insulate the body.

d. Lipids protect delicate organs.

e. Lipids act as a raw material for synthesis of hormones.

6. Energy is stored in the human body as

- a. sugar and starch. d. glycogen and lipids.
- b. protein and lipids. e. proteins and starch.
- c. glycogen and proteins.

7. How many different amino acids are available for the assembling of proteins?

- a. 100 d. 8
- b. 40 e. an infinite number
- c. 20

8. What type of bond is formed between oxygen and hydrogen in a water molecule?

- a. ionic bond d. polar covalent bond
- b. covalent bond e. none of the above
- c. hydrogen bond

9. The hydrolysis (breakdown) of a dipeptide results in

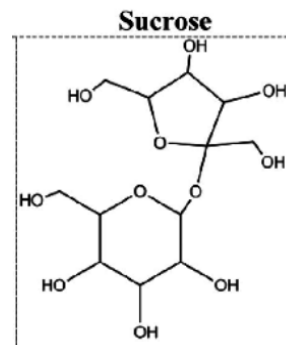
- a. a sugar and an acid. d. two sugars.
- b. two amino acids. e. a fatty acid and an alcohol.

- c. an acid and an amine.
10. When fatty acids and glycerol chemically combine to form a triglyceride, one other product is
- carbon dioxide.
 - ATP.
 - a monosaccharide.
 - water.
 - an amino group.
11. Which of the following statements about enzymes is **false**?
- All enzymes are proteins and catalysts.
 - Enzymes work by increasing the energy of activation.
 - Enzymes require a specific temperature to function.
 - Enzymes have specific substrates.
 - When there is excess substrate, increasing the concentration of enzymes increases the rate of reaction.
12. When two organic molecules are bonded together and a water molecule is removed, the reaction is called
- dehydration synthesis.
 - hydrogenation.
 - hydrolysis.
 - oxidation.
 - reduction.
13. Which of the following statements about enzymes is **false**?
- Enzymes can be denatured by high temperatures.
 - Competitive inhibitors compete with the substrate for the active site.
 - Coenzymes are inorganic molecules like vitamins.
 - Some enzymes work best in an acidic environment like the stomach.
 - Increasing the [enzyme] increases the rate of reaction when there is an excess of substrate molecules.
14. Which process involves the addition of water to compounds?
- condensation
 - hydrolysis
 - esterification
 - phosphorylation
 - polymerization

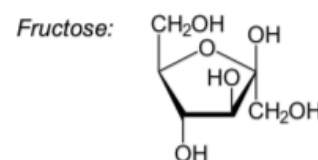
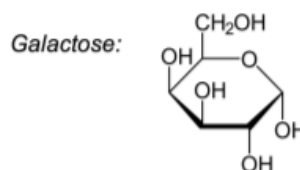
15. Aspartame is an example of a dipeptide sweetener that is lower in calories than carbohydrate-based sweeteners such as sucrose. Given that taste perception begins when a chemical binds to a specific receptor on the tongue, which functional group does aspartame most likely share with sucrose?

- Phosphate
- Methyl
- Amino

- Hydroxyl
- Benzyl



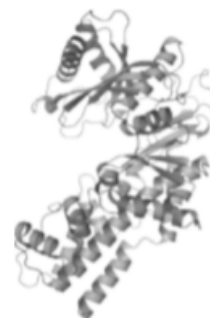
16. The disaccharide lactulose is formed by a **condensation** reaction from one monomer each of galactose and fructose, both shown below. What is the molecular formula of lactulose?



- a. $C_6H_{12}O_6$
- b. $C_{12}H_{14}O_{11}$
- c. $C_{12}H_{16}O_{12}$
- d. $C_{12}H_{22}O_{11}$
- e. $C_{12}H_{24}O_{12}$

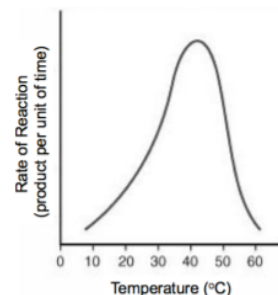
17. Hexokinase, shown here in a ribbon representation, is an enzyme in glycolysis. It consists of a single polypeptide chain with several cysteine amino acids, but has **no** disulfide bonds. What is the highest level of structure found in this enzyme?

- a. Primary
- b. Secondary
- c. Tertiary
- d. Quaternary
- e. Not enough information; would need to see a ball-and-stick representation.



18. The rate of reaction of an enzyme over a range of temperatures is measured. What is the most likely explanation for the data shown in this graph?

- a. The enzyme works rapidly at first but then gets used up in the reaction after about 50 degrees.
- b. The enzyme is running out of substrate and so is slowing down.
- c. The enzyme speeds its rate of reaction as it warms but begins to denature past a certain temperature.
- d. The enzyme could begin to speed up its rate again after about 65 degrees.
- e. The enzyme works most effectively at temperatures below 30 degrees Celsius.

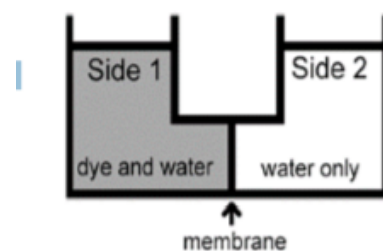


19. When a living human red blood cell is placed in pure fresh water the cell will swell and burst. What is the reason for this?

- a. Water molecules move from higher to lower concentration of dissolved particles.
- b. The cell membrane dissolves in water.
- c. Cells lose stability outside the human body.
- d. Water molecules move from higher to lower concentration of water.
- e. Water is actively transported into the cell because it is a hypotonic solution.

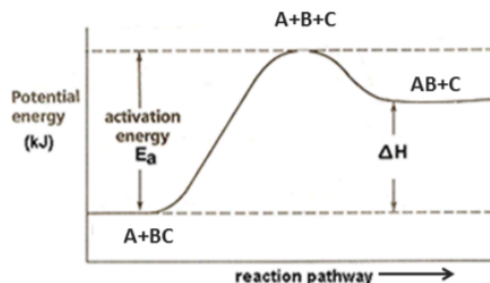
20. In the figure here, two columns of water are separated by a semipermeable membrane through which only water molecules can pass. Side 1 contains coloured dye and water; Side 2 contains only pure water. What will happen after time passes?

- a. Water will leave Side 1 and enter Side 2.
- b. Water will leave Side 2 and enter Side 1.
- c. Dye will leave Side 1 and enter Side 2.
- d. Water will leave Side 2 and enter Side 1; dye will leave Side 1 and enter Side 2.
- e. Side 2.



e. Water will leave Side 1 and enter Side 2; dye will leave Side 1 and enter Side 2.

21. You are studying the effects of temperature on the rate of a particular enzyme-catalyzed reaction. When you increase the temperature from 30° to 50°C, what effect will this have on the rate of the reaction?
- a. It will increase.
 - b. It will decrease.
 - c. It will stay the same.
 - d. It will increase and then decrease.
 - e. More information about the enzyme is needed to predict the effect(s).
23. An enzyme catalyzes a reaction to convert substance X into substance Y. ATP is required for the enzyme to perform the $X \rightarrow Y$ reaction. There are two ATP-binding sites on this enzyme: the first site is where ATP binds to catalyze the $X \rightarrow Y$ reaction. However, if ATP levels are high ATP will bind to the second site, causing a conformational change in the enzyme. Based on this information, which statement is CORRECT?
- a. When ATP levels are high the reaction is reversed.
 - b. In this case, ATP is acting as an allosteric regulator.
 - c. ATP is always an inhibitor of the reaction.
 - d. ATP competitively inhibits the substrate X from binding to the enzyme.
 - e. The reaction occurs at a faster rate when ATP levels are high.
24. Which of the following is NOT part of an amino acid?
- a. An ester component
 - b. A carboxyl group
 - c. An alpha carbon
 - d. A R-group
 - e. A hydrogen atom
25. You are training for a long-distance race and decide to follow a carbohydrate-rich diet to enhance your performance. Why does a carbohydrate-rich diet help enhance performance compared to a diet high in proteins or fats?
- a. It provides more total energy, as carbohydrates contain more chemical energy per gram than fatty acids.
 - b. It increases glycogen stored in muscles and the liver, which are easily converted to glucose.
 - c. It increases the efficiency of oxygen transportation to muscle tissue.
 - d. It increases sucrose storage in muscle tissue which is used for ATP production.
 - e. It increases the amount of ATP in the blood which can be delivered to muscle tissues.
26. Based on the reaction shown in the graph below, which statement is CORRECT?
- a. Energy is released by this reaction.
 - b. **Energy must be added for the reaction to proceed.**
 - c. An enzyme is required to catalyze this reaction.
 - d. The reaction would proceed more quickly at a lower temperature.
 - e. This reaction produces amino acids.
27. Which statement about saturated or unsaturated fats is CORRECT?
- a. Unsaturated fats have double bonds between carbon atoms in the fatty acid chain.
 - b. Unsaturated fats are solid at room temperature.



- c. Saturated fats have a kink in the hydrocarbon chain.
- d. Unsaturated fats contain additional hydrogen atoms.
- e. Unsaturated fats are principally composed of two fatty acid chains bonded to glycerol.

28. Which of the following is a neutralization reaction?

- a. $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- b. $\text{Ester} + \text{H}_2\text{O} \rightarrow \text{acid} + \text{alcohol}$
- c. $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$
- d. $\text{Amino acid} + \text{amino acid} \rightarrow \text{peptide} + \text{H}_2\text{O}$
- e. $\text{H}_2 + \text{F}_2 \rightarrow 2\text{HF}$

BIOCHEMISTRY Remedial Test Opportunity

Name: _____

All multiple choice answers must be recorded in this table. When you are finished answering all the multiple choice questions transfer your answers to this table. Print neatly using UPPER CASE letters, ambiguous answers will not be marked.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28		