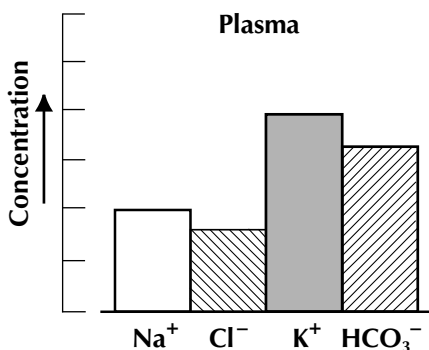
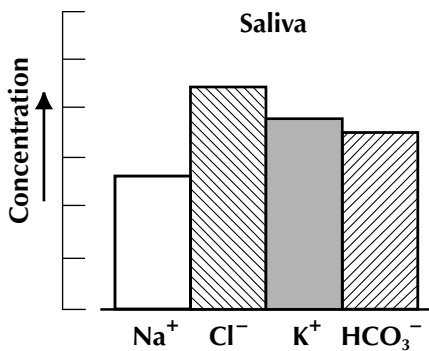


Topic 1: The Nature of Life

Directions: Each of the following questions or incomplete statements is followed by five suggested answers or completions. Select the one that is best in each case.

- All the chemical reactions occurring within the cells of an organism are known as
 - assimilation.
 - metabolism.
 - circulation.
 - regulation.
 - respiration.
- Which of the following is NOT part of any amino acid?
 - COOH
 - PO₄
 - NH₂
 - H
 - CH₃

3. In an investigation of body fluids, a scientist compared the concentrations of certain ions in saliva and blood plasma. These graphs show the results:

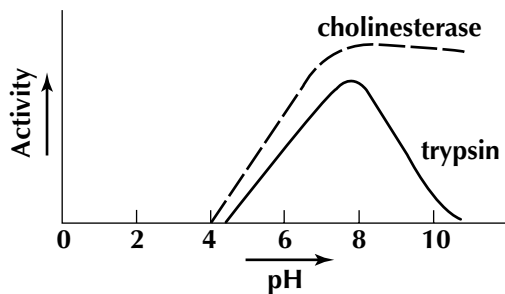


According to the graphs,

- the concentrations of chlorine ion in saliva and plasma are approximately equal.
 - the concentrations of potassium ion in saliva and plasma are approximately equal.
 - the concentration of bicarbonate ion in saliva is much less than that in plasma.
 - the concentration of sodium ion in plasma is greater than that in saliva.
 - the concentrations of sodium ion in saliva and potassium ion in plasma are approximately equal.
- Which of the following nutrients are a source of energy for the body with or without conversion?
 - Minerals
 - Proteins
 - Carbohydrates
 - I only
 - II only
 - III only
 - II and III only
 - I, II, and III
 - All of the following are elements EXCEPT
 - carbon.
 - hydrogen.
 - sulfur.
 - oxygen.
 - water.
 - Maltose and water react to form two molecules of glucose in the process of
 - dehydration synthesis.
 - hydrogenation.
 - catalysis.
 - glycolysis.
 - hydrolysis.

7. All types of living things do each of the following EXCEPT
- (A) grow and develop.
 - (B) reproduce.
 - (C) destroy the environment.
 - (D) respond to stimuli.
 - (E) obtain and use energy.

8. This graph shows the effect of pH on the activity of two enzymes. Choose the most correct statement regarding the information presented.

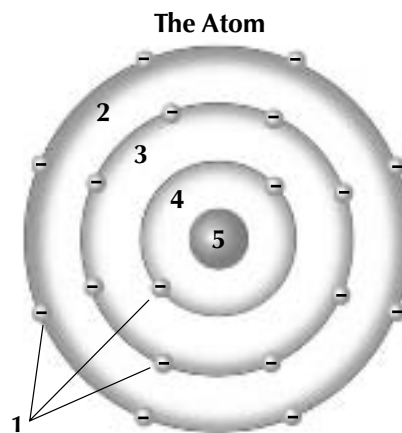


- (A) Trypsin is effective in a wider pH range than is cholinesterase.
 - (B) At pH 6 cholinesterase is less active than trypsin.
 - (C) Both enzymes have maximal activity at around pH 8.
 - (D) pH has little effect on either trypsin or cholinesterase.
 - (E) Both enzymes become denatured at basic pH.
9. The body's maintaining of a constant fluid content is an example of
- (A) aging.
 - (B) irritability.
 - (C) digestion.
 - (D) homeostasis.
 - (E) reproduction.

10. A COOH (carboxyl) group is found in which of the following organic compounds?

- I. Protein
 - II. Carbohydrate
 - III. Lipid
- (A) I only
 - (B) II only
 - (C) III only
 - (D) I and II only
 - (E) I and III only

Directions: Questions 11–13 refer to the diagram below with certain parts labeled with numbers. Each question is followed by five suggested labels or answers. For each question select one best answer.



11. The structure that contains protons and neutrons
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4
 - (E) 5
12. The particle(s) with the least mass
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4
 - (E) 5
13. The energy level(s) that can each hold up to 8 electrons
- (A) 2 only
 - (B) 3 only
 - (C) 2 and 3
 - (D) 4 and 5
 - (E) 2, 3, and 4

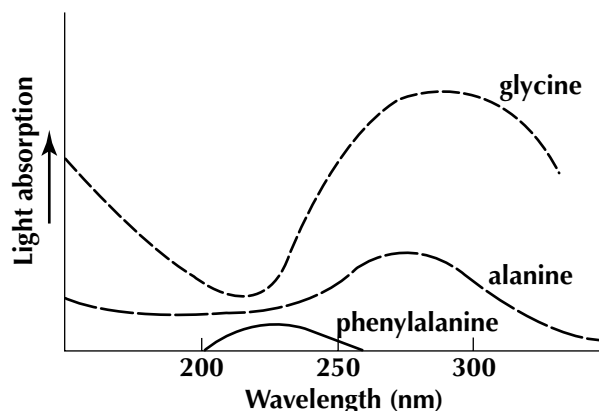
Directions: Questions 14–17 refer to the set of lettered choices below. Select the one lettered choice that best fits each statement. A choice may be used once, more than once, or not at all.

- (A) Lipids
- (B) Carbohydrates
- (C) Proteins
- (D) Nucleic Acids
- (E) Enzymes

14. Amino acids are the structural units of these.
15. Typical shapes of these include helices and pleated sheets.
16. These are formed by the dehydration synthesis of three fatty acids and glycerol.
17. $C_6H_{12}O_6$ is a common formula for these.

Directions: The following group of questions concerns a laboratory or experimental situation. Study the graph. Then choose the one best answer to each question.

Questions 18–21 refer to the graph below. A scientist was asked to analyze two samples of amino acids, A and B. Employing a technique called spectrophotometry, he determined the amount of light at different wavelengths absorbed by the two solutions. Then, referring to the graph, he identified the amino acids present in samples A and B.



18. The scientist determined that sample A absorbed light most strongly between 250 and 300 nm. According to the graph, this sample probably contained
- (A) phenylalanine only.
 - (B) glycine but not alanine.
 - (C) glycine and/or alanine.
 - (D) phenylalanine and alanine.
 - (E) alanine but not glycine.
19. He then observed that sample B only absorbed light at around 225 nm. This sample probably contained
- (A) phenylalanine only.
 - (B) glycine but not alanine.
 - (C) glycine and/or alanine.
 - (D) phenylalanine and alanine.
 - (E) alanine but not glycine.
20. One way the absorption spectrum for glycine differs from that for alanine is that
- (A) glycine has lower absorption above 300 nm.
 - (B) alanine has higher absorption between 250 and 300 nm.
 - (C) glycine has lower absorption between 150 and 300 nm.
 - (D) alanine has lower absorption at all wavelengths observed.
 - (E) glycine has lower absorption between 200 and 250 nm.
21. These amino acids could be found in compounds such as
- (A) glucose and starch.
 - (B) glycerol and cellulose.
 - (C) cholesterol and estradiol.
 - (D) RNA and DNA.
 - (E) insulin and chlorophyll.