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2 The Chemistry of Life Practice Exam

Multiple Choice

Write the letter that best answers the question or completes the statement on the line provided.

_____ **1.** If an atom contains 3 protons, 4 neutrons, and 3 electrons, its mass number is

a. 3. **c.** 7

b. 4. **d.** 11.

_____ **2.** If an atom contains 11 protons and 12 neutrons, its atomic number is

a. 1. **c.** 12.

b. 11. **d.** 23.

_____ **3.** Which of the following makes up a molecule of water?

a. one atom of hydrogen and one atom of oxygen

b. one atom of sodium and one atom of chlorine

c. one atom of hydrogen and two atoms of oxygen

d. two atoms of hydrogen and one atom of oxygen

_____ **4.** A covalent bond is formed as the result of

a. transferring electrons. **c.** transferring protons.

b. sharing electrons. **d.** sharing protons.

_____ **5.** Water molecules are polar, with the

a. oxygen side being slightly positive and the hydrogen side being slightly negative.

b. oxygen and hydrogen sides being slightly positive.

c. oxygen and hydrogen sides being slightly negative.

d. oxygen side being slightly negative and the hydrogen side being slightly positive.

_____ **6.** If you stir salt into boiling water, you produce a

a. mixture called a suspension. **c.** solution and suspension.

b. mixture called a solution. **d.** mixture only.

_____ **7.** A substance with a pH of 6 is called

a. an acid. **c.** water.

b. a base. **d.** a suspension.

_____ **8.** Solutions that have more OH^- than H^+ ions are

a. reactants. **c.** bases.

b. acids. **d.** enzymes.

_____ **9.** Why is carbon so special compared to other elements?

a. Carbon atoms can bond to one another and form a lot of different structures.

b. Carbon atoms can form quadruple bonds.

c. Only carbon atoms can form covalent bonds with oxygen and hydrogen.

d. Only carbon atoms can be dissolved in water solutions and suspensions.

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_____ **10.** Carbon-12 is the most common isotope of carbon. It has 6 protons, 6 neutrons, and 6 electrons. Of its 6 electrons, 4 are valence electrons. How many covalent bonds can a carbon atom form?

a. 1 **c.** 6

b. 4 **d.** 12

_____ **11.** Amino acid is to protein as

a. fat is to lipid. **c.** sugar is to fat.

b. DNA is to RNA. **d.** simple sugar is to starch.

_____ **12.** In chemical reactions, atoms are

a. created. **c.** rearranged.

b. destroyed. **d.** neutralized.

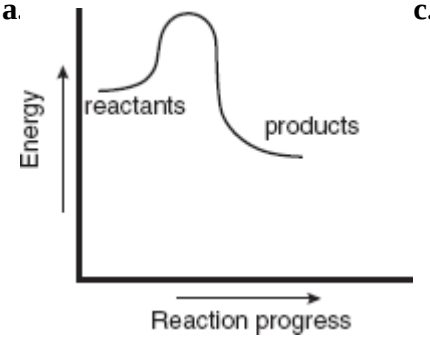
_____ **13.** When hydrogen and oxygen combine to form water, water is

a. a product. **c.** an enzyme.

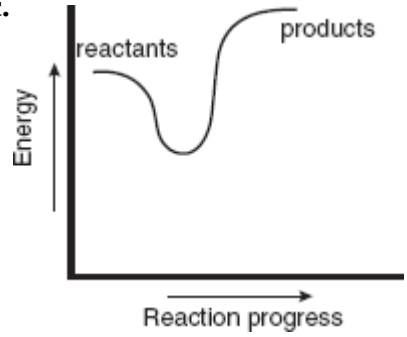
b. a reactant. **d.** a catalyst.

_____ **14.** Which of the following diagrams correctly shows the reaction pathway of a reaction that absorbs energy?

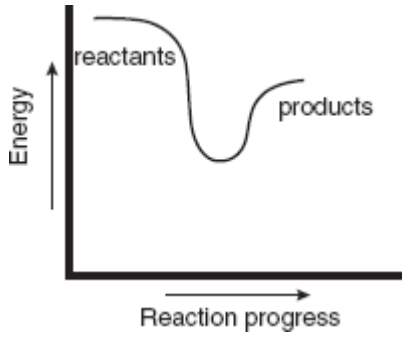
a.



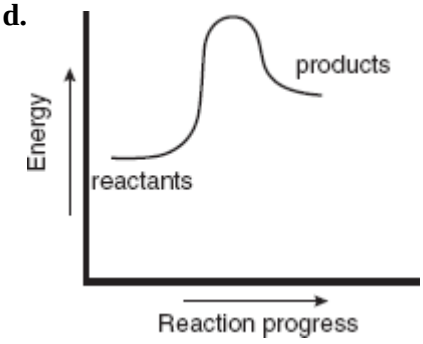
c.



b.



d.



_____ **15.** Which of the following statements about enzymes is NOT true?

a. Enzymes work best at a specified pH.

b. All enzymes have the same shape as their substrates.

c. Enzymes are proteins.

d. The shape of an enzyme allows it to do its job.

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Completion

Complete each statement on the line provided.

16. Of the three subatomic particles, _____ are most involved in forming chemical bonds.

17. A water molecule is polar because there is an uneven distribution of _____ between the oxygen and the hydrogen atoms.

18. Complex carbohydrates are to monosaccharides as polymers are to _____.

19. The elements or compounds that go into a chemical reaction are _____.

20. The energy needed to start a chemical reaction is called the _____.

Short Answer

In complete sentences, write the answers to the questions on the lines provided.

21. Can you predict the properties of a compound by knowing the properties of the elements that make up the compound? Explain your answer.

_____

_____

_____

22. Describe how a sodium atom forms a bond with a chlorine atom.

_____

_____

_____

23. When H_2 gas and O_2 gas react to form water, what happens to the atoms that were in the gases, and what kind of bonds result?

_____

_____

_____

24. What accounts for water's properties of adhesion and cohesion?

_____

_____

_____

25. What is a mixture?

_____

_____

_____

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Using Science Skills

Use the diagram below to answer the following questions on the lines provided.

Effect of Temperature on Two Enzymes That Function at Different Temperatures in Two Different Organisms

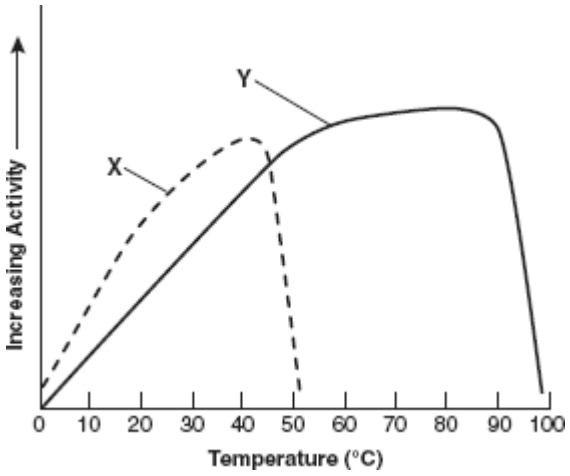

Figure 2–1

26. Apply Concepts According to Figure 2–1, which enzyme would you expect to find in a bacterium growing in a hot spring?

_____

_____

27. Interpret Graphs According to Figure 2–1, at what temperature do the two enzymes have the same amount of activity?

_____

_____

28. Interpret Graphs According to Figure 2–1, what are the optimum temperatures for each enzyme?

_____

_____

29. Apply Concepts Based on Figure 2–1, which enzyme would have the most activity in humans?

_____

_____

30. Interpret Graphs Based on Figure 2–1, which enzyme is active over the largest temperature range?

_____

_____

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Essay

Write the answer to each question in the space provided.

31. What relationship exists between the mass number of an element and the isotopes of that element?

32. When working in the laboratory, you discover that the solutions you are working with are tomato juice with a pH of 4 and soap with a pH of 10. By comparing the pH of these substances with that of pure water, would you find that each of these substances is acidic or basic? Explain.

33. How can you account for the great number, size, and complexity of organic compounds?

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34. The four groups of macromolecules are carbohydrates, lipids, nucleic acids, and proteins. Which of these groups are polymers and which are not? Explain your answer.

35. How is energy related to the reactants and products of a chemical reaction?