

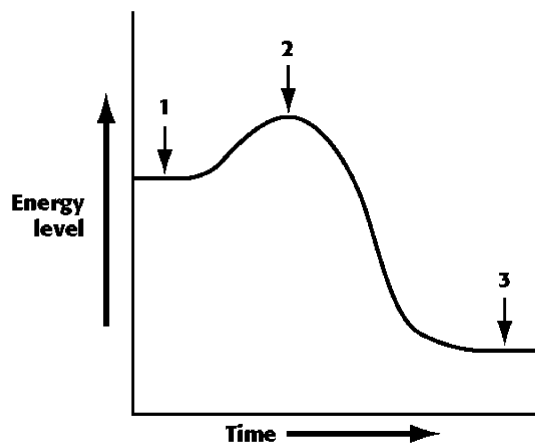
Self-Test: Chemistry of Life (CH 2)**Completion**

Complete each statement.

1. Substances that are changed when they become involved in chemical reactions are called _____, while the new substances that are formed are called _____.
2. The energy needed to break existing chemical bonds during the initiation of a chemical reaction is called _____.
3. Chemical reactions in the body can be speeded up by adding a(n) _____, which lowers the amount of activation energy required to start the reaction.
4. The loss of electrons from a molecule is called _____, while the gain of electrons by a molecule is called _____.
5. A substance that dissolves in another is called a(n) _____.
6. _____ is the most common solvent in cells.
7. _____ and _____ ions form when water dissociates.
8. An acidic solution is one that has more _____ than _____ ions.
9. A solution with a pH of 3 has _____ times more hydronium ions than a solution with a pH of 6.
10. Buffers are important because body fluids must be maintained within a relatively narrow range of _____.
11. Water is very effective at dissolving other polar substances because of its _____.
12. Breaking of _____ bonds is the first thing that happens when water is heated, which means that it takes a great deal of thermal energy to raise the temperature of water.
13. Because carbon atoms have four electrons in their outermost energy level, they can form up to _____ covalent bonds with other atoms.
14. In the molecule that has the chemical formula C_2H_4 , the carbon atoms are bonded together with a _____ bond.
15. The formation of polymers from monomers occurs as a result of _____ reactions, and the breakdown of polymers into monomers occurs as a result of _____ reactions.
16. Lipids are _____ molecules because they have no negative and positive poles.
17. A substrate attaches to the _____ of an enzyme.
18. ATP contains _____ phosphate groups.

Problem

19.



Refer to the illustration above. The graph depicts the relative energy levels of the products and reactants for the following chemical reaction: $A + B \rightleftharpoons C + D$. Write your answers to the following in the spaces below.

- Which substances, A, B, C, and/or D, are present at point 1 on the graph?
 - Which substances, A, B, C, and/or D, are present at point 3 on the graph?
 - Why is point 2 at a higher energy level than point 1?
 - Why is point 3 at a lower energy level than point 1?
 - Draw a dashed line on the graph indicating how the energy level of this reaction over time would be different if the enzyme that catalyzes the reaction were not present.
20. You are given four test tubes containing purified biological macromolecules. The test tubes are unlabeled except for a number between 1 and 4. You are told that one test tube contains a protein, one contains a lipid, one contains a carbohydrate, and one contains a nucleic acid. You then perform some tests on the macromolecules and collect the following information:
- Test tubes #2 and #4 contain nitrogen, but the other tubes do not.
 - The contents of test tube #3 are not soluble in water, but the contents of the other test tubes are soluble in water.
 - The contents of test tube #1 can be broken down into subunits that are all exactly identical to each other.
 - The macromolecule in test tube #2 is found to have a globular shape.

What are the identities of the macromolecules present in the four test tubes? Write your answer in the space below.

Essay

- Plant growers often use sprinkler irrigation to protect crops they are growing from frost damage. The water that lands on the leaves turns to ice. How does this protect the plants from frost damage? Write your answer in the space below.
- Define *enzyme*, and describe how an enzyme can function in speeding up a chemical reaction within a cell. Write your answer in the space below.