Human Physiology 15th edition Fox Solutions Manual

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Fox: *Human Physiology*, 15th Edition
Chapter 2 Answers to In-chapter Questions

Test Your Understanding

16. Nonpolar covalent bonds are formed when the valence electrons are shared equally. Polar covalent bonds are formed when the valence electrons are shared unequally. Ionic bonds are formed by negative and positive ions that are attracted to each other, not by the sharing of electrons.

17. An *acid* is a molecule that can donate protons (H^+) to solution. A *base* is a molecule that can directly or indirectly remove protons from the solution.

18. Starch in a potato can be hydrolyzed in the digestive system into its glucose subunits, which can be absorbed into the blood. The liver can remove glucose from the blood and through dehydration synthesis reaction synthesize glycogen (animal starch). Then the blood glucose fall, hydrolysis of liver glycogen releases free glucose for the blood.

19. All fats are lipids because they are nonpolar and not water-soluble. Not all lipids are fats, because fats are triglycerides and there are other categories of lipids, such as steroids and phospholipids.

20. Both fats and oils are triglycerides. Fats are solid at room temperature, whereas oils are liquid. Generally, fats contain more saturated fatty acids then oils. There is evidence that a diet too high in saturated fatty acids as part of saturated fats can contribute to atherosclerosis, and thus cardiovascular disease. This may be because saturated fatty acids help raise the LDL-cholesterol and lower the HDL-cholesterol.

21. DNA serves as a template because of complementary base pairing. An adenine must pair with thymine, and a guanine must pair with a cytosine. One strand of a parent DNA is duplicated in this way, so that the new DNA molecule contains one strand that is "conserved" from the parent DNA and one strand that was newly formed from it.

Test Your Analytical Ability

22. The primary structure refers to the sequence of amino acids in the protein. The secondary structure refers to its helical structure, and the tertiary structure refers to its 3D structure. How the polypeptide chain forms its higher order structure is determined by the particular amino acid functional groups and their positions in the polypeptide chain.

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23. In order to extract the hormone it must be soluble in the fluid used. If the hormone is not soluble in water, it may be some type of lipid. This idea is supported by the observation that the benzene (a nonpolar solvent) extract did have a hormonal effect.

24. It is chemically correct in the sense that the product is free of cholesterol. It is misleading in the sense that it could be free of cholesterol yet high in saturated fat and therefore unhealthy despite the lack of cholesterol.

25. Hydrogenation is a method of making butter substitutes that increase fatty acid saturation and leads to the production of trans fats. Both saturated fats and trans fats appear to contribute to high blood cholesterol, which is a risk factor in the development of atherosclerosis.

26. When you cook meat, the heat can cause weak hydrogen bonds and others to break and lead to a change in the consistency of the meat compared to its raw state. However, cooking does not break the much stronger covalent peptide bonds, so it doesn't lead to a soup of amino acids.

Test Your Quantitative Ability

27. H_2O has a molecular weight of 18. $C_6H_{12}O_6$ has a molecular weight of 180.

28. Fructose must have the same molecular weight as glucose: 180.

29. Sucrose has a molecular weight of 342.

30. Fructose and glucose each have a molecular weight of 180, so the two together would be doubled to 360. However, they come together by dehydration synthesis, so water with a molecular weight of 18 is removed. Therefore, 180 + 180 − 18 = 342.

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