

Macromolecules

1. If you remove all of the functional groups from an organic molecule so that it has only carbon and hydrogen atoms, the molecule become a _____ molecule.
 - A) carbohydrate
 - B) carbonyl
 - C) carboxyl
 - D) **hydrocarbon**
2. All of the following are true of protein denaturation except that it
 - A) is a shape change
 - B) **is always irreversible**
 - C) may be caused by a pH change
 - D) could result from a temperature change
3. There are several levels of protein structure, the most complex of which is
 - A) primary
 - B) secondary
 - C) tertiary
 - D) **quaternary**
4. Nucleic acids are chains of 5-carbon sugars linked by _____ bonds with an organic base protruding from each sugar.
 - A) amino
 - B) **phosphodiester**
 - C) carboxyl
 - D) phosphate
5. With respect to galactose, glucose is
 - A) a **stereoisomer**
 - B) a structural isomer
 - C) not an isomer
 - D) unrelated except that they are both sugars
6. The functional group - NH₂ is a(n)
 - A) carboxyl group
 - B) **amino group**
 - C) hydroxyl group
 - D) phosphate group
 - E) carbonyl group
7. Which of the following is not a lipid?
 - A) **chitin**
 - B) testosterone
 - C) steroids
 - D) oil
 - E) unsaturated fat
8. Glucose is a
 - A) protein
 - B) disaccharide
 - C) nucleic acid
 - D) **monosaccharide**

- E) starch
9. Double helix describes the structure of a molecule of
- A) protein
 - B) disaccharide
 - C) starch
 - D) monosaccharide
 - E) **DNA**
10. Triacylglycerol contains fatty acids and
- A) glucose
 - B) glycogen
 - C) **glycerol**
 - D) guanine
 - E) an amino group
11. Animals store glucose in the form of
- A) amylose
 - B) **glycogen**
 - C) glycerol
 - D) guanine
 - E) cellulose
12. What is the yield of chemical energy, on average, for every gram of carbohydrate and every gram of fat that is utilized?
- A) 4 kcal each
 - B) 9 kcal each
 - C) **4 kcal and 9 kcal, respectively**
 - D) 9 kcal and 4 kcal, respectively
 - E) 40 kcal and 90 kcal, respectively
13. In the formation of a macromolecule, what type of bond would join two amino acid subunits?
- A) ionic bond
 - B) phosphodiester bond
 - C) hydrogen bond
 - D) **peptide bond**
14. In the formation of a macromolecule, what type of reaction would join two subunits together?
- A) hydrophobic reaction
 - B) hydrolysis reaction
 - C) **dehydration reaction**
 - D) denaturation reaction
15. The sequence of amino acids in a polypeptide is called the
- A) **primary structure**
 - B) secondary structure
 - C) tertiary structure
 - D) quaternary structure
16. The globular shape of a protein is called the
- A) primary structure
 - B) secondary structure

- C) **tertiary structure**
 - D) quaternary structure
17. In a DNA molecule, what holds together nitrogenous bases from the two polymer chains?
- A) phosphodiester bonds
 - B) ionic bonds
 - C) covalent bonds
 - D) peptide bonds
 - E) **hydrogen bonds**
18. Assuming they all had the same number of carbon atoms, which of the following has the most C-H bonds?
- A) an unsaturated fat
 - B) a polyunsaturated fat
 - C) a polysaccharide
 - D) a **saturated fat**
19. Why is cellulose so difficult for most animals to digest?
- A) they don't have the proper enzyme to break the bonds between subunits
 - B) cellulose is made up of chitin, which is indigestible
 - C) the bonds holding cellulose subunits together are extremely strong, stronger than in any other macromolecule
 - D) there are many hydrogen bonds holding the subunits together
20. What happens during a hydrolysis reaction?
- A) protein coils into its secondary structure
 - B) the bond between two subunits of a macromolecule is broken
 - C) saturated fats become unsaturated
 - D) a bond is formed between two subunits of a macromolecule
 - E) water breaks ionic bonds
21. Which of the following is not a disaccharide?
- A) sucrose
 - B) maltose
 - C) lactose
 - D) amylose
 - E) all of the above are disaccharides
22. The general term for a large molecule made up of many similar subunits is
- A) polymer
 - B) functional group
 - C) peptide
 - D) helix
 - E) pectin
23. Dehydration and hydrolysis reactions involve removing or adding _____ to macromolecule subunits.
- A) C and O
 - B) CH and NH₂
 - C) C and H
 - D) COOH and H
 - E) OH and H

24. The general formula for carbohydrates is
- A) (CH_2O)
 - B) $(CH_2O)_n$
 - C) $2(CHO)_n$
 - D) $(C_2HO)_n$
 - E) $(C_nH_nO_n)_2$
25. Which of the following nitrogenous bases is found in DNA but is not found in RNA?
- A) adenine
 - B) guanine
 - C) cytosine
 - D) thymine
 - E) uracil
26. What type of macromolecule carries out catalysis in biological reactions?
- A) proteins called enzymes
 - B) carbohydrates called starches
 - C) lipids called steroids
 - D) nucleic acids called DNA
 - E) carbohydrates called sugars
27. In nucleic acids, the purine nitrogenous bases are
- A) uracil and thymine
 - B) cytosine and guanine
 - C) thymine and cytosine
 - D) adenine and guanine
 - E) guanine and thymine
28. Molecules that have the same chemical formula but have different molecular structures are called
- A) isotopes
 - B) ions
 - C) structural isotopes
 - D) isomers
 - E) both a and c
29. A fatty acid is said to be saturated if:
- A) one end of the molecule is hydrophilic while the other end is hydrophobic.
 - B) it has one or more double bonds between carbon atoms.
 - C) it contains more than one functional group.
 - D) each internal carbon atom is covalently bonded to two hydrogen atoms.
 - E) its functional groups include at least one aromatic ring.
30. At what level(s) of protein structure would you expect to find disulfide bridges?
- A) primary
 - B) secondary
 - C) tertiary
 - D) quaternary
 - E) only in b and c
31. Polymerization reactions in which polysaccharides are synthesized from monosaccharides or proteins are synthesized from amino acids:
- A) result in the formation of water.
 - B) are hydrolysis reactions.

- C) release energy.
 - D) result in the formation of covalent bonds between monomers called peptide bonds.
 - E) all of the above.
32. Which of the following is a characteristic of proteins?
- A) Some may enhance the rate of specific chemical reactions.
 - B) They may form either long, thin fibrous molecules or compact, rounded globular molecules.
 - C) They store genetic information for cellular metabolism.
 - D) They form through hydrolysis reactions.
 - E) a and b
33. Amino acids and proteins are ionized at typical biological pH such that both the amino group and the carboxyl group gain hydrogen ions to become -NH_3^+ and -COOH , respectively.
- A) True
 - B) False
34. A protein with quaternary structure contains four domains.
- A) True
 - B) False
35. Both glycoside and peptide linkages result from dehydration synthesis.
- A) True
 - B) False
36. Glycogen, starch, and cellulose are all polymers of glucose.
- A) True
 - B) False
37. Hydrolysis of one molecule of a triglyceride to glycerol and fatty acids yields two molecules of water.
- A) True
 - B) False
38. Which element occurs in nucleic acids?
- A) calcium
 - B) phosphorus
 - C) manganese
 - D) sulfur
 - E) iron
39. The group of molecules called nucleotides contain:
- A) phosphate groups.
 - B) pyrimidines.
 - C) purines.
 - D) pentose (a 5-carbon sugar).
 - E) all of the above.
40. Nucleotides have a nitrogenous base attached to a sugar at the:
- A) 1' carbon
 - B) 2' carbon
 - C) 3' carbon
 - D) 4' carbon

E) 5' carbon

41. The two strands of a DNA double helix are held together by:

- A) ionic bonds.
- B) hydrogen bonds.
- C) nonpolar covalent bonds.
- D) polar covalent bonds.
- E) hydrophobic exclusions.

42. Molecular chaperones

- A) are found in the nucleus and aid in folding of DNA
- B) degrade proteins that have folded incorrectly
- C) help new proteins fold correctly and repair incorrectly folded proteins
- D) are only present in cells that are exposed to high temperatures
- E) work through hydrophobic interactions