

# Biochemistry Quiz

Name: \_\_\_\_\_

Correctly complete the following statements with a term that makes your tutor happy 😊

1. The monomer of a polysaccharide is called a(n) \_\_\_\_\_.
2. Fatty acids containing at least one double or triple covalent bonds between its carbons is called a(n) \_\_\_\_\_ fatty acid
3. The \_\_\_\_\_ structure of a protein describes the overall shape formed by **several polypeptide chains** which compose the protein.
4. The amino acid sequence of a polypeptide chain best describes the \_\_\_\_\_ structure of the polypeptide chain.
5. The monomer of a polypeptide is called a(n) \_\_\_\_\_.
6. The overall three dimensional shape of a protein best describes its \_\_\_\_\_.
7. The polysaccharide \_\_\_\_\_ is a component of cell walls in plants.
8. The substance \_\_\_\_\_ is also known as animal starch.
9. The ratio between the elements hydrogen and oxygen in a carbohydrate is \_\_\_\_\_.
10. The hydrolytic breakdown products of protein hydrolysis are \_\_\_\_\_.
11. A(n) \_\_\_\_\_ is any long chain molecule formed from repeating monomer units.
12. A(n) \_\_\_\_\_ is a polymer used to store energy in animals and fungi

## ☹ True or False Section ☹

1. The tendency of fatty acids and phospholipids to lie at the interface between non-polar and aqueous polar environments makes them important components of cell membranes. T / F
2. Fatty acids and amino acids are acids because each has a carboxyl group that can lose hydroxide ions in water. T / F
3. A carbon atom can form 4 covalent bonds and can bond with other carbon atoms to form long carbon chains. T / F
4. The phosphate end of a phospholipid is its hydrophilic end and the two carbon tails compose the hydrophobic end T / F
5. A pentose is a sugar with 5 carbons. T / F
6. Cholesterol is naturally synthesized in the human body and is the derivative of many other compounds synthesized by humans. T / F
7. Synthesis reactions involve the addition of water to join two simpler molecules to form a more complex molecule T / F
8. The secondary structure of a protein is a  $\beta$ -pleated sheet type of structure T / F

## ☺ Multiple Choice Section ☺

1. A compound unrelated to the substrate that binds to and alters the active site is usually a(n)  
(a) promoter (b) terminator (c) activator (d) producer (e) inhibitor
2. The disorder of a system is measured by its  
(a) activation energy (b) heat of reaction (c) entropy (d) energy (e) enteron
3. Which is the optimum pH of most human enzymes?  
(a) 1.8 (b) 2.4 (c) 6.3 (d) 7.1 (e) 8.5
4. Which compounds would be lipids or derivatives of lipids?  
(a) glycogen and cellulose  
(b) cholesterol and oestrogen  
(c) keratin and protease  
(d) chlorophyll and haemoglobin  
(e) DNA and RNA

Base your answers to questions 5 and 6 below on the following passage and your knowledge (or lack thereof) in biology.

*A student ground 1 g of fresh liver in a mortar and pestle, placed the ground liver in a test tube, and added 1 cm<sup>3</sup> of hydrogen peroxide. The gas that was generated was collected. A glowing splint burst into flames when placed in the gas. The student then repeated the procedure, using 1g of boiled liver and 1g of liver treated with a strong acid. When hydrogen peroxide was added to each sample of liver, no gas was generated.*

5. The gas that was generated was probably  
(a) oxygen (b) nitrogen (c) carbon dioxide (d) hydrogen (e) ammonia
6. If the substance in the liver that acted on the hydrogen peroxide was an enzyme, it could  
(a) be recovered from the living tissue that had not been boiled or treated with acid after the reaction ceased  
(b) not be recovered because it was consumed while engaging in its catalytic reaction activities  
(c) not be recovered because there is no enzyme in liver that catalyzes the breakdown of peroxide  
(d) not be recovered because grinding would break up the molecule  
(e) be recovered only before the peroxide was added
7. Which of the following molecules is smallest?  
(a) sucrose (b) glucose (c) glycogen (d) starch (e) mucus
8. Which element is **not** required in order for the compound to be considered organic?  
(a) carbon (b) oxygen (c) hydrogen (d) all must be present (e) none must be present
9. Which element is usually found in proteins but not in triglycerides?  
(a) calcium (b) phosphorus (c) nitrogen (d) oxygen (e) kryptonite
10. Structurally lipids are a very diverse group but they are all placed in one group because of what property?  
(a) They are composed of glycerol and fatty acids.  
(b) They are all relatively insoluble in water.  
(c) They all contain four interlocking rings.  
(d) They all are important as energy storage molecules.  
(e) None of the answers is correct.

11. In the digestive process, the macromolecules are broken down into small molecules that can cross cell membranes. This process is called
- (a) hydrolysis
  - (b) dehydration synthesis
  - (c) cellular respiration
  - (d) protein synthesis
  - (e) the Green Cross Code
12. The functional group(s) associated with amino acids is/are
- (a) hydroxyl (b) carbonyl (c) amino (d) carboxyl (e) both amino and carboxyl
13. The following equation (G = glucose):  $G + G + G \rightarrow G-G-G + 2H_2O$ , is an example of
- (a) ionic bond formation
  - (b) peptide bond formation
  - (c) a condensation reaction
  - (d) a hydrolysis reaction
  - (e) an equal and opposite reaction
14. All the following reactions involve condensation reactions except
- (a) the formation of a disaccharide
  - (b) the production of a polypeptide
  - (c) the formation of a fat
  - (d) digestion of a polysaccharide
  - (e) the production of a complex sugar.
15. Which term describes the largest group of biochemicals?
- (a) glucose
  - (b) amylose
  - (c) sucrose
  - (d) carbohydrate
  - (e) fructose
16. All of the following are storage carbohydrates **except**
- (a) starch (b) glycogen (c) amylopectin (d) amylose (e) cellulose
17. All the following statements are true concerning lipids **except**
- (a) their components consist of glycerol and three fatty acids
  - (b) they are used for protection of vital organs
  - (c) plants may contain fats in their seeds
  - (d) saturated fats have many double bonds between their carbons
  - (e) one gram of fat gives off 9 kJ of energy.
18. Which statement is true?
- (a) Proteins are made of amino acids held together by ester bonds.
  - (b) A polysaccharide is a complex lipid needed for storage and structure
  - (c) The primary protein structure is based on the order of its amino acids.
  - (d) Steroids are complex proteins needed to control the body's chemistry.
  - (e) Macdonald's is the best restaurant in Guildford
19. All the following molecules contain more than one ring **except**
- (a) Cholesterol (b) glucose (c) progesterone (d) sucrose (e) DNA

20. A consequence of the cell membrane being composed of phospholipids is:
- (a) it is hydrophobic at the ends and hydrophilic in the middle
  - (b) it is hydrophilic at the ends and hydrophobic in the middle
  - (c) that Americans spell the word as 'fosfolipid'
  - (d) it is a non-polar molecule
  - (e) it is high in energy
21. All the following are proteins except:
- (a) haemoglobin
  - (b) keratin
  - (c) enzymes
  - (d) antibodies
  - (e) glycogen
22. The main difference between the secondary and quaternary structure of a protein is
- (a) bond angles between amino acids
  - (b) sequence of amino acids
  - (c) number of polypeptides in the molecule
  - (d) the folding pattern of the molecule
  - (e) The disulphide bridges
23. The 'primary structure' of a protein refers to
- (a) interactions among the side chains or R-groups of the amino acids
  - (b) coiling due to hydrogen bonding between amino acids
  - (c) the number and sequence of amino acids
  - (d) the alpha-helix, or pleated sheets
  - (e) the weak interaction of two or more polypeptides
24. A fatty acid containing at least two double bonds is called
- (a) cholesterol
  - (b) saturated
  - (c) polyunsaturated
  - (d) dehydrogenase
  - (e) monounsaturated
25. Which is **not** a function of carbohydrates (in general)?
- (a) Structural support
  - (b) Immediate energy
  - (c) Energy storage
  - (d) Enzymatic catalysis
  - (e) All are carbohydrate functions.
26. Most biopolymers are formed by what type of reaction?
- (a) Hydrophobic
  - (b) Hydrazinolysis
  - (c) Dehydration or condensation
  - (d) Hydrolysis
  - (e) None of the above
27. Which is a true statement comparing phospholipids and triglycerides (fats and oils)?
- (a) Both molecules contain a phosphate group.
  - (b) Triglycerides may be saturated or unsaturated, but all phospholipids are saturated
  - (c) Phospholipids are the primary storage form for fats in our bodies.
  - (d) Phospholipids occur in fused rings, whilst triglycerides maintain a straight-chain form.
  - (e) Phospholipid molecules have a distinctly polar 'head' and a distinctly non-polar 'tail,' whilst triglycerides are predominantly non-polar.

28. At a conference, the speaker's grand finale was sautéing mealworms (insect larvae) in butter and serving them to the audience. They were crunchy (like popcorn) because their exoskeletons contain the polysaccharide

- (a) linolenic acid
- (b) cellulose
- (c) collagen
- (d) glycogen
- (e) chitin.

29. \_\_\_\_\_ are the subunits of proteins, and \_\_\_\_\_ are the subunits of fats and oils.

- (a) Amino acids ... fatty acids and glycerol
- (b) Amino acids ... monosaccharides
- (c) Nucleic acids ... monosaccharides
- (d) Glutamic acids ... carboxylic acids
- (e) Nucleic acids ... fatty acids

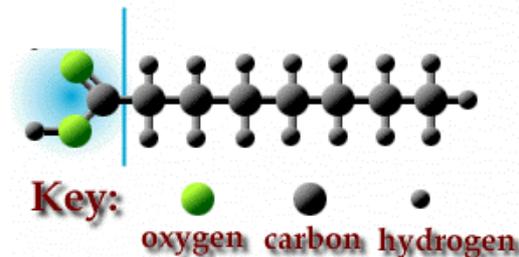
30. A hydrophobic amino acid R group would be found where in a protein?

- (a) forming a peptide bond with the next amino acid in the chain
- (b) on the outside of the folded chain, in the water
- (c) on the inside of the folded chain, away from water
- (d) forming hydrogen bonds with other R groups
- (e) only at one end of a protein chain

31. The building blocks of nucleic acid molecules are called \_\_\_\_\_.

- (a) polysaccharides (b) amino acids (c) fatty acids (d) nucleotides (e) DNA and RNA

Use the molecule below and your knowledge of biochemistry (whassat?) to answer questions 32 and 33 which follow.



32. The molecule above contains numerous bonds between carbon and hydrogen. These bonds are:

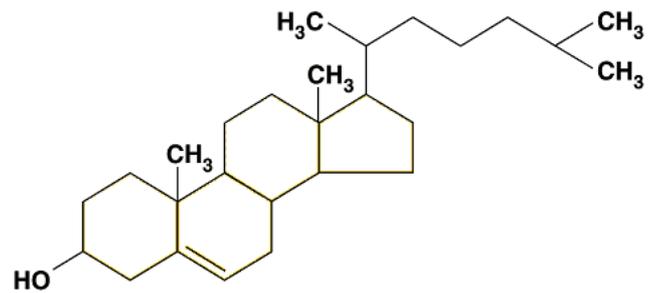
- (a) covalent bonds
- (b) government savings bonds
- (c) James
- (d) hydrogen bonds
- (e) ionic bonds

33. This compound would be a(n)

- (a) glycerol      (b) fatty acid      (c) amino acid      (d) triglyceride      (e) phospholipid

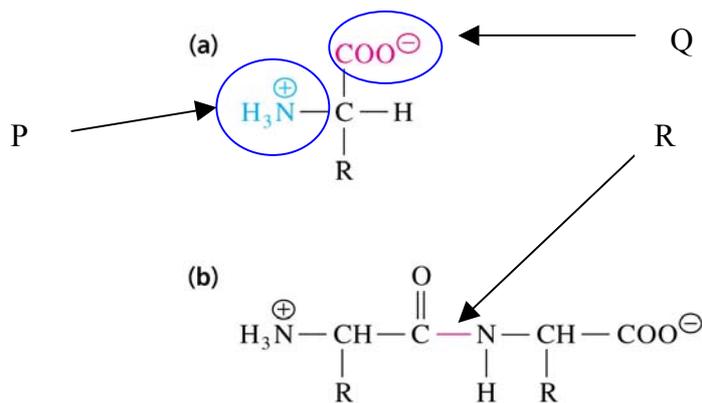
Use the molecule below and your knowledge of biochemistry (what?) to answer the following questions.

34. This compound is an example of a(n)
- protein
  - steroid
  - polysaccharide
  - lipid
  - polypeptide



35. Which statement about this compound is false?
- This compound is a precursor of sex hormones.
  - This compound is involved in giving stability to the structure of membranes.
  - This compound is synthesized naturally in the body.
  - This compound is relatively insoluble in water.
  - This compound is one of many classes of strength giving proteins.

Use the pictured reaction below and your knowledge of biochemistry to answer the following questions.



36. Identify functional group P on compound (a). \_\_\_\_\_
37. Identify functional group Q on compound (a). \_\_\_\_\_
38. Identify the monomer represented by compound (a). \_\_\_\_\_
39. Identify compound (b). \_\_\_\_\_
40. Identify the type of reaction that would produce (b). \_\_\_\_\_
41. Name the bond formed at the arrow R above \_\_\_\_\_

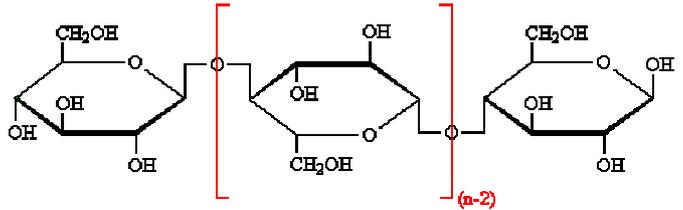
Use the diagram (*right*) and your knowledge of biochemistry (qué!) to answer questions 42 and 43.

42. Identify this specific class of carbohydrate

\_\_\_\_\_

43. What are the monomers of this compound?

\_\_\_\_\_



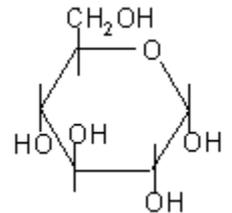
Use the diagram below and your knowledge of biochemistry to answer questions 44 and 45.

44. Identify this monosaccharide (*right*)

\_\_\_\_\_

45. State the empirical formula and the molecular formula of this monosaccharide

Empirical \_\_\_\_\_ molecular \_\_\_\_\_

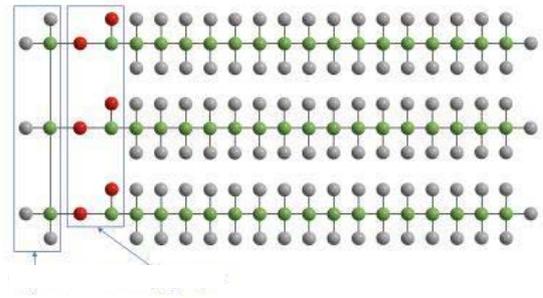


Use the diagram below and your knowledge of biochemistry (if any) to answer questions 46 and 47.

46. Identify this compound (or the class this compound belongs to) \_\_\_\_\_

47. What are the subunits which form this compound?

\_\_\_\_\_ and \_\_\_\_\_



48. Enzymes are a special type of

(a) carbohydrates (b) lipids (c) proteins (d) inorganic compounds (e) problem for me

49. A catalyst is a substance which

(a) increases the rate of a chemical reaction but is itself unchanged by the reaction  
 (b) is toxic to most cells  
 (c) is composed mostly of lipids  
 (d) does not usually participate in any chemical reactions  
 (e) makes an mammal of the genus *Felix* unable to stand up straight

50. The molecule to which an enzyme joins is called its

(a) coenzyme (b) catalyst (c) target molecule (d) substrate (e) partner

51. Enzymes act as biological

(a) substrates (b) solvents (c) catalysts (d) inhibitors (e) deterrents

52. Enzymes speed up biochemical reactions by:

(a) lowering the activation energy of the reaction  
 (b) increasing the activation energy of the reaction  
 (c) lowering the temperature of the reaction  
 (d) increasing the temperature of the reaction  
 (e) they just **do**, ok?