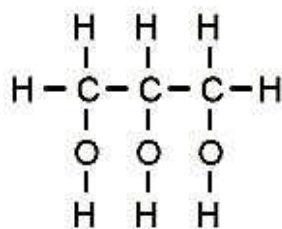


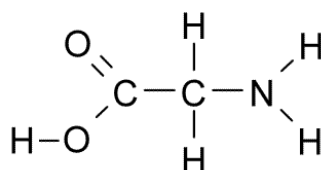
Review for Unit 01: Biochemistry Practice Multiple Choice Questions

- Which of the following bonds is the most polar?
 a) H – C b) H – S c) H – N d) H – P
- Which of the following atoms has the strongest attraction for electrons when forming a chemical bond?
 a) Na b) S c) O d) P
- Hydrogen bonding is best described as:
 a) the polar covalent bond between atoms of N – H and O – H
 b) the attraction between δ^- and δ^+ charges on molecules that have N – H and O – H bonds
 c) the covalent bond between an atom of hydrogen and any other non-metal atom
 d) all of the above

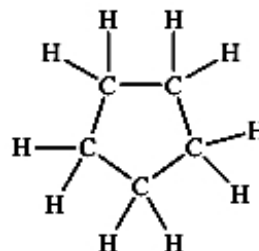
Answer questions 4 – 6 about the molecules below:



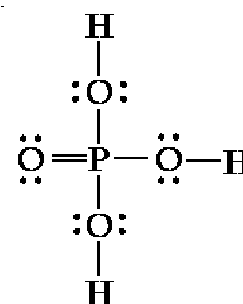
glycerol



glycine



cyclopentane



phosphoric acid

- Which of the above molecules is/are organic?
 a) glycerol and cyclopentane only c) glycerol, glycine and cyclopentane only
 b) glycerol and glycine only d) glycerol, glycine and phosphoric acid only
- Which of the above molecules is/are capable of hydrogen bonding?
 a) glycerol and cyclopentane only c) glycerol, glycine and phosphoric acid only
 b) glycerol and glycine only d) all of them
- Which of the above molecules is/are amino acids?
 a) glycerol and cyclopentane only c) glycine only
 b) glycerol and glycine only d) glycine and phosphoric acid only
- Water is a polar molecule because:
 a) oxygen has a stronger attraction for bonded electrons than hydrogen
 b) hydrogen has a stronger attraction for bonded electrons than oxygen
 c) hydrogen and oxygen have approximately equal attraction for bonded electrons
 d) the electrons in a water molecule are very evenly distributed
- Which of the following molecules will dissolve best in water?
 a) H₂S b) NH₃ c) CH₄ d) all will dissolve well

S

N

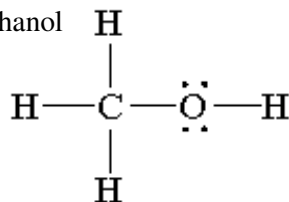
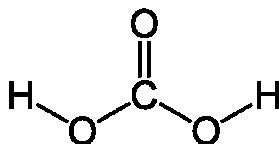
C
- Which of the molecules in Question 8 can form hydrogen bonds?
 a) H₂S b) NH₃ c) CH₄ d) all form hydrogen bonds
- Which of the following properties of water is critical to life on Earth?
 a) water is the only known liquid to become less dense as it freezes, protecting life in ponds and lakes
 b) water remains liquid over a wide range of temperatures
 c) the small size of water's molecules and its strong polarity make it an excellent solvent
 d) all of the above

11. Which of the following bonds is most polar:

- a) P – H b) P – S c) P – C d) P – O

12. Which of the following molecules is/are organic?

- a) CO₂ b) carbonic acid c) methanol d) all of these



13. Of the molecules in Question 12, which is/are capable of hydrogen bonding?

- a) CO₂ b) carbonic acid c) methanol d) both b) and c)

14. Carbohydrates:

- a) contain C, H and O in the ratio C₂HO
b) are excellent energy storage molecules because of their many C – C and C – H bonds
c) are large, non-polar molecules which dissolve well in fats
d) all of the above

15. Which of the following carbohydrates is/are found in animal tissues?

- a) glycogen b) starch c) cellulose d) all of the above

16. Which of the following is/are sugars?

- a) ribulose b) sorbitol c) sucrase d) all of the above

17. Which of the following molecules are monosaccharides?

- i) glucose
ii) fructose
iii) lactose
iv) sucrose
v) galactose

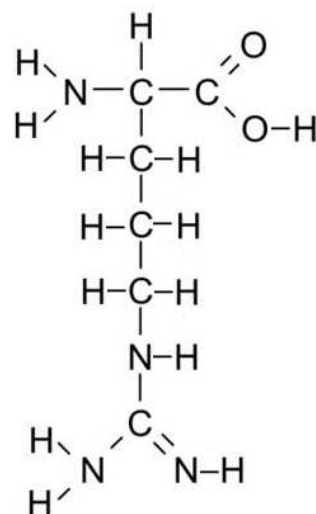
- a) i, ii and iii only c) i, iii and iv only
b) ii, iii and v only d) i, ii and v only

18. Both fats and glycogen:

- a) are very polar c) are made of subunits of glucose
b) store energy in animal tissues d) all of the above

19. The molecule shown to the right is a(n):

- a) fatty acid c) amino acid
b) nucleic acid d) simple sugar



20. The molecule shown to the right is:

- i) organic
ii) polar
iii) hydrophobic
iv) capable of hydrogen bonding

- a) i and ii only c) i, ii and iv only
b) ii and iii only d) i, ii, iii and iv

21. When galactose and glucose are combined, the product is:

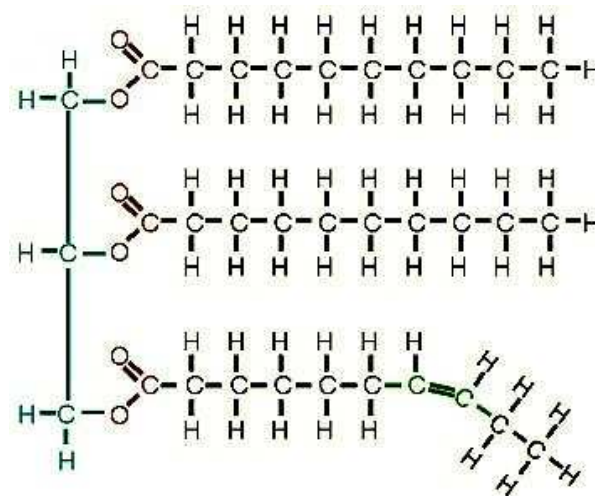
- a) maltose c) dextrose
b) sucrose d) lactose

22. Cellulose is:

- a) a polysaccharide b) made of glucose c) broken down by cellulase d) all of the above

23. Which of the following are made only of glucose:
 - i) maltose
 - ii) glycogen
 - iii) cellulose
 - iv) amylase
 - a) i and ii only
 - b) ii and iii only
 - c) i, ii and iii only
 - d) i, ii and iv only
24. When maltose is broken down:
 - a) the product is glucose
 - b) this is a hydrolysis reaction
 - c) this is a catabolic reaction
 - d) all of the above
25. When sucrose is formed from its subunits:
 - a) this is an anabolic reaction
 - b) energy is released
 - c) the products are glucose and galactose
 - d) none of the above
26. Glycogen is:
 - a) a monosaccharide
 - b) found in plants
 - c) an energy storage molecule
 - d) all of the above
27. DNA is:
 - a) found in the nucleus
 - b) a molecule with a double helix
 - c) made of the nucleotides A, T, C and G
 - d) all of the above
28. Starch and triglycerides BOTH:
 - a) dissolve well in water
 - b) are important in energy storage
 - c) are found in plant and animal cells
 - d) all of the above
29. Saturated fatty acids:
 - a) contain at least one C = C double bond
 - b) are found in most animal fats
 - c) are liquid at room temperature
 - d) all of the above
30. The bonds between glucose units in cellulose molecules are:
 - a) ionic bonds
 - b) peptide bonds
 - c) hydrogen bonds
 - d) covalent bonds
31. Which of the following is/are carbohydrates?
 - a) C_4H_2O
 - b) $C_6H_6O_6$
 - c) $C_5H_{10}O_5$
 - d) all of these
32. Which animal would have the most unsaturated fat?
 - a) people
 - b) salmon
 - c) pigs
 - d) chickens
33. All triglycerides are composed of three fatty acids joined to a molecule of :
 - a) glycerol
 - b) ethyl alcohol
 - c) calciferol
 - d) glucose
34. Which four elements are found in ALL amino acids?
 - a) C, O, N, & H
 - b) C, O, H, & Cl
 - c) C, O, N, & Na
 - d) C, O, K & Na
35. A macromolecule contains C, O, H, N and P. It is most likely a:
 - a) phospholipid
 - b) polypeptide
 - c) triglyceride
 - d) nucleic acid
36. Which of the following are made of amino acids?
 - i) cellulose
 - ii) hemoglobin
 - iii) antibodies
 - iv) insulin
 - a) i and ii only
 - b) ii, iii and iv only
 - c) i and iv only
 - d) i, ii, iii and iv

37. The molecule to the right represents:
- a saturated fat
 - cholesterol
 - a fatty acid
 - an unsaturated fat



38. Lactose will:
- turn Lugol's iodine black
 - turn Benedict's solution yellow/orange
 - turn Biuret solution purple
 - none of the above
39. Peptide bonds are found between molecules of:
- simple sugars
 - amino acids
 - water
 - glycerol and fatty acids

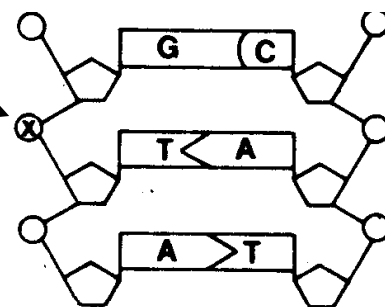
40. Which organic compound is correctly matched with its subunit?
- protein-fatty acid
 - starch-sucrose
 - maltase-amino acid
 - lipid-lactose

41. Phospholipids behave differently from triglycerides because phospholipids:
- contain glycerol
 - have both polar and non-polar regions
 - contain only unsaturated fatty acids
 - all of the above

42. Unsaturated fats are liquid at room temperature because their fatty acid chains:
- are very straight and pack well together
 - are hydrophobic
 - have double bonds which make them kinky
 - are unfinished and unstable

43. Hydrogen bonds are found between:
- water molecules
 - A and T nitrogen bases in DNA
 - polypeptide chains within a protein
 - all of the above

44. Refer to the diagram to the right. What is represented by the letter X?
- ribose
 - adenine
 - phosphate
 - uracil



45. Which of the following reagents is used to test for the presence of protein?
- bromothymol blue
 - Benedict's solution
 - Lugol's solution
 - Biuret solution

46. RNA and DNA molecules are similar in that they both contain:
- nucleotides
 - thymine
 - a double helix
 - deoxyribose sugars

47. Which of the following is **not** a part of DNA?
- deoxyribose
 - phosphates
 - glucose
 - nitrogen base

48. Which of the following is NOT a function of lipids:
- making steroid hormones
 - providing fiber in the diet
 - to cushion and protect the internal organs
 - insulating animals for warmth

49. A fat contains a glycerol molecule, two fatty acids with no C = C double bonds and one fatty acid with three C = C double bonds. This fat:
- is a phospholipid
 - will be liquid at room temperature
 - is a saturated fat
 - is water soluble

50. Nucleotides are:
- the subunits for nucleic acids
 - slightly different for DNA and RNA
 - made of a sugar, phosphate and nitrogen base
 - all of the above

A student performed the standard chemical tests on some unknown samples of food and got the results summarized below. Answer questions 51 – 54 using this information:

	Benedict's test	Biuret test	oily spot test	Lugol's Iodine test
Sample #1	blue	blue	no	black
Sample #2	orange	purple	yes	yellow
Sample #3	blue	purple	no	black

51. From the results in the chart above, samples:
 - a) 1 and 2 do not contain any carbohydrates
 - b) 1 and 3 do not contain simple sugars
 - c) 2 and 3 do not contain any protein
 - d) 2 and 3 do not contain any carbohydrates
52. From the results in the chart above, which sample(s) contain BOTH protein and starch?
 - a) sample 1 only
 - b) sample 2 only
 - c) sample 3 only
 - d) both samples 1 and 3
53. From the results in the chart above, which sample(s) contain simple sugars?
 - a) sample 1 only
 - b) sample 2 only
 - c) sample 3 only
 - d) both samples 1 and 3
54. From the results in the chart above, which sample likely contains the most energy (calories)?
 - a) sample 1
 - b) sample 2
 - c) sample 3
 - d) this is unknown
55. Some amino acids are called “essential” amino acids for humans because they:
 - a) are part of every protein made in peoples' bodies
 - b) are unsaturated and healthier choices in our diet
 - c) can not be made in the human body and must be provided in the diet
 - d) all of the above
56. In the presence of _____, Lugol's iodine turns from _____ to _____.
 - a) protein, yellow, blue
 - b) glucose, blue, orange
 - c) nitrogen bases, colourless, pink
 - d) starch, yellow, black
57. Which statement is true?
 - a) lactose is the substrate for lactase
 - b) lactase is the substrate for lactose
 - c) lactose is an enzyme and lactase is a sugar
 - d) all of the above
58. Glucuronidase is a(n):
 - a) enzyme
 - b) protein
 - c) organic catalyst
 - d) all of the above
59. Which of the following statements is/are true?
 - a) anabolic reactions break down molecules and release energy
 - b) anabolic reactions break down molecules and require energy
 - c) catabolic reactions break down molecules and release energy
 - d) catabolic reactions break down molecules and require energy
60. The reaction: $C_6H_{12}O_6 + 6 O_2 \rightarrow 6 CO_2 + 6 H_2O + 38 ATP$
 - a) is anabolic
 - b) is part of the metabolism of animal cells
 - c) is part of photosynthesis
 - d) all of the above
61. ATP stands for:
 - a) anabolic triple phosphate
 - b) a typical protein
 - c) adenosine triphosphate
 - d) amylase triglyceride phospholipid
62. Which of the following reactions would require energy from ATP?
 - a) amino acids \rightarrow polypeptide
 - b) starch \rightarrow glucose
 - c) triglyceride \rightarrow glycerol + fatty acids
 - d) all of the above
63. How many enzymes are required for the series of biological reactions: **A \rightarrow B \rightarrow C \rightarrow D \rightarrow E \rightarrow F**
 - a) 1
 - b) 6
 - c) 5
 - d) it is impossible to know

64. Cellular respiration:
 a) combines CO_2 and H_2O to make glucose
 b) is an anabolic reaction
 c) is the reverse reaction to photosynthesis
 d) all of the above
65. Which of the following reactions is catabolic?
 a) cellular respiration
 b) photosynthesis
 c) bonding fatty acids and glycerol to make a fat
 d) forming ATP from ADP and phosphate
66. When the active site of an enzyme changes shape due to a high temperature, it is:
 a) decomposed
 b) denatured
 c) replicated
 d) discombobulated
67. Enzymes:
 a) give energy to metabolic reactions
 b) change the direction of metabolic reactions
 c) speed up (control the rate) of metabolic reactions
 d) act as a buffer in metabolic reactions
68. The part of the enzyme molecule into which the substrate fits is called the:
 a) coenzyme
 b) polypeptide
 c) protease
 d) active site
69. Which of the following is a hydrolysis reaction?
 a) glucose molecules are converted to starches
 b) glucose is formed by photosynthesis
 c) glucose molecules are converted to maltose
 d) glucose is formed from starch
70. When two molecules are chemically bonded together, a molecule of water is released. This is called:
 a) hydrolysis
 b) denaturation
 c) absorption
 d) dehydration synthesis
71. In cells, the energy released from glucose is used to:
 a) make ATP
 b) make ADP
 c) break down ATP
 d) break down ADP
72. The first reaction in cellular respiration is shown: $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2 \text{C}_3\text{H}_6\text{O}_3$
 This reaction:
 a) is an anabolic reaction
 b) is a dehydration reaction
 c) releases energy
 d) all of the above
73. Which of the following is an anabolic reaction?
 a) $\text{ATP} + \text{H}_2\text{O} \rightarrow \text{ADP} + \text{P}_i$
 b) $\text{starch} + \text{many H}_2\text{O} \rightarrow \text{many C}_6\text{H}_{12}\text{O}_6$
 c) $6 \text{CO}_2 + 6 \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2$
 d) cellular respiration
74. Molecules of CO_2 and H_2O are the:
 a) reactants in cellular respiration
 b) reactants in photosynthesis
 c) products of photosynthesis
 d) products of dehydration synthesis of lipids
75. A molecule contains several H – O bonds. This molecule:
 a) dissolves well in water
 b) is hydrophobic
 c) is organic
 d) all of the above

Answers:

1. c	11. d	21. d	31. c	41. b	51. b	61. c	71. a
2. c	12. c	22. d	32. b	42. c	52. c	62. a	72. c
3. b	13. d	23. c	33. a	43. d	53. b	63. c	73. c
4. c	14. b	24. d	34. a	44. c	54. b	64. c	74. b
5. c	15. a	25. a	35. d	45. d	55. c	65. a	75. a
6. c	16. a	26. c	36. b	46. a	56. d	66. b	
7. a	17. d	27. d	37. a	47. c	57. a	67. c	
8. b	18. b	28. b	38. d	48. b	58. d	68. d	
9. b	19. c	29. b	39. b	49. c	59. c	69. d	
10. d	20. c	30. d	40. c	50. d	60. b	70. d	