**Chapter 3 Biochemistry of Cells Study Guide**

1. What is the most abundant organic compound on Earth?

2. Approximately how much water makes up the cells of organisms?

3. \_\_\_\_\_\_\_\_\_\_\_ is known as the universal solvent.

4. List 4 properties of water that make it so useful to organisms.

5. Besides water, what other substance makes up most of the cell?

6. \_\_\_\_\_\_\_\_\_\_\_\_ chemistry is the study of carbon compounds.

7. Carbon has \_\_\_\_\_\_\_ outer electrons so it can form \_\_\_\_\_\_\_\_\_\_\_ bonds by sharing these electrons.

8. Carbon & hydrogen make up compounds called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

9. Sketch a simple hydrocarbon with the formula CH4.

10. Carbon skeletons may be straight \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_ chains, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_ structures.

11. Hydrocarbons in \_\_\_\_\_\_\_\_\_\_\_\_ supply our bodies with energy.

12. The \_\_\_\_\_\_\_ of an organic molecule determines its function.

13. \_\_\_\_\_\_\_\_\_\_\_\_ groups give different properties to the organic compound to which they attach.

14. Write the formula for the following functional groups:

      a. Hydroxyl

      b. Carbonyl

      c. Carboxyl

      d. Amino

15. Give examples of organic compounds that contain each of the functional groups from question 14.

16. Large organic molecules are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

17. Polymers are built from smaller subunits called \_\_\_\_\_\_\_\_\_\_\_\_\_.

18. Biologists call polymers \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

19. Name 4 examples of polymers found in living things.

20. Monomers linked together are called \_\_\_\_\_\_\_\_\_\_\_\_.

21. The process of linking monomers together is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

22. Dehydration synthesis links small molecules or monomers together by removing molecules of \_\_\_\_\_\_\_\_\_\_\_\_\_.

23. Name the process used to break down large polymers into smaller monomers.

24. Hydrolysis involves \_\_\_\_\_\_\_\_\_\_\_\_ a molecule of water in order to break bonds.

25. Name some foods that contain lots of carbohydrates.

26. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are simple sugars.

27. Name 3 monosaccharides & give their chemical formula.

28. Monosaccharides are called hexose sugars because they contain 6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

29. \_\_\_\_\_\_\_\_\_\_ is the simple sugar made by plants, \_\_\_\_\_\_\_\_\_\_\_ is the sugar found in fruits, while \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is known as “milk sugar”.  Sugars have an \_\_\_\_\_\_\_\_\_\_ ending.

30. What are isomers?

31. Name 2 isomers.

32. What does aqueous mean?

33. What happens to simple sugars, monosaccharides, when they are put into aqueous solutions inside cells?

34. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ serve as fuel for cells. Saccharide means \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

35. What is a double sugar called?

36. How are disaccharides formed? Name the BOND that joins them together.

37. Name 3 disaccharides.

38. Name the simple sugars that make up each of these disaccharides:

      a. Sucrose

      b. Maltose

      c. Lactose

39. Complex carbohydrates are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & are made of chains of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

40. Name 3 examples of polysaccharides and tell the shape of each.

41. Plants store carbohydrate energy as \_\_\_\_\_\_\_\_\_\_\_\_.

42. Name some starchy foods.

43. Animals store their carbohydrate energy as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

44. Both starch & glycogen are made of monomers of \_\_\_\_\_\_\_\_\_\_\_\_ or glucose.

45. Describe cellulose fibers & tell where in plants it is found.

46. Cellulose makes up \_\_\_\_\_\_\_\_\_\_ in plants and serves as dietary \_\_\_\_\_\_\_\_\_\_ in animals.

47. How are cows able to digest cellulose?

48. Since sugars dissolve in water, they are said to be \_\_\_\_\_\_\_\_\_\_\_\_\_ or water-loving. What functional group makes them water soluble?

49. Lipids are hydrophobic. What does this mean?

50. Name 4 examples of lipids and then give 3 functions for lipids in the body.

      Examples:

      a.

      b.

      c.

51. If the bonds between carbons in a fatty acid are all single bonds, the fatty acid is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Sketch a saturated fatty acid.

52. If there is a double bond between carbons in a fatty acid, the fatty acid is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Sketch an unsaturated fatty acid.

53. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are the monomers that make up lipids or fats.

54. Triglycerides are made of an alcohol called \_\_\_\_\_\_\_\_\_\_\_\_ and 3 \_\_\_\_\_\_\_\_\_\_\_ acid chains.

55. \_\_\_\_\_\_\_\_\_\_\_ forms the backbone of the fat. Sketch glycerol.

56. Saturated fatty acids are \_\_\_\_\_\_\_\_\_\_\_ at room temperature and include \_\_\_\_\_\_\_\_\_\_,

margarine, and \_\_\_\_\_\_\_\_\_\_\_\_\_.

57. Unsaturated fats in plants exist as \_\_\_\_\_\_\_\_ or oils at room temperature.

58. (a) What process links the 3 fatty acid chains to the glycerol in lipids?

     (b) What lipids are in cell membranes?

     (c) Sketch and label a phospholipid.

      (d) Phospholipid heads are \_\_\_\_\_\_\_\_\_\_\_\_\_ and attract water, while the 2 tails are \_\_\_\_\_\_\_\_\_ and repel water.

59. Lipids called \_\_\_\_\_\_\_\_\_\_\_\_\_ are made of four, fused rings of carbon.

60. Name 3 steroids found in organisms.

      a.

      b.

      c.

61. Proteins are polymers made of monomers called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

62. How many different amino acids are there?

63. Give 3 jobs for proteins in cells.

      a.

      b.

      c.

64. What four things are bonded to the central carbon of every amino acid?

65. Sketch the structure of an amino acid & label the attached groups.

66. Amino acids are linked together by \_\_\_\_\_\_\_\_\_\_\_\_ synthesis and held together by \_\_\_\_\_\_\_\_\_\_\_\_\_ bonds.

67. Many proteins act as \_\_\_\_\_\_\_\_\_\_ or biological catalysts.

68. Cells have \_\_\_\_\_\_\_\_\_\_\_\_\_ of enzymes which may \_\_\_\_\_\_\_\_\_\_\_ chemical bonds and \_\_\_\_\_\_\_\_\_\_\_\_ the amount of activation energy needed for the reaction to occur.

69. Enzymes have what shape?

70. Substrates attach to an enzyme at its \_\_\_\_\_\_\_\_\_\_\_ site. When a substrate attaches to the active site the active site changes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  This is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_ fit.

71. Can enzymes be reused?

72. The linear sequence of amino acids (chain) is the \_\_\_\_\_\_\_\_\_\_\_\_ structure of a protein.

73. Protein chains are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

74. Secondary protein structures occur when proteins \_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_.

75. When polypeptides join together, the \_\_\_\_\_\_\_\_\_ groups interact with each other forming the \_\_\_\_\_\_\_\_\_\_\_ structure of a protein forms.

76. Proteins take on a \_\_\_\_\_\_\_\_\_\_\_\_\_ shape in the watery environment inside a cell. This is known as their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ structure. Protein shape is also known as protein \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

77. Denaturing a protein involves changing its \_\_\_\_\_\_\_\_\_\_ so it no longer works.

78. Name 2 things that denature proteins.

     (b) What is the function of the protein hemoglobin in red blood cells?

    79. (a) What protein controls blood sugar level?

     (b) Proteins in the cell membrane that help cells recognize similar cells are called \_\_\_\_\_\_\_\_\_\_ proteins.

80. \_\_\_\_\_\_\_\_\_\_\_ acids store hereditary information for making all of the body’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

81. Name the 2 types of nucleic acids.

82. What are the monomers for nucleic acids? Sketch a nucleotide.

83. Name the 4 bases on DNA.

84. What 2 things make up the sides of DNA?

85. DNA is \_\_\_\_\_\_\_\_\_\_\_ stranded & coiled to make a shape called the double \_\_\_\_\_\_\_\_\_\_\_\_.

86. RNA has \_\_\_\_\_\_\_\_\_\_ sugar instead of DEOXYRIBOSE sugar on DNA

87. RNA is a \_\_\_\_\_\_\_\_\_\_\_\_\_ stranded molecule unlike double stranded DNA.

88. On RNA, the base \_\_\_\_\_\_\_\_\_\_\_\_\_\_ replaces thymine.

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