

## Study Guide BSCS Biology Chapter 1

1. Define: element
2. Does the chemical composition of water ( $H_2O$ ) change when it boils?
3. List the following in order of complexity (simple to complex)  
  
\_\_\_\_\_ compound  
\_\_\_\_\_ element  
\_\_\_\_\_ atom
4. What information does this formula provide:  $C_{12}H_{22}O_{11}$ ?
5. Define: compound.
6. Over 96% of all living matter is made up of which elements?
7. Describe this formula:  $CO_2$ .
8. Are elements made up of 1 or more atoms?
9. Molecular models are derived from what 3 sources (according to text)?

10. Draw a Bohr model and label the subatomic particles .

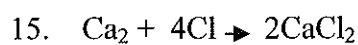
11. Define: isotope.

12. If an electron is lost during a reaction, would the charge of the atom be positive, negative, or neutral?

13. Why do the electrons stay in the electron cloud around the nucleus?

14. The energy that can be used by living things exists as the energy

- a. of the nucleus of the atom.
- b. that bonds one atom to another.
- c. of motion, which all atoms have.
- d. stored in molecules in the form of heat.



- a. How many kinds of atoms are represented?
- b. How many kinds of molecules are represented?
- c. How many molecules are represented?
- d. How many atoms are represented?

16. You have two gases A and B that are mixed together in a closed container. Both these gases react violently with each other and produce an explosion raising the temperature in the container. Write an equation that would best describe what happened.

17. I take 2 pieces of wood and rub them together to start a fire. The friction of the pieces of wood would be an example of \_\_\_\_\_.

18. Knowing that the H atom in a water molecule with a slightly (+) charge and the O atom has a slightly (-) charge. When does hydrogen bonding occur?

19. True/False:

- Chemical reactions are important for cell growth and maintenance.
- Chemical reactions are important in the production of new elements.
- Chemical reactions are important for energy storage and use.
- Chemical reactions are important for cell development.

20. Define: ion.

21. Choose the best response:

Covalent bonds \_\_\_\_\_.

- allow atoms to always share electrons.
- are easily broken.
- occur only between different elements.
- help to fill electron shells.

22. Three Italian dressings were tested under controlled conditions to determine which stayed mixed longer. Oil is nonpolar covalent and vinegar is polar covalent. Using the data below decide whether each conclusion is

- a. supported by data.
- b. not supported by data.
- c. neither supported not supported by data.

<b>Brand</b>	<b>A</b>	<b>B</b>	<b>C</b>
Ave time mixed (s)	12	24	21
Oil content (%)	47	36	30

23. The lower the oil content, the longer the dressing stays mixed.
24. Brand B has an ingredient that will neutralize the polarity of the vinegar.
25. % of nonpolar and polar components in Brand C allows it to stay mixed longer than brand A.
26. How does an ionic bond form?
27. Describe the pH scale. (Include ranges in your response.)
28. You had a tank full of water and determine that its pH is 5.0 and it needs to have a pH which is neutral. What would you add to it?
29. A precipitate forms in limewater when CO<sub>2</sub> is added. Below is a chart depicting the results of a series of test using chemical indicators (bromothymol blue and limewater). Bromothymol (BTB) is blue in basic solution and yellow in acidic solution.

<b>Tubes</b>	<b>Indicator</b>	<b>Material Added</b>	<b>Color after 5 minutes</b>
T1	BTB	nothing	blue
T2	BTB	breath through straw	yellow
T3	limewater	nothing	clear
T4	limewater	breath through straw	precipitate

- a. What does T1 serve in this experiment?
  - b. What does the change of bromothymol blue from blue to yellow indicates?
30. With respect to the composition of the air we expel from our lungs, the results of the limewater test. \_\_\_\_\_.
  31. A scientist says, "A tube of limewater will remain clear if dead insects are placed in it." Is she/he stating a hypothesis or making a prediction?
  32. How would you best explain the experimental design? (hint: CO<sub>2</sub>)
  33. What do you think would happen in T2 if a live grasshopper had been placed in this group?
  34. Are carbohydrates, proteins, lipids and nucleic acids considered to be organics?
  35. List the two elements always present in organic compounds.
  36. What elements make up a carbohydrate?
  37. Name the building blocks for carbohydrates.
  38. Is cellulose a type of lipid or carbohydrate?

39. What is glycogen?

40. What elements make up a protein?

41. A strand of beads is analogous to a starch molecule in that the

- a. single sugars always bond in single file..
- b. beads represent glucose units and the string represents the bonds.
- c. string represents the carbon skeleton to which the glucose units are attached.
- d. beads are only functional when they are in a close ring.

42. Name the building blocks of lipids.

43. Draw a structural diagram showing a simple representation of a fatty acid..

44. List some types of lipids.

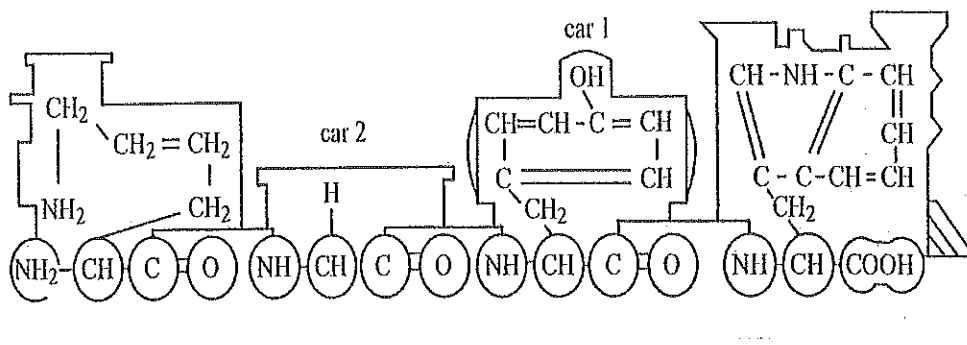
45. Name the primary use of the type of macromolecule which is a source of energy.

46. Name the macromolecule which is the primary component in cellular membranes.

47. Name the macromolecule whose function includes structural contributions, communication, and defense against disease.

48. The tertiary structure of a protein is determined by its \_\_\_\_\_.

Use the figure below to answer the questions 49 -52.



49. In the protein molecule, each "car" represents \_\_\_\_\_.

50. The "couplings" that connect one car to the next are the \_\_\_\_\_.

51. If the "caboose" were moved behind the "engine" and "car 1" were moved to the end of the "train" the chain would \_\_\_\_\_.

52. When two amino acids are bonded chemically is water released or added?

53. Proteins are made up of \_\_\_\_\_.

54. Amino acids are the building blocks of \_\_\_\_\_.

55. Nucleotides have the same kind of \_\_\_\_\_ groups.

56. In what way do the 4 nucleotides in a DNA molecule differ from each other?

57. Define: nucleotide.

58. With regard to structural differences in RNA and DNA which of the following are true?

- DNA is a double-stranded helix whereas RNA is single-stranded.
- RNA has the nitrogen base uracil instead of thymine.
- DNA has a greater number of phosphate groups.
- DNA has one less oxygen in its sugar molecule.

59. If you were to build a DNA model, what would need to be included?
60. True/False: The arrangement of nucleotides in DNA molecules vary in all living things.
61. Name the chemical link between generations in all living things.
62. Name the individual(s) responsible for determining the shape and structure of the DNA molecule.
63. Who was involved in taking X-ray pictures of DNA which helped in determining the shape of the DNA molecule?
64. Is it true that the number of adenine molecules in a sample of DNA is always the same as the number of molecules of cytosine?
65. Name the molecules found in DNA but not in an RNA molecule.
66. Name the type of nucleic acid found in the nucleus and the cytoplasm.
67. What type of bonding mechanism takes place in which DNA strands pair?
68. In what form is genetic information passed on from parent to offspring?
69. Define: codon.



70. Although there are exceptions, generally, genetic information flows in living organisms in which order?

- protein to RNA to DNA
- RNA to DNA to amino acids
- DNA to RNA to protein
- nucleotides to protein

71. The scanning tunneling microscope is used to reveal what structure of a sample?

72. Another data table – to be described in class. (8 questions in reference to this table)