

**Test Bank for Integrated Principles of Zoology 16th Edition  
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**Chapter 02  
The Origin and Chemistry of Life**

**Multiple Choice Questions**

1. Spontaneous generation was first proposed as
- A. a concept to explain the formation of the first living cells on earth.
  - B. a concept to explain the evolution of simple chemicals into complex macromolecules.
  - C. an explanation for the appearance of maggots and mice from rotting material, fish from leaves that fall into water, etc.
  - D. an explanation by Pasteur accounting for the germination of spores in broth.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Spontaneous Generation of Life?*

*Topic: Spontaneous Generation of Life?*

2. Pasteur's work with spontaneous generation showed that
- A. life could not have evolved from non-living chemistry on the early earth.
  - B. mice came from mother mice and maggots from mother flies.
  - C. simple chemicals could become complex organic macromolecules without any living cell involved.
  - D. broth did not ferment spontaneously but required contamination with organisms.

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*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Spontaneous Generation of Life?*

*Topic: Spontaneous Generation of Life?*

3. The hypothesis that simple chemicals may have naturally become complex macromolecules by natural physical forces was first proposed by

- A. Stanley Miller.
- B. Graham Cairns-Smith.
- C. Alexander Oparin and J.B.S. Haldane.
- D. Sidney Fox.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Spontaneous Generation of Life?*

*Topic: Spontaneous Generation of Life?*

4. A solution that has a pH of 5 has

- A. a concentration of  $H^+$  20 times higher than water.
- B. a concentration of  $H^+$  100 times higher than water.
- C. a concentration of  $H^+$  the same as water.
- D. a concentration of  $H^+$  20 times lower than water.
- E. a concentration of  $H^+$  100 times lower than water.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*Gradable: automatic*

*Section: Water and Life*

*Topic: Water and Life*

5. A dissolved substance that has the ability to either remove or add  $H^+$  and  $OH^-$  ions to resist pH changes is

- A. a solution.
- B. pure water.
- C. a buffer.
- D. a solvent.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Water and Life*

*Topic: Water and Life*

6. Most organic molecules are associated with living organisms. Which of the following statements is NOT related to the general distinctions between these types of molecules?
- A. Carbon dioxide (CO<sub>2</sub>) lacks hydrogen atoms found in most organic molecules and therefore is usually not considered to be "organic."
  - B. Formaldehyde (CH<sub>2</sub>O) is a small molecule compared to most organic molecules but does have carbon and hydrogen covalently bonded together and therefore is considered to be "organic."
  - C. Salt (Na<sup>+</sup>Cl<sup>-</sup>) is not an organic molecule but is important to the life of many organisms.
  - D. Organic carbon atoms are more diverse than inorganic carbon molecules that form the molecular structure of soot or a diamond from pure carbon.
  - E. All of the choices are correct.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

7. Perhaps a better description of an organic compound is that an organic compound is any substance
- A. derived from living matter.
  - B. containing carbon.
  - C. found within a cell.
  - D. consumed by animals.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

8. Carbohydrates are categorized into
- A. organic and inorganic carbohydrates.
  - B. saturated and unsaturated carbohydrates.
  - C. monosaccharides, disaccharides and polysaccharides.
  - D. primary, secondary, tertiary and quaternary carbohydrates.
  - E. monomer and polymer carbohydrates.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

9. Which of the following is a "structural" carbohydrate molecule?
- A. Sucrose
  - B. Glycogen
  - C. Cellulose
  - D. Glucose

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

10. Which of the carbohydrates given below is a major component of the cuticle of arthropods (e.g., insects, crayfish, etc.)?
- A. Starch **B.**
  - Chitin C.
  - Cellulose D.
  - Glycogen

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

11. Which of the following carbohydrates is used in animal muscle and liver cells for energy storage?

- A. Starch
- B. Chitin
- C. Cellulose
- D. Glycogen**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

12. Which of the following is the most abundant carbohydrate in the world?

- A. Cellulose**
- B. Glycogen
- C. Fructose
- D. Glucose

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

13. Polysaccharide are polymers made up of which kind of monomers?

- A. Simple sugars
- B. Amino acids
- C. Nucleotides
- D. Alternating sugar and phosphate groups
- E. Fatty acids and glycerol

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

14. The three principal groups of lipids are neutral fats, phospholipids, and
- A. glycogen.
  - B. steroids.
  - C. amino acids.
  - D. fatty acids.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

15. Neutral fats are A. stored as glycogen. B. not stored. **C.** made of fatty acids and glycerol. D. made of chains of fatty acids linked together by water molecules.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

16. Lipids are polymers made of which monomers?
- A. Glucose or modified glucose molecules
  - B. Amino acids
  - C. Alternating sugar and phosphate groups
  - D. Fatty acids and glycerol

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

17. A dehydration synthesis reaction is also
- A. a condensation reaction.
  - B. a hydrolysis reaction.
  - C. an isomeric reaction.
  - D. a reaction that does not require enzymes.

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*Gradable: automatic*  
*Section: Chemical Evolution*  
*Section: Organic Molecular Structure of Living Systems*  
*Topic: Chemical Evolution*  
*Topic: Organic Molecular Structure of Living Systems*

18. Which of the lipid groups below is structurally unlike the others?
- A. Steroids
  - B. Neutral fats
  - C. Triglycerides
  - D. Phospholipids

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 2. Understand*  
*Gradable: automatic*  
*Section: Organic Molecular Structure of Living Systems*  
*Topic: Organic Molecular Structure of Living Systems*

19. Which of the following lipids forms a bilayer between two fluid regions, such as in the plasma membrane of a cell?
- A. Steroids
  - B. Waxes
  - C. Phospholipids
  - D. Lipoproteins

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*Gradable: automatic*  
*Section: Organic Molecular Structure of Living Systems*  
*Topic: Organic Molecular Structure of Living Systems*

20. Which of the following is NOT a steroid?

- A. Vitamin D
- B. Adrenocortical hormones
- C. Sex hormones
- D. Cholesterol
- E. All of the choices are steroids

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

21. Cholesterol belongs to which of the following groups?

- A. Steroids
- B. Neutral fats
- C. Carbohydrates
- D. Phospholipids

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

22. If an animal needs to store high-energy compounds for long-term use with the least amount of extra body weight, which would be the best molecule for storage?

- A. Fructose and glucose in the form of honey
- B. High-calorie fat molecules
- C. Starch
- D. Glycogen with extensive side branches of glucose

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*



23. A protein is a polymer made up of which kind of monomers?

- A. Glucose or modified glucose molecules
- B. Amino acids
- C. Nucleotides
- D. Fatty acids and glycerol

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

24. A peptide bond is found in which type of biological molecule?

- A. Carbohydrate
- B. Lipid
- C. Protein
- D. Simple sugar

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

25. A chain consisting of a number of amino acids is a

- A. quaternary structure.
- B. dipeptide. **C.**
- polypeptide.
- D. None of the choices are correct.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

26. In a protein, the folding of a polypeptide into a three-dimensional structure, usually stabilized by covalent bonds between the side groups of the amino acids, is the
- A. primary structure.
  - B. secondary structure.
  - C. tertiary structure.
  - D. quaternary structure.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

27. The alpha helix is found at which level of protein organization?
- A. Primary structure
  - B. Secondary structure
  - C. Tertiary structure
  - D. Quaternary structure

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

28. The splitting of one compound into two by the addition of water is called
- A. covalent.
  - B. ionic formation.
  - C. hydrolysis.
  - D. condensation.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

29. You eat eggs for breakfast and return in the evening to dirty dishes with "dried on" yellow streaks. After soaking awhile, the egg yolk protein molecules easily "wash off." What happened?

- A. Heating denatured the egg protein molecules, hydrolysis reactions then formed bonds in the dried egg yolk, and soaking in water eventually resulted in condensation reactions where water broke these bonds
- B. Heating denatured the egg protein molecules, unorganized condensation reactions formed bonds in the drying egg, and soaking in water resulted in hydrolysis reactions where water broke these bonds
- C. Egg monomers were fused to become one polymer, which was easily dissolved by water back into monomers
- D. Addition of water converted organic molecules into inorganic molecules

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*Gradable: automatic*

*Section: Chemical Evolution*

*Topic: Chemical Evolution*

30. At the molecular level, a cell's ability to vary in its operational tolerance to temperature, etc., is most closely related to

- A. enzyme activity and protein denaturation.
- B. ATP efficiency.
- C. replication of nucleic acids.
- D. extent of saturation of fatty acids.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

31. DNA and RNA are polymers composed of repeated units called **A.** nucleotides.  
B. bases.  
C. sugars.  
D. None of the choices are correct.

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*Gradable: automatic*  
*Section: Organic Molecular Structure of Living Systems*  
*Topic: Organic Molecular Structure of Living Systems*

32. A nucleic acid is a polymer made up of which kind of monomers?  
A. Amino acids  
B. Nucleotides  
C. Glucose or modified glucose molecules  
D. Alternating sugar and phosphate groups

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*Gradable: automatic*  
*Section: Organic Molecular Structure of Living Systems*  
*Topic: Organic Molecular Structure of Living Systems*

33. Nucleic acids are important because they  
A. act as buffers.  
B. are the basic units of neutral fats.  
C. direct the synthesis of proteins.  
D. None of the choices are correct.

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 2. Understand*  
*Gradable: automatic*  
*Section: Organic Molecular Structure of Living Systems*  
*Topic: Organic Molecular Structure of Living Systems*

34. Which of these statements is true about DNA?

- A. It is the genetic material of the cell
- B. It forms a protein
- C. It is pure amino acid
- D. It contains no sugar

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

35. Fish sperm is mostly made of male DNA. A chemical test would find high amounts of

- A. nitrogenous bases, sugar, and phosphate groups.
- B. phospholipids and steroids.
- C. amino acids and unsaturated fats.
- D. triglycerides and ATP.
- E. globular proteins and stored fats.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

36. Prions are infectious

- A. carbohydrates.
- B. proteins.
- C. lipids.
- D. Prions are not actually infectious.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

37. Which of the following forms of energy is NOT one of those thought to have been involved in the production of large organic molecules in the primitive reducing atmosphere? A. Radioactivity  
B. Electrical energy  
C. Radiation from the sun  
D. Sound

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 2. Understand*  
*Gradable: automatic*  
*Section: Chemical Evolution*  
*Topic: Chemical Evolution*

38. The term "reducing atmosphere" for the early earth means that the atmosphere  
A. was much thinner around the surface of the earth than now.  
B. contained only two or three kinds of gases.  
C. contained little or no free oxygen.  
D. contained little or no free nitrogen.

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*Gradable: automatic*  
*Section: Chemical Evolution*  
*Topic: Chemical Evolution*

39. Who first performed an experiment that proved that amino acids could be produced in the laboratory from a reducing atmosphere and electrical sparks?  
A. Stanley Miller and Harold Urey  
B. Graham Cairns-Smith  
C. Thomas Cech  
D. Alexander Oparin and J.B.S. Haldane

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*Gradable: automatic*  
*Section: Chemical Evolution*  
*Topic: Chemical Evolution*

40. Which of the following is a correct statement about oxidation reduction reactions?

- A. Reduction is the loss of electrons
- B. Reduction is the loss of hydrogen atoms
- C. Oxidation is the loss of electrons or hydrogen atoms
- D. Reduction and oxidation sometimes occur together, but not always

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Chemical Evolution*

*Topic: Chemical Evolution*

41. Which of the following kinds of molecules is thought to have been absent from the primitive reducing atmosphere?

- A. Water vapor (H<sub>2</sub>O)
- B. Carbon dioxide (CO<sub>2</sub>)
- C. Oxygen (O<sub>2</sub>)
- D. Nitrogen (N<sub>2</sub>)

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Chemical Evolution*

*Topic: Chemical Evolution*

42. An alternative environment to the "hot dilute soup" and clay hypothesis that offers a possible source of energy and molecules for the origin of life is/are the

- A. frozen Antarctic ice sheets.
- B. surface of Mars.
- C. hydrothermal vents in ocean bottoms.
- D. Earth mantle and core.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Chemical Evolution*

*Topic: Chemical Evolution*

43. Water has which of the following important characteristics that explain its key role in living systems?

- A. High specific heat capacity
- B. High surface tension
- C. Is an excellent solvent
- D. All of the choices are correct

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Water and Life*

*Topic: Water and Life*

44. A molecule of RNA that has enzymatic or catalytic properties is called a

- \_\_\_\_\_.
- A. deoxyribose
  - B. nucleotide
  - C. ribonucleic acid
  - D. ribozyme**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Origin of Living Systems*

*Topic: Origin of Living Systems*

45. The fact that nucleic acids are very complicated molecules suggests that

- A. the RNA-first hypothesis is impossible.
- B. the protein-first hypothesis is therefore the only plausible hypothesis.
- C. no natural system could ever generate them.
- D. None of the choices are correct.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*Gradable: automatic*

*Section: Origin of Living Systems*

*Topic: Origin of Living Systems*



46. The ancestral protocells

- A. may have contained RNA or DNA as their genetic material.
- B. may have evolved before the development of a true cell.
- C. may have had a lipid and protein membrane surrounding them, forming a proteinoid microsphere.
- D. may have contained a biochemical pathway for energy metabolism.
- E. All of the choices are correct.

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 5. Evaluate*  
*Gradable: automatic*  
*Section: Origin of Living Systems*  
*Topic: Origin of Living Systems*

47. Biological evolution differs from chemical evolution in that biological evolution would have been possible only after the development of

- A. true cells capable of replication.
- B. nucleic acids.
- C. enzymes.
- D. a metabolic pathway.

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*Gradable: automatic*  
*Section: Chemical Evolution*  
*Section: Origin of Living Systems*  
*Section: Precambrian Life*  
*Topic: Chemical Evolution*  
*Topic: Origin of Living Systems*  
*Topic: Precambrian Life*

48. Heating dry mixtures of amino acids and then mixing them with water forms small

- A. strands of DNA.
- B. living cells.
- C. proteinoid microspheres.
- D. plasma membranes.

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*Gradable: automatic*  
*Section: Chemical Evolution*  
*Topic: Chemical Evolution*

49. If the hypothesis that protocells were based on an "RNA world" is correct, what would be necessary to shift to a "DNA world"?

- A. An enzyme or reaction capable of removing one oxygen from ribose in nucleotides
- B. Enzymes for reverse transcription of RNA into DNA
- C. New enzymes to replicate the DNA
- D. New enzymes for transcribing DNA back to RNA
- E. All are necessary to switch to a "DNA world."

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 4. Analyze*  
*Gradable: automatic*

50. Scientists once assumed that the earliest protocells would have been autotrophs. This concept appears to be

- A. correct, since heterotrophs would depend upon eating autotrophs.
- B. correct, since glycolysis and fermentation only occur after oxygen is present from photosynthesis.
- C. incorrect, since the primordial soup likely contained many preformed food molecules suitable for heterotrophic metabolism.
- D. incorrect, since glycolysis and fermentation require complex enzymes for catalytic reactions.

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*Gradable: automatic*  
*Section: Origin of Living Systems*  
*Topic: Origin of Living Systems*

51. Prokaryotic cells are represented by fossils that are dated back as far as \_\_\_\_\_ billion years ago.

- A. 1.5.
- B. 2.8.
- C. 3.8.**
- D. 4.8.

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*Gradable: automatic*  
*Section: Origin of Living Systems*  
*Topic: Origin of Living Systems*

52. The Precambrian-Cambrian boundary is

- A. A point that separates reduction environments from oxidation environments
- B. The separation point between prokaryotes and eukaryotes
- C. A point of dramatically increased fossilization, although it is likely that many animal groups existed before this time
- D. The shift-over from plants to animal life

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Precambrian Life*

*Topic: Precambrian Life*

53. The first eukaryotic cells probably arose about \_\_\_\_\_ billion years ago. A. 1.5

- B. 2.5
- C. 3.5
- D. 4.5

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Precambrian Life*

*Topic: Precambrian Life*

54. Which pairing of occurrence and date is correct?

- A. Beginning of Cambrian — 600 million years ago
- B. Origin of life — 3.8 billion years ago
- C. Origin of eukaryotic cells — 1.5 billion years ago
- D. All the choices are correct

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Precambrian Life*

*Topic: Precambrian Life*

55. Our current understanding of the origin of eukaryotic organelles such as mitochondria is that they

- A. were copies of a cell nucleus that failed to be separated by cytokinesis.
- B. are prokaryotes that were taken into a cell and now live there symbiotically.
- C. are variations of the plasma membrane.
- D. are new forms of life that arose inside other cells.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Precambrian Life*

*Topic: Precambrian Life*

### Fill in the Blank Questions

56. The term \_\_\_\_\_ refers broadly to compounds that contain carbon.

**organic**

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

57. The most important of the energy-storing carbohydrate monomers is the molecule

\_\_\_\_\_  
**glucose**

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

58. The molecule \_\_\_\_\_ is an important form for storing sugar in animals and is found mainly in the liver and muscle cells of animals.

**glycogen**

*Bloom's Level: 1. Remember*

*Gradable: automatic*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

59. A(n) \_\_\_\_\_ fatty acid has two or more carbon atoms joined by double bonds.

**unsaturated**

*Bloom's Level: 1. Remember*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

60. Amino acids are linked together to form proteins by \_\_\_\_\_ bonds.

**peptide**

*Bloom's Level: 1. Remember*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

61. The alpha-helix is an example of the \_\_\_\_\_ structure of a protein.

**secondary**

*Bloom's Level: 1. Remember*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

62. When hemoglobin takes up or releases oxygen, it undergoes a change in its \_\_\_\_\_ structure.

**quaternary**

*Bloom's Level: 1. Remember*

*Section: Organic Molecular Structure of Living Systems*

*Topic: Organic Molecular Structure of Living Systems*

63. Submarine hot springs where seawater seeps through cracks in the bottom and comes close to the hot magma are called \_\_\_\_\_.

**hydrothermal vents**

*Bloom's Level: 1. Remember*

*Section: Chemical Evolution*

*Topic: Chemical Evolution*

64. Most biological polymerizations are \_\_\_\_\_ dehydration reactions in which monomers are linked together by removal of water.

**condensation**

*Bloom's Level: 1. Remember*

*Section: Chemical Evolution*

*Topic: Chemical Evolution*

65. Sidney Fox studied the synthesis of polypeptides into polymers which in water formed small spherical bodies called \_\_\_\_\_.

**proteinoid microspheres**

*Bloom's Level: 1. Remember*

*Section: Chemical Evolution*

*Topic: Chemical Evolution*

66. A critical answer to the chicken-or-the-egg problem formed by the nucleic-acid-or-enzyme-first dilemma is perhaps solved by the discovery of catalytic RNA called \_\_\_\_\_.

**ribozymes**

*Bloom's Level: 1. Remember*

*Section: Origin of Living Systems*

*Topic: Origin of Living Systems*

67. The earliest source of reduced compounds for oxidative metabolism was probably

\_\_\_\_\_.  
**hydrogen sulfide**

*Bloom's Level: 1. Remember*  
*Section: Origin of Living Systems*  
*Topic: Origin of Living Systems*

68. Bacteria contain a single, large molecule of DNA in the \_\_\_\_\_ region.

**nucleoid**

*Bloom's Level: 1. Remember*  
*Section: Origin of Living Systems*  
*Topic: Origin of Living Systems*

69. The \_\_\_\_\_ theory proposes that pre-eukaryotes are the result of anaerobic bacteria ingesting aerobic bacteria and subsequently a symbiotic relationship was formed.

**endosymbiotic**

*Bloom's Level: 1. Remember*  
*Section: Precambrian Life*  
*Topic: Precambrian Life*

## Essay Questions

70. Describe the first evidence for chemical evolution that came from Stanley Miller's experiment.

Answers will vary.

*Bloom's Level: 2. Understand*  
*Section: Chemical Evolution*  
*Topic: Chemical Evolution*

71. This chapter began with Pasteur disproving spontaneous generation, the theory that life could arise from non-living material. Then Miller and Urey test the Oparin-Haldane hypothesis and suggest that life once did arise from non-living chemicals. Are these experiments contradictory? Explain how the science community recognize both as valid.

Answers will vary.

*Bloom's Level: 4. Analyze*  
*Section: Chemical Evolution*  
*Section: Spontaneous Generation of Life?*  
*Topic: Chemical Evolution*  
*Topic: Spontaneous Generation of Life?*

72. The Miller-Urey experiments demonstrated the formation of larger molecules from simple molecules. Why is there still a need for concentration in order to make formation of a protocell more likely?

Answers will vary.

*Bloom's Level: 2. Understand*  
*Section: Chemical Evolution*  
*Topic: Chemical Evolution*

73. Assumptions that the earliest life forms had to make their own food have been replaced with the belief that the earliest microorganisms were definitely primary heterotrophs. How could these earliest cells have lived if they did not make their own food, and why do we feel certain that they were not photosynthetic?

Answers will vary.

*Bloom's Level: 2. Understand*  
*Section: Chemical Evolution*  
*Topic: Chemical Evolution*



74. What evidence do scientists have that the earth's primeval atmosphere was a reducing atmosphere?

Answers will vary.

*Bloom's Level: 4. Analyze*  
*Section: Chemical Evolution*  
*Topic: Chemical Evolution*

75. Why can't we set up an experiment that would again duplicate the conditions that were present at the early origin of protocells?

Answers will vary.

*Bloom's Level: 4. Analyze*  
*Section: Origin of Living Systems*  
*Topic: Origin of Living Systems*

76. Describe the chicken-or-the-egg dilemma with enzymes and hereditary molecules, and detail how the "RNA world" proposal offers a solution.

Answers will vary.

*Bloom's Level: 4. Analyze*  
*Section: Origin of Living Systems*  
*Topic: Origin of Living Systems*

77. What are the essential properties of a "protocell"?

Answers will vary.

*Bloom's Level: 2. Understand*  
*Section: Origin of Living Systems*  
*Topic: Origin of Living Systems*

78. Describe the symbiotic theory of the origin of eukaryotes.

Answers will vary.

*Bloom's Level: 2. Understand*  
*Section: Precambrian Life*  
*Topic: Precambrian Life*

79. What may have been the "reason" for the "Cambrian explosion"?

Answers will vary.

*Bloom's Level: 2. Understand*  
*Section: Precambrian Life*  
*Topic: Precambrian Life*

80. What evidence leads researchers to believe that there was a diversity of animal life before the Cambrian if we cannot find extensive fossils of earlier animals?

Answers will vary.

*Bloom's Level: 1. Remember*  
*Section: Precambrian Life*  
*Topic: Precambrian Life*

81. Compare and contrast the prokaryotic and eukaryotic cellular structures.

Answers will vary.

*Bloom's Level: 2. Understand*  
*Section: Origin of Living Systems*  
*Section: Precambrian Life*  
*Topic: Origin of Living Systems*  
*Topic: Precambrian Life*

82. If eukaryotes are more complex than prokaryotes, then why are there prokaryotes living today?

Answers will vary.

*Bloom's Level: 3. Apply*  
*Section: Origin of Living Systems*  
*Topic: Origin of Living Systems*

83. Does the recognition of prokaryotes as two major lineages, Archaeobacteria and Eubacteria, result in any major changes to the internal taxonomic arrangement of the fungi, protozoan groups, plants and animals?

Answers will vary.

*Bloom's Level: 4. Analyze*  
*Section: Origin of Living Systems*  
*Topic: Origin of Living Systems*