

Chapter 1—Biochemistry and the Organization of Cells

MULTIPLE CHOICE

1. How do the molecules that play a role in living cells compare to those encountered in organic chemistry?
- They are the same, just operating in a different context.
 - Biological molecules are organic molecules, but the similarity ends there.
 - Biological molecules aren't similar to organic molecules at all.
 - Biology isn't based on molecules at all, but a "vital force".

ANS: A PTS: 1 OBJ: New in 6e TOP: Basic Themes

2. Which of the following best defines **organic chemistry**?
- The study of compounds contained in organisms.
 - The study of compounds containing organs.
 - The study of compounds containing carbon and hydrogen and their derivatives.
 - The study of compounds containing elements other than carbon.

ANS: C PTS: 1 OBJ: New in 6e
TOP: Chemical Foundations of Biochemistry

3. Which of the following was part of the **vital force theory**?
- The compounds found in living things are just like those found in the non-living world.
 - The compounds found in living things are interesting, but can easily be produced in the laboratory.
 - The compounds found in living things can not be produced in the laboratory.

ANS: C PTS: 1 OBJ: New in 6e
TOP: Chemical Foundations of Biochemistry

4. The synthesis of urea from ammonium cyanate.
- was a critical component of the Miller-Urey experiment.
 - requires a protein as a catalyst.
 - helped dispel the vital force theory.
 - supported the vital force theory.

ANS: C PTS: 1 TOP: Chemical Foundations of Biochemistry

5. Which of the following is NOT a Functional Group
- Amino group
 - Protein
 - Alcohol group
 - Carbonyl group

ANS: B PTS: 1 OBJ: New in 7e
TOP: Chemical Foundations of Biochemistry

6. Which of the following functional groups are not commonly seen in biomolecules?
- Alkyl halides
 - Amides
 - Carboxylic acids
 - Ethers
 - Phosphate esters

ANS: A PTS: 1 OBJ: Modified from 5e
TOP: Chemical Foundations of Biochemistry

7. Which of the following statements regarding biomolecules is **false**?
- They contain predominantly ionic bonds.
 - They contain predominantly nonmetallic elements.
 - Carbon is the key element.
 - Specific stereoisomers are essential in most cases.

ANS: A PTS: 1 OBJ: Modified from 5e
TOP: Chemical Foundations of Biochemistry

8. All of the following bonds are important in biomolecules, **except**:
- C–Cl
 - C–H
 - C–N
 - O–H
 - O–P

ANS: A PTS: 1 TOP: Chemical Foundations of Biochemistry

9. Which of the following statements regarding biopolymers is false?
- Different sequences of the monomers can lead to different functions.
 - Only soluble polymers can be created from soluble monomers.
 - A wide, almost uncountable variety of polymers can be created from just a few monomers.
 - Different linkages between the monomers can lead to different functions.
 - Biopolymers can fold up into complex shapes.

ANS: B PTS: 1 OBJ: Modified from 5e
TOP: Chemical Foundations of Biochemistry

10. Which statement is **not** correct about peptide nucleic acids, PNA?
- They are combinations of peptides and nucleic acids.
 - Scientists create them to study the origins of life
 - They were proven to be the first hereditary molecule.
 - They may combine the catalytic properties of proteins with the information transfer ability of nucleic acid
 - All of these statements apply to PNA.

ANS: C PTS: 1 OBJ: New in 7e
TOP: Chemical Foundations of Biochemistry

11. Rank the following levels of structural organization in terms of size from smallest to biggest:
- atoms < molecules < organelles < cells < organs
 - atoms < organelles < molecules < cells < organs
 - atoms < molecules < cells < organelles < organs
 - molecules < atoms < organelles < cells < organs
 - atoms < molecules < organelles < organs < cells

ANS: A PTS: 1 OBJ: New in 6e TOP: Origin of Life

12. According to the big bang theory of the creation of the universe,
- the universe has been getting cooler since its beginning
 - the initial explosion caused the creation of all of the elements of the periodic table

- c. carbon is the most abundant element in the universe
- d. the earth could be no older than 1 billion years

ANS: A PTS: 1 OBJ: New in 7e TOP: Origin of Life

13. In its earliest stages, which atoms were present in the universe?
- a. carbon, hydrogen, and oxygen
 - b. hydrogen, helium, and lithium
 - c. nitrogen, sulfur, and phosphorous
 - d. uranium, polonium, and radium
 - e. helium, neon, and argon

ANS: B PTS: 1 OBJ: New in 6e TOP: Origin of Life

14. How are the majority of elements thought to have been formed?
- a. By thermonuclear reactions that normally take place in stars.
 - b. In explosions of stars.
 - c. By the action of cosmic rays outside the stars since the formation of the galaxy.
 - d.** All of the above.
 - e.** None of the above; all the elements were present from the initial Big Bang.

ANS: D PTS: 1 OBJ: New in 6e TOP: Origin of Life

15. What is the chemical formula for ozone?
- a. O₂
 - b. O₃
 - c. NH₃
 - d. H₂S
 - e. CH₄

ANS: B PTS: 1 OBJ: New in 6e TOP: Origin of Life

16. It is generally believed that the following gas was missing in the primordial atmosphere:
- a. H₂
 - b. CO₂
 - c. CH₄
 - d. NH₃
 - e. O₂

ANS: E PTS: 1 TOP: Origin of Life

17. A catalyst
- a. increases the rate of a chemical reaction
 - b. increases the amount of product obtained in a chemical reaction
 - c. decreases the amount of product obtained in a chemical reaction
 - d.** none of the above

ANS: A PTS: 1 TOP: Origin of Life

18. The genetic coding material is
- a. protein
 - b. DNA
 - c. polysaccharide
 - d. lipid

ANS: B PTS: 1 TOP: Origin of Life

19. This question was moved to the Matching section in ExamView.

(To maintain the integrity of the numbering system between the printed copy and ExamView, this question has been marked "do not use on test" in ExamView's question information dialog.)

- a. not available
- b. not available
- c. not available
- d. not available

ANS: A PTS: 1 TOP: Origin of Life

20. Which of the following best describes the results of the Miller-Urey experiment?

- a. It proved that DNA is the genetic material.
- b. It produced proteins under conditions simulating the early Earth.
- c. It created living cells from non-living materials.
- d. It produced some simple organic compounds from a mixture of gases presumed to have existed in the early atmosphere.
- e. All of these results of the Miller-Urey experiment.

ANS: D PTS: 1 OBJ: New in 6e TOP: Origin of Life

21. The genetic code

- a. determines the order of sugars in a polysaccharide
- b. has no effect on the sequence of amino acids in proteins
- c. is the means by which the "blueprint" for living organisms is passed from one generation to the next
- d. cannot be understood by currently available experimental methods

ANS: C PTS: 1 TOP: Origin of Life

22. Biological catalysts are

- a. proteins exclusively
- b. RNA exclusively
- c. DNA exclusively
- d. some proteins and some RNA

ANS: D PTS: 1 TOP: Origin of Life

23. The main difference between prokaryotic and eukaryotic cells is the existence of ____ in eukaryotes.

- a. the nucleus
- b. ribosomes
- c. DNA
- d. RNA
- e. cell walls

ANS: A PTS: 1 OBJ: Modified from 5e
TOP: Prokaryotes & Eukaryotes

24. All of the following features are common to all living organisms, **except**:

- a. Biomolecules
- b. Metabolic pathways
- c. Cellular structures
- d. DNA sequences
- e. RNA molecules

ANS: C

PTS: 1

TOP: Prokaryotes & Eukaryotes

25. All eukaryotic organisms

- a. are multicellular
- b. have a nucleus
- c. have chloroplasts
- d. have a cell wall

ANS: B

PTS: 1

OBJ: New in 7e

TOP: Prokaryotes & Eukaryotes

26. Cell membranes

- a. are found in plants, but not in animals
- b. consist mainly of sugars
- c. do not allow transport into or out of the cell
- d. separate the cell from the outside world

ANS: D

PTS: 1

TOP: Prokaryotes & Eukaryotes

27. Which of the following is **not** a subcellular organelle?

- a. nucleus
- b. mitochondrion
- c. endoplasmic reticulum
- d. cytoskeleton

ANS: D

PTS: 1

OBJ: New in 7e

TOP: Prokaryotes & Eukaryotes

28. Energy-yielding oxidation reactions take place in eukaryotic

- a. nuclei.
- b. ribosomes.
- c. mitochondria.
- d. endoplasmic reticula.
- e. cell walls.

ANS: C

PTS: 1

OBJ: New in 6e

TOP: Prokaryotes & Eukaryotes

29. Prokaryotic cells

- a. do not have a well defined nucleus
- b. are smaller than eukaryotic cells
- c. do not have internal membranes
- d. all of the above

ANS: D

PTS: 1

TOP: Prokaryotic Structure

30. Prokaryotes

- a. contain ribosomes
- b. do not have a cell membrane
- c. contain mitochondria
- d. none of the above

ANS: A

PTS: 1

TOP: Prokaryotic Structure

31. Ribosomes

- a. are the site of photosynthesis
- b. are the site of protein synthesis
- c. are never bound to membranes
- d. cannot be seen in the electron microscope

ANS: B PTS: 1 TOP: Prokaryotic Structure

32. 11 Ribosomes are made up of
- RNA and proteins
 - DNA and proteins
 - RNA and DNA
 - proteins and carbohydrates

ANS: A PTS: 1 TOP: Prokaryotic Structure

33. Which of the following cellular components is commonly found in bacteria?
- Nucleus
 - Ribosomes
 - Chloroplasts
 - Mitochondria
 - More than one of these is characteristic of bacteria.

ANS: B PTS: 1 OBJ: Modified from 5e
TOP: Prokaryotic Structure

34. Which organelle does not contain DNA?
- Nucleus
 - Mitochondrion
 - Rough Endoplasmic Reticulum
 - Chloroplast
 - All of these organelles contain DNA

ANS: C PTS: 1 TOP: Eukaryotic Structure

35. Which cell component is composed of RNA and protein?
- Nucleus
 - Mitochondrion
 - Endoplasmic Reticulum
 - Chloroplast
 - Ribosome

ANS: E PTS: 1 OBJ: New in 6e TOP: Eukaryotic Structure

36. Which cell component has cristae?
- Nucleus
 - Mitochondrion
 - Endoplasmic Reticulum
 - Chloroplast
 - Ribosome

ANS: B PTS: 1 OBJ: New in 6e TOP: Eukaryotic Structure

37. Which organelle is involved in the synthesis of ATP?
- Nucleus
 - Mitochondrion
 - Chloroplast
 - ATP is synthesized in both mitochondria and chloroplasts.
 - ATP is synthesized in all three organelles.

ANS: D PTS: 1 TOP: Eukaryotic Structure

38. Eukaryotic DNA
- a. is found in the nucleus
 - b. is found in the mitochondrion
 - c. is found in the chloroplast
 - d. all of the above**

ANS: D PTS: 1 TOP: Eukaryotic Structure

39. Which of the following statements about eukaryotic nuclei is FALSE?
- a. They are separated from the rest of the cell by a single membrane.
 - b. They contain RNA.
 - c. They contain chromatin.
 - d. They play a role in genetics.

ANS: A PTS: 1 OBJ: Modified from 5e
TOP: Eukaryotic Structure

40. Which cell component does **not** have a double membrane?
- a. Nucleus
 - b. Lysosome
 - c. Rough Endoplasmic Reticulum
 - d. Chloroplast
 - e. Mitochondrion

ANS: B PTS: 1 OBJ: Modified from 5e
TOP: Eukaryotic Structure

41. Which of the following statements about eukaryotic mitochondria is TRUE?
- a. They play a role in genetics.
 - b. They are the site of photosynthesis in green plants.
 - c. They have an inner and an outer membrane.
 - d. They only occur in animals, not plants.

ANS: C PTS: 1 OBJ: Modified from 5e
TOP: Eukaryotic Structure

42. Which is **not** a property of ribosomes?
- a. They are an assembly of polypeptides and RNA.
 - b. They are found in both prokaryotic and eukaryotic cells.
 - c. They function as agents in the biosynthesis of proteins.
 - d. They are found in the cytoplasm and smooth endoplasmic reticulum.
 - e. All of these statements are true about ribosomes.**

ANS: D PTS: 1 TOP: Eukaryotic Structure

43. Which cell component is able to capture the energy of light?
- a. Nucleus
 - b. Lysosome
 - c. Rough Endoplasmic Reticulum
 - d. Chloroplast
 - e. Mitochondrion

ANS: D PTS: 1 OBJ: Modified from 5e
TOP: Eukaryotic Structure

44. Which cell component contains many hydrolytic enzymes?

- a. Nucleus
- b. Lysosome
- c. Rough Endoplasmic Reticulum
- d. Chloroplast
- e. Mitochondrion

ANS: B

PTS: 1

OBJ: Modified from 5e

TOP: Eukaryotic Structure

45. The following cellular component is characteristic of eukaryotic cells:

- a. Nucleus
- b. Ribosomes
- c. Chloroplasts
- d. Mitochondria
- e. More than one of these is characteristic of eukaryotic cells.

ANS: E

PTS: 1

TOP: Eukaryotic Structure

46. The following cellular component is the defining component of eukaryotic cells:

- a. Nucleus
- b. Ribosomes
- c. Chloroplasts
- d. Mitochondria
- e. Cell membranes

ANS: A

PTS: 1

TOP: Eukaryotic Structure

47. The mitochondrial matrix

- a. is the location of enzymes needed for oxidation reactions
- b. contains an array of microtubules
- c. is part of the endoplasmic reticulum
- d. lies between the inner and outer mitochondrial membrane

ANS: A

PTS: 1

TOP: Eukaryotic Structure

48. The following cellular component is the defining component of most plant cells:

- a. Nucleus
- b. Ribosomes
- c. Chloroplasts
- d. Mitochondria
- e. Cell walls

ANS: C

PTS: 1

TOP: Eukaryotic Structure

49. The endoplasmic reticulum

- a. is part of a continuous membrane system throughout the cell
- b. occurs in two forms, rough and smooth
- c. can have ribosomes bound to it
- d. all of the above

ANS: D

PTS: 1

TOP: Eukaryotic Structure

50. Chloroplasts

- a. contain no DNA
- b. are bounded by a single membrane

- c. are relatively small organelles
- d. are the site of photosynthesis in green plants

ANS: D PTS: 1 TOP: Eukaryotic Structure

51. The Golgi apparatus
- a. occurs in prokaryotes
 - b. is involved in secretion of proteins from the cell
 - c. is part of the chloroplast
 - d. is the site of protein synthesis

ANS: B PTS: 1 TOP: Eukaryotic Structure

52. Lysosomes, peroxisomes, and glyoxysomes are
- a. sites of cell damage
 - b. important in mitosis
 - c. specialized organelles
 - d. a part of the rough endoplasmic reticulum

ANS: C PTS: 1 TOP: Eukaryotic Structure

53. Cell walls
- a. occur in plants and bacteria
 - b. occur in plants and animals
 - c. occur only in plants
 - d. occur only in bacteria

ANS: A PTS: 1 TOP: Eukaryotic Structure

54. Animal cells do not contain
- a. a nucleus
 - b. mitochondria
 - c. chloroplasts
 - d. lysosomes

ANS: C PTS: 1 TOP: Eukaryotic Structure

55. A kind of cellular structure present in plant cells but not in human cells is
- a. the endoplasmic reticulum
 - b. a cell wall
 - c. ribosomes
 - d. a plasma membrane

ANS: B PTS: 1 OBJ: Modified from 5e
TOP: Eukaryotic Structure

56. Which of the following organelles does not have a double membrane?
- a. mitochondrion
 - b. nucleus
 - c. endoplasmic reticulum
 - d. chloroplast

ANS: C PTS: 1 OBJ: Modified from 5e
TOP: Eukaryotic Structure

57. Which of these kingdoms includes only prokaryotic organisms?

- a. Animals
- b. Fungi
- c. Monera
- d. Plants
- e. Protista

ANS: C PTS: 1 OBJ: Modified from 5e
TOP: Five Kingdoms, Three Domains

58. Which of these eukaryotic kingdoms consists primarily of unicellular organisms?
- a. Animals
 - b. Fungi
 - c. Plants
 - d. Protista
 - e. Both fungi and protista.

ANS: D PTS: 1 OBJ: Modified from 5e
TOP: Five Kingdoms, Three Domains

59. In the Five Kingdom classification system, human beings would be considered
- a. animals.
 - b. protists.
 - c. monera.
 - d. fungi.
 - e. none of the above.

ANS: A PTS: 1 OBJ: Modified from 5e
TOP: Five Kingdoms, Three Domains

60. In the Three Domain classification system, human beings would be considered
- a. Archaeobacteria.
 - b. Eubacteria.
 - c. Eukarya.
 - d. none of the above.

ANS: C PTS: 1 TOP: Five Kingdoms, Three Domains

61. In the Five Kingdom classification system, *Escherichia coli* would be considered
- a. animals.
 - b. protists.
 - c. monera.
 - d. none of the above.

ANS: C PTS: 1 OBJ: Modified from 5e
TOP: Five Kingdoms, Three Domains

62. In the Three Domain classification system, *Escherichia coli* would be considered
- a. Archaeobacteria.
 - b. Eubacteria.
 - c. Eukarya.
 - d. none of the above.

ANS: B PTS: 1 TOP: Five Kingdoms, Three Domains

63. The endosymbiotic theory describes the origin of
- a. the nucleus & ribosomes.

- b. the Golgi and endoplasmic reticulum.
- c. lysosomes and the cytoskeleton.
- d. mitochondria & chloroplasts.

ANS: D

PTS: 1

TOP: Common Ground For All Cells

64. Which of following provides evidence for the endosymbiotic theory describing the origin of mitochondria & chloroplasts?
- a. These organelles have their own nuclei.
 - b. These organelles have their own endoplasmic reticulum.
 - c. These organelles have their own lysosomes.
 - d. These organelles have their own DNA.

ANS: D

PTS: 1

OBJ: New in 6e

TOP: Common Ground For All Cells

65. According to thermodynamics, favored processes are
- a. ones that require energy.
 - b. ones that release energy.
 - c. oxidations.
 - d. reductions.

ANS: B

PTS: 1

TOP: Biochemical Energetics

66. Which of the following is/are true?
- a.** The hydrolysis of ATP releases energy.
 - b.** Favorable reactions are always fast.
 - c.** The hydrolysis of ATP requires the input of oxygen
 - d.** The hydrolysis of ATP yields more energy per molecule than the reaction of any other compound

ANS: A

PTS: 1

OBJ: New in 7e

TOP: Biochemical Energetics

67. The aerobic combustion of glucose to yield carbon dioxide and water
- a.** is thermodynamically favorable
 - b.** requires oxygen
 - c.** has a negative Gibb's free energy
 - d.** all of these are true

ANS: D

PTS: 1

OBJ: New in 7e

TOP: Energy and Change

68. A spontaneous reaction is
- a. exergonic.
 - b. endergonic.
 - c. at equilibrium.
 - d.** none of the above.

ANS: A

PTS: 1

OBJ: Modified in 7e

TOP: Spontaneity

69. The heat of a reaction at constant pressure is
- a. its change in entropy.
 - b. its change in enthalpy.
 - c. its change in free energy.
 - d. its spontaneity.

ANS: B

PTS: 1

TOP: Life and Thermodynamics

MATCHING

Match the macromolecules with the monomeric unit in each.

- a. nucleic acids
 - b. proteins
 - c. carbohydrate
-
- 1. amino acid
 - 2. monosaccharide
 - 3. nucleotide

1. ANS: B

PTS: 1

TOP: Origin of Life

2. ANS: C

PTS: 1

TOP: Origin of Life

3. ANS: A

PTS: 1

TOP: Origin of Life