Student: _____

1. If oxygen were present in the Earth's primitive atmosphere, then according to one hypothesis
   A. the processes leading to the origin of life would occur.
   B. organic molecules could not form from inorganic molecules.
   C. reduction reactions would have been possible.
   D. None of these answers is correct.

2. To form organic molecules from inorganic molecules it would have been necessary to have
   A. protocells.
   B. a source of energy.
   C. an atmosphere with ozone.
   D. All of these answers are correct.

3. Stanley Miller's experiment was concerned with the idea that
   A. life originated in outer space.
   B. life originated by biogenesis.
   C. life originated by spontaneous generation, but biogenesis followed.
   D. organic molecules could be formed from gases in the early atmosphere.

4. What evidence supports the idea that life could have arrived on Earth from extraterrestrial sources?
   A. Many of the other planets have oxygen in their atmosphere.
   B. Living things have been found on Mars.
   C. Many meteorites have been found to contain organic molecules.
   D. None of these answers is correct.

5. If living material is produced from living material, the process is called
   A. spontaneous generation.
   B. proteins.
   C. biogenesis.
   D. oxidation.

6. According to Oparin's theory, primitive Earth's atmosphere must have lacked
   A. oxygen.
   B. hydrogen.
   C. water.
   D. nitrogen.

7. Which of the following gases was probably not present in the atmosphere of primitive Earth?
   A. water
   B. hydrogen
   C. carbon dioxide
   D. ozone

8. Current evidence suggests that
   A. the "Big Bang" occurred about 13 billion years ago.
   B. atoms from the "Big Bang" collected into stars and planets.
   C. the Earth formed about 4.6 billion years ago.
   D. All of these answers are correct.

9. Oparin's theory of the origin of life on Earth was supported, in part, by an experiment performed by
   A. Oparin.
   B. Pasteur.
   C. Stanley Miller.
   D. Spallanzani.

10. All of the following characteristics are necessary for a structure to be classified as a primitive cell except
    A. a boundary separating the cell from its watery surroundings.
    B. DNA.
    C. an ability to obtain energy from its surroundings.
    D. macromolecules.

11. If oxygen had been present at the beginning of organic evolution, one hypothesis suggests that
    A. evolution would have been speeded up.
    B. evolution would have been speeded up only for plants.
    C. no change would be noted.
    D. life would not have evolved.

12. Biogenesis states that life begins with
    A. oceans.
    B. nonliving material.
    C. other living material.
    D. spontaneous generation.

13. Stanley Miller's experiment
    A. proved the origin of life.
    B. demonstrated that complex organic molecules might have been formed on primitive Earth.
    C. showed how energy created life.
    D. disputed the Oparin hypothesis.

14. If the first living things were autotrophs, they
    A. would have used organic molecules as a source of energy.
    B. would have engaged in photosynthesis.
    C. would have engaged in chemosynthesis.
    D. All of these answers are true.

15. It is speculated that one of the first kinds of organic molecules formed on primitive Earth was
    A. amino acid.
    B. ammonia.
    C. oxygen.
    D. protein.

16. Different scientists have speculated about how the first living thing appeared on Earth. All of the following are supported by evidence EXCEPT
    A. origin on Earth of a photosynthetic autotroph.
    B. origin on Earth of a chemosynthetic autotroph.
    C. origin on Earth of an anaerobic heterotroph.
    D. an organism arrived from an extraterrestrial source.

17. To produce organic matter from inorganic matter, energy is needed. Miller's experiment provided two sources of energy. They were
    A. ultraviolet light and heat.
    B. heat and electric sparks.
    C. electric sparks and ultraviolet light.
    D. None of these answers is correct.

18. Currently _____ is/are thought to have been the genetic material of the earliest cells.
    A. proteins
    B. DNA
    C. RNA
    D. amino acids

19. If the first primitive cells on Earth were heterotrophs, they must have
    A. received organic molecules from autotrophs.
    B. had DNA as their genetic material.
    C. manufactured their own organic matter.
    D. None of these answers is correct.

20. According to Oparin's theory of the origin of life,
    A. the atmosphere of primitive Earth was an oxidizing atmosphere.
    B. organic molecules were formed in the atmosphere and collected in the oceans.
    C. the first living things would have used sunlight for energy.
    D. All of these answers are true.

21. All of the following may have been in the atmosphere of primitive Earth EXCEPT
    A. hydrogen.
    B. ammonia.
    C. water.
    D. oxygen.

22. All of the following support the idea that RNA may have been the first genetic material EXCEPT?
    A. There are viruses that use RNA as genetic material.
    B. RNA is a simpler molecule than DNA.
    C. RNA does not mutate.
    D. RNA has been shown to be able to make copies of itself.

23. In order to be called a primitive cell, the entity would have to
    A. control chemical reactions.
    B. have genetic material.
    C. use a source of energy from its surroundings.
    D. All of these answers are true.

24. If the first living thing was produced on Earth,
    A. it was produced in the atmosphere.
    B. it was an aerobic heterotroph.
    C. spontaneous generation occurred.
    D. None of these answers is correct.

25. All of the following would have been energy sources on primitive Earth EXCEPT
    A. ultraviolet light.
    B. heat.
    C. oxidation of organic molecules.
    D. sunlight.

26. Oxygen would interfere with organic molecules by
    A. increasing the weight (mass) of the molecules.
    B. combining with the organic molecules and destroying them.
    C. stopping all chemical reactions.
    D. increasing the thickness of the atmosphere.

27. In earlier times those who believed that spontaneous generation occurred believed that
    A. rotting meat produced maggots.
    B. only living things could generate life.
    C. life arrived from outer space.
    D. organic molecules were produced spontaneously in an oxidizing atmosphere.

28. In order for macromolecules to form, smaller molecules must be concentrated. All of the following have been proposed as ways for concentrating organic molecules EXCEPT?
    A. Organic molecules could have collected on the surface of clay particles.
    B. Organic molecules could have been concentrated when they were trapped in small basins and the water evaporated.
    C. Organic molecules could have made copies of themselves and this resulted in concentrations of molecules.
    D. Organic molecules could have been concentrated when water froze.

29. No other planet in our solar system has oxygen in its atmosphere. The source of oxygen in our atmosphere is
    A. heterotrophic metabolism.
    B. volcanic eruptions.
    C. photosynthesis.
    D. lightning discharge.

30. Which of the following plays an important role in screening out harmful ultraviolet rays?
    A. atmospheric oxygen
    B. water
    C. methane
    D. ozone

31. The first primitive cells probably came into being
    A. in the ocean.
    B. in the early oxidizing atmosphere.
    C. on land.
    D. in volcanoes.

32. The oldest fossils are about _____ billion years old.
    A. 1.8
    B. 3.5
    C. 13
    D. 0.5

33. The oldest fossils of eukaryotic cells are about _____ years old.
    A. 1.8 billion
    B. 3.5 billion
    C. 500 million
    D. 100 million

34. When oxygen became part of the atmosphere, it came from
    A. carbon dioxide.
    B. volcanoes.
    C. the splitting of water by autotrophs.
    D. organic molecules.

35. The first multicellular organisms (algae) appeared about _____ billion years ago.
    A. 1
    B. 1.8
    C. 3.5
    D. 13

36. Which of the following is the most likely series of events?
    A. Earth formed—oxygen in atmosphere—living organisms—ozone
    B. Ozone—living organisms—plants—organic molecules
    C. Organic molecules—ozone—living organisms—oxygen in atmosphere
    D. Organic molecules—living organisms—oxygen in atmosphere—ozone

37. Oxygen was necessary in the atmosphere before
    A. photosynthesis could occur.
    B. life could begin.
    C. metabolism could occur.
    D. aerobic respiration could occur.

38. When comparing primitive Earth to modern Earth, we note that
    A. primitive Earth had more ozone.
    B. modern Earth has more ultraviolet light.
    C. modern Earth is cooler.
    D. there is less oxygen on modern Earth.

39. Mitochondria and chloroplasts probably formed as a result of
    A. spontaneous generation.
    B. endosymbiosis.
    C. coacervates.
    D. None of the above is correct.

40. The endosymbiotic theory is concerned with the development of
    A. prokaryotic cells.
    B. eukaryotic cells.
    C. coacervates.
    D. prebionts.

41. The first terrestrial organisms are found in the fossil record at about _____ million years ago.
    A. 4
    B. 40
    C. 400
    D. 4000

42. Oparin and Haldane's hypothesis states that the
    A. Earth's early atmosphere contained 0_2.
    B. first organic macromolecules originated in Earth's early atmosphere.
    C. first cells were autotrophs.
    D. first cells originated in the oceans.

43. The first photosynthetic organisms probably
    A. lived in the ocean.
    B. were prokaryotic.
    C. were cyanobacteria.
    D. All of these answers are correct.

44. The theory of spontaneous generation was supported by
    A. Redi.
    B. Needham.
    C. Spallanzani.
    D. Pasteur.

45. The idea that living things only originate from other living things is
    A. the theory of spontaneous generation.
    B. the endosymbiotic theory.
    C. Oparin and Haldane's hypothesis.
    D. the theory of biogenesis.

46. The explanation of how eukaryotic cells came about is
    A. the theory of spontaneous generation.
    B. the endosymbiotic theory.
    C. Oparin and Haldane's hypothesis.
    D. the theory of biogenesis.

47. Redi concluded from his experiment that
    A. maggots arise from decaying meat.
    B. air is a "vital element" necessary for spontaneous generation.
    C. living things arise from other living things.
    D. microorganisms are present in the air.

48. Pasteur put the theory of spontaneous generation to rest by
    A. employing a swan-neck flask.
    B. being the first researcher to work under sterile conditions.
    C. demonstrating the synthesis of organic molecules.
    D. showing that maggots arise from eggs laid by flies.

49. Spallanzani's experiment was criticized because
    A. he did not thoroughly sterilize his equipment.
    B. he did not have a control group.
    C. he sealed half of his containers, thereby excluding air.
    D. his sample size was small.

50. Although they lived at different times, all of the following people performed experiments related to how life originated. The strongest support for biogenesis came from
    A. Miller.
    B. Fox.
    C. Pasteur.
    D. Needham.

51. According to one hypothesis, the first eukaryotic cells originated by
    A. spontaneous generation.
    B. biogenesis.
    C. endosymbiosis.
    D. mitosis.

52. _____ was probably not present in the Earth's early atmosphere.
    A. H_2O
    B. NH_3
    C. O_2
    D. CO_2

53. The Earth's early atmosphere
    A. was a reducing atmosphere.
    B. contained large quantities of ozone.
    C. was an oxidizing atmosphere.
    D. was similar to today's atmosphere.

54. Endosymbiosis is a current theory that explains the origin of
    A. eukaryotic cells from prokaryotic cells.
    B. some eukaryotic algae from other eukaryotic cells.
    C. both eukaryotic cells from prokaryotic cells and the origin of some eukaryotic algae from other eukaryotic cells.
    D. None of these answers is correct.

55. Miller's apparatus synthesized
    A. ammonia.
    B. amino acids.
    C. carbon dioxide.
    D. DNA.

56. Miller's apparatus was designed to
    A. simulate the conditions of early Earth.
    B. prove how complex organic molecules originated.
    C. support the theory of biogenesis.
    D. demonstrate how the first cells originated.

57. The formation of the first macromolecules from the first simple organic molecules required
    A. hydrolysis.
    B. concentration of the simple molecules.
    C. an oxidizing atmosphere.
    D. spontaneous generation.

58. A sphere formed by organic molecules surrounded by water molecules is called a
    A. coacervate.
    B. microsphere.
    C. proteinoid.
    D. protocell.

59. Coacervates can
    A. absorb chemicals from the environment.
    B. separate their internal contents from their surroundings.
    C. be synthesized in the lab.
    D. All of the above are correct.

60. Microspheres
    A. have a boundary membrane.
    B. are formed from heating protein-like molecules
    C. contain macromolecules.
    D. All of these answers are correct.

61. A probable sequence of the evolution of cells was
    A. autotroph → aerobic heterotroph → anaerobic heterotroph.
    B. anaerobic heterotroph → aerobic heterotroph → autotroph.
    C. anaerobic heterotroph → autotroph → aerobic heterotroph.
    D. aerobic heterotroph → autotroph → anaerobic heterotroph.

62. The first cells were probably
    A. Eukaryotic.
    B. Archaea.
    C. Aerobic.
    D. Prokaryotic.

63. According to the endosymbiotic theory, _____ evolved from free-living prokaryotic cells.
    A. nucleoli
    B. mitochondria
    C. ribosomes
    D. Golgi bodies

64. Chloroplasts
    A. contain bacterial type DNA.
    B. contain bacterial type ribosomes.
    C. reproduce independently of the cell.
    D. All of these answers are correct.

65. Earth has supported life for approximately
    A. 20 billion years.
    B. 3.8 - 3.7 billion years.
    C. 1.5 billion years.
    D. 700 - 800 million years.

66. In the origin and development of the major types of living things, which of the following is necessary before any of the other events could take place?
    A. Photosynthesis
    B. Aerobic respiration
    C. The formation of organic molecules
    D. The formation of cells

67. Which of the following supports the idea that eukaryotic cells were formed by the joining of different kinds of prokaryotic cells?
    A. Plants have cell walls.
    B. Mitochondria carry on photosynthesis.
    C. Chloroplasts contain DNA.
    D. Animal cells have mitochondria.

68. According to the currently popular scientific theory for the origin of life, which of the following occurred before all of the others?
    A. Eukaryotic organisms
    B. Oxygen in the atmosphere
    C. Prokaryotic organisms
    D. Photosynthesis

69. The spontaneous generation of living things from nonliving things was thought to be common many years ago. Louis Pasteur used specially constructed flasks with a long S-shaped neck to prove that
    A. spontaneous generation of organisms occurred in broth in the flasks.
    B. oxygen was required to have living things present in the broth.
    C. microorganisms had to enter the flask to get the broth to "spoil."
    D. the broth "spoiled" even if organisms were not present.

70. According to the currently popular scientific theory for the origin of life, which of the following processes originated after the others?
    A. photosynthesis
    B. aerobic respiration
    C. anaerobic respiration
    D. protein synthesis

71. The protoplanet nebula model states that the simplest and most abundant gases would have been
    A. hydrogen and helium.
    B. oxygen and carbon dioxide.
    C. nitrogen and hydrogen.
    D. hydrogen and oxygen.

72. The spontaneous formation of organic molecules does not happen today because they are
    A. consumed by organisms or oxidized to simpler inorganic compounds in the atmosphere.
    B. destroyed by the increase in harmful radiation coming through holes in the ozone layer.
    C. unable to form because of a lack of sufficient internal energy.
    D. photosynthesis is all that is required.

73. Early in the 1900s, Svante Arrhenius proposed the concept of
    A. panspermia.
    B. spontaneous generation.
    C. autotroph theory.
    D. endosymbiosis.

74. The scientific theories for the origin of life suggest that life arose
    A. by endosymbiosis.
    B. as a result of God's creation.
    C. by deliberate design.
    D. from natural processes and that these processes can be observed and evaluated by scientific experimentation.

75. When we speculate about the origin of life from inorganic material it seems logical that several events or steps were necessary. Which of the following is not a part of these ideas?
    A. Organic molecules must first be formed from inorganic molecules.
    B. Basic organic molecules form RNA that can serve as the genetic material and catalyze other reactions.
    C. RNA becomes self-replicating.
    D. The inorganic molecules must be collected together and segregated from other molecules by a membrane.

76. The nutrients utilized by the Archaea were most likely
    A. sugars and proteins.
    B. CO_2, CO, H_2, H_2S, N_2, and S.
    C. vitamins and minerals.
    D. carbohydrates and fats.

77. The idea that life came to Earth from a distant planet is called
    A. spontaneous generation.
    B. panspermia.
    C. the heterotroph hypothesis.
    D. endosymbiotic theory.

19 Key

1. If oxygen were present in the Earth's primitive atmosphere, then according to one hypothesis
   A. the processes leading to the origin of life would occur.
   B. organic molecules could not form from inorganic molecules.
   C. reduction reactions would have been possible.
   D. None of these answers is correct.

Blooms Level: 2. Understand
Enger - Chapter 19 #1
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Section: 19.03
Section: 19.04
Topic: Origins of Life

2. To form organic molecules from inorganic molecules it would have been necessary to have
   A. protocells.
   B. a source of energy.
   C. an atmosphere with ozone.
   D. All of these answers are correct.

Blooms Level: 2. Understand
Enger - Chapter 19 #2
Learning Outcome: Explain the chemical and physical events that must have occurred to have life originate on Earth.
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.03
Section: 19.04
Topic: Origins of Life

3. Stanley Miller's experiment was concerned with the idea that
   A. life originated in outer space.
   B. life originated by biogenesis.
   C. life originated by spontaneous generation, but biogenesis followed.
   D. organic molecules could be formed from gases in the early atmosphere.

Blooms Level: 1. Remember
Enger - Chapter 19 #3
Learning Outcome: Explain how scientists have conducted experiments that test the ideas of spontaneous generation and biogenesis.
Section: 19.04
Topic: Origins of Life

4. What evidence supports the idea that life could have arrived on Earth from extraterrestrial sources?

   A. Many of the other planets have oxygen in their atmosphere.
   B. Living things have been found on Mars.
   C. Many meteorites have been found to contain organic molecules.
   D. None of these answers is correct.

Blooms Level: 1. Remember
Enger - Chapter 19 #4
Learning Outcome: Describe the kinds of evidence used to suggest an extraterrestrial source for life on Earth.
Section: 19.02
Topic: Origins of Life

5. If living material is produced from living material, the process is called
   A. spontaneous generation.
   B. proteins.
   C. biogenesis.
   D. oxidation.

Blooms Level: 1. Remember
Enger - Chapter 19 #5
Learning Outcome: Describe the differences between the concepts of spontaneous generation and biogenesis.
Learning Outcome: Explain how scientists have conducted experiments that test the ideas of spontaneous generation and biogenesis.
Section: 19.01
Topic: Origins of Life

6. According to Oparin's theory, primitive Earth's atmosphere must have lacked
A. oxygen.
B. hydrogen.
C. water.
D. nitrogen.

Blooms Level: 1. Remember
Enger - Chapter 19 #6
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Learning Outcome: Describe the way in which organisms have caused the atmosphere of the Earth to change.
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.04
Section: 19.05
Topic: Origins of Life

7. Which of the following gases was probably not present in the atmosphere of primitive Earth?
A. water
B. hydrogen
C. carbon dioxide
D. ozone

Blooms Level: 1. Remember
Enger - Chapter 19 #7
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Section: 19.03
Section: 19.04
Section: 19.05
Topic: Origins of Life

8. Current evidence suggests that
A. the "Big Bang" occurred about 13 billion years ago.
B. atoms from the "Big Bang" collected into stars and planets.
C. the Earth formed about 4.6 billion years ago.
D. All of these answers are correct.

Blooms Level: 2. Understand
Enger - Chapter 19 #8
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Section: 19.03
Topic: Origins of Life

9. Oparin's theory of the origin of life on Earth was supported, in part, by an experiment performed by
A. Oparin.
B. Pasteur.
C. Stanley Miller.
D. Spallanzani.

Blooms Level: 1. Remember
Enger - Chapter 19 #9
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.04
Topic: Origins of Life

10. All of the following characteristics are necessary for a structure to be classified as a primitive cell except
A. a boundary separating the cell from its watery surroundings.
B. DNA.
C. an ability to obtain energy from its surroundings.
D. macromolecules.

Blooms Level: 2. Understand
Enger - Chapter 19 #10
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Section: 19.01
Section: 19.04
Section: 19.05
Topic: Origins of Life

11. If oxygen had been present at the beginning of organic evolution, one hypothesis suggests that
A. evolution would have been speeded up.
B. evolution would have been speeded up only for plants.
C. no change would be noted.
D. life would not have evolved.

Blooms Level: 2. Understand
Enger - Chapter 19 #11
Learning Outcome: Discuss current thinking about the origin of life.
Section: 19.01
Section: 19.02
Section: 19.03
Section: 19.04
Section: 19.05
Topic: Origins of Life

12. Biogenesis states that life begins with
A. oceans.
B. nonliving material.
C. other living material.
D. spontaneous generation.

Blooms Level: 1. Remember
Enger - Chapter 19 #12
Learning Outcome: Describe the differences between the concepts of spontaneous generation and biogenesis.
Section: 19.01
Topic: Origins of Life

13. Stanley Miller's experiment
A. proved the origin of life.
B. demonstrated that complex organic molecules might have been formed on primitive Earth.
C. showed how energy created life.
D. disputed the Oparin hypothesis.

Blooms Level: 1. Remember
Enger - Chapter 19 #13
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.04
Topic: Origins of Life

14. If the first living things were autotrophs, they
A. would have used organic molecules as a source of energy.
B. would have engaged in photosynthesis.
C. would have engaged in chemosynthesis.
D. All of these answers are true.

Blooms Level: 1. Remember
Enger - Chapter 19 #14
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Section: 19.02
Section: 19.04
Topic: Origins of Life

15. It is speculated that one of the first kinds of organic molecules formed on primitive Earth was
A. amino acid.
B. ammonia.
C. oxygen.
D. protein.

Blooms Level: 1. Remember
Enger - Chapter 19 #15
Learning Outcome: Explain the chemical and physical events that must have occurred to have life originate on Earth.
Section: 19.04
Section: 19.05
Topic: Origins of Life

16. Different scientists have speculated about how the first living thing appeared on Earth. All of the following are supported by evidence EXCEPT
A. origin on Earth of a photosynthetic autotroph.
B. origin on Earth of a chemosynthetic autotroph.
C. origin on Earth of an anaerobic heterotroph.
D. an organism arrived from an extraterrestrial source.

Blooms Level: 1. Remember
Enger - Chapter 19 #16
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Section: 19.04
Section: 19.05
Topic: Origins of Life

17. To produce organic matter from inorganic matter, energy is needed. Miller's experiment provided two sources of energy. They were
A. ultraviolet light and heat.
B. heat and electric sparks.
C. electric sparks and ultraviolet light.
D. None of these answers is correct.

Blooms Level: 1. Remember
Enger - Chapter 19 #17
Learning Outcome: Explain the chemical and physical events that must have occurred to have life originate on Earth.
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.04
Topic: Origins of Life

18. Currently _____ is/are thought to have been the genetic material of the earliest cells.
A. proteins
B. DNA
C. RNA
D. amino acids

Blooms Level: 1. Remember
Enger - Chapter 19 #18
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Section: 19.04
Topic: Origins of Life

19. If the first primitive cells on Earth were heterotrophs, they must have
A. received organic molecules from autotrophs.
B. had DNA as their genetic material.
C. manufactured their own organic matter.
D. None of these answers is correct.

Blooms Level: 1. Remember
Enger - Chapter 19 #19
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Section: 19.04
Topic: Origins of Life

20. According to Oparin's theory of the origin of life,
A. the atmosphere of primitive Earth was an oxidizing atmosphere.
B. organic molecules were formed in the atmosphere and collected in the oceans.
C. the first living things would have used sunlight for energy.
D. All of these answers are true.

Blooms Level: 1. Remember
Enger - Chapter 19 #20
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Learning Outcome: Explain the chemical and physical events that must have occurred to have life originate on Earth.
Section: 19.04
Topic: Origins of Life

21. All of the following may have been in the atmosphere of primitive Earth EXCEPT
A. hydrogen.
B. ammonia.
C. water.
D. oxygen.

Blooms Level: 1. Remember
Enger - Chapter 19 #21
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Learning Outcome: Describe the way in which organisms have caused the atmosphere of the Earth to change.
Section: 19.01
Section: 19.02
Section: 19.03
Section: 19.04
Topic: Origins of Life

22. All of the following support the idea that RNA may have been the first genetic material EXCEPT?
A. There are viruses that use RNA as genetic material.
B. RNA is a simpler molecule than DNA.
C. RNA does not mutate.
D. RNA has been shown to be able to make copies of itself.

Blooms Level: 2. Understand
Enger - Chapter 19 #22
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Section: 19.04
Topic: Origins of Life

23. In order to be called a primitive cell, the entity would have to
A. control chemical reactions.
B. have genetic material.
C. use a source of energy from its surroundings.
D. All of these answers are true.

Blooms Level: 1. Remember
Enger - Chapter 19 #23
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Section: 19.04
Section: 19.05
Topic: Origins of Life

24. If the first living thing was produced on Earth,
A. it was produced in the atmosphere.
B. it was an aerobic heterotroph.
C. spontaneous generation occurred.
D. None of these answers is correct.

Blooms Level: 1. Remember
Enger - Chapter 19 #24
Learning Outcome: Describe the differences between the concepts of spontaneous generation and biogenesis.
Learning Outcome: Explain how scientists have conducted experiments that test the ideas of spontaneous generation and biogenesis.
Section: 19.02
Topic: Origins of Life

25. All of the following would have been energy sources on primitive Earth EXCEPT
A. ultraviolet light.
B. heat.
C. oxidation of organic molecules.
D. sunlight.

Blooms Level: 2. Understand
Enger - Chapter 19 #25
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Section: 19.01
Section: 19.02
Section: 19.03
Section: 19.04
Topic: Origins of Life

26. Oxygen would interfere with organic molecules by
A. increasing the weight (mass) of the molecules.
B. combining with the organic molecules and destroying them.
C. stopping all chemical reactions.
D. increasing the thickness of the atmosphere.

Blooms Level: 1. Remember
Enger - Chapter 19 #26
Learning Outcome: Describe the way in which organisms have caused the atmosphere of the Earth to change.
Learning Outcome: Explain the chemical and physical events that must have occurred to have life originate on Earth.
Section: 19.01
Section: 19.03
Section: 19.04
Section: 19.05
Topic: Origins of Life

27. In earlier times those who believed that spontaneous generation occurred believed that
A. rotting meat produced maggots.
B. only living things could generate life.
C. life arrived from outer space.
D. organic molecules were produced spontaneously in an oxidizing atmosphere.

Blooms Level: 1. Remember
Enger - Chapter 19 #27
Learning Outcome: Describe the differences between the concepts of spontaneous generation and biogenesis.
Section: 19.01
Topic: Origins of Life

28. In order for macromolecules to form, smaller molecules must be concentrated. All of the following have been proposed as ways for concentrating organic molecules EXCEPT?
A. Organic molecules could have collected on the surface of clay particles.
B. Organic molecules could have been concentrated when they were trapped in small basins and the water evaporated.
C. Organic molecules could have made copies of themselves and this resulted in concentrations of molecules.
D. Organic molecules could have been concentrated when water froze.

Blooms Level: 2. Understand
Enger - Chapter 19 #28
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.03
Section: 19.04
Section: 19.05
Topic: Origins of Life

29. No other planet in our solar system has oxygen in its atmosphere. The source of oxygen in our atmosphere is
A. heterotrophic metabolism.
B. volcanic eruptions.
C. photosynthesis.
D. lightning discharge.

Blooms Level: 2. Understand
Enger - Chapter 19 #29
Learning Outcome: Describe the way in which organisms have caused the atmosphere of the Earth to change.
Section: 19.05
Topic: Origins of Life

30. Which of the following plays an important role in screening out harmful ultraviolet rays?
A. atmospheric oxygen
B. water
C. methane
D. ozone

Blooms Level: 1. Remember
Enger - Chapter 19 #30
Learning Outcome: Describe the way in which organisms have caused the atmosphere of the Earth to change.
Section: 19.05
Topic: Origins of Life

31. The first primitive cells probably came into being
A. in the ocean.
B. in the early oxidizing atmosphere.
C. on land.
D. in volcanoes.

Blooms Level: 1. Remember
Enger - Chapter 19 #31
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Section: 19.01
Section: 19.04
Section: 19.05
Topic: Origins of Life

32. The oldest fossils are about _____ billion years old.
A. 1.8
B. 3.5
C. 13
D. 0.5

Blooms Level: 1. Remember
Enger - Chapter 19 #32
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.06
Topic: Origins of Life

33. The oldest fossils of eukaryotic cells are about _____ years old.
A. 1.8 billion
B. 3.5 billion
C. 500 million
D. 100 million

Blooms Level: 1. Remember
Enger - Chapter 19 #33
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.06
Topic: Origins of Life

34. When oxygen became part of the atmosphere, it came from
A. carbon dioxide.
B. volcanoes.
C. the splitting of water by autotrophs.
D. organic molecules.

Blooms Level: 2. Understand
Enger - Chapter 19 #34
Learning Outcome: Describe the way in which organisms have caused the atmosphere of the Earth to change.
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.05
Topic: Origins of Life

35. The first multicellular organisms (algae) appeared about _____ billion years ago.
A. 1
B. 1.8
C. 3.5
D. 13

Blooms Level: 1. Remember
Enger - Chapter 19 #35
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.06
Topic: Origins of Life

36. Which of the following is the most likely series of events?
A. Earth formed—oxygen in atmosphere—living organisms—ozone
B. Ozone—living organisms—plants—organic molecules
C. Organic molecules—ozone—living organisms—oxygen in atmosphere
D. Organic molecules—living organisms—oxygen in atmosphere—ozone

Blooms Level: 2. Understand
Enger - Chapter 19 #36
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.06
Topic: Origins of Life

37. Oxygen was necessary in the atmosphere before
A. photosynthesis could occur.
B. life could begin.
C. metabolism could occur.
D. aerobic respiration could occur.

Blooms Level: 2. Understand
Enger - Chapter 19 #37
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.05
Section: 19.06
Topic: Origins of Life

38. When comparing primitive Earth to modern Earth, we note that
A. primitive Earth had more ozone.
B. modern Earth has more ultraviolet light.
C. modern Earth is cooler.
D. there is less oxygen on modern Earth.

Blooms Level: 1. Remember
Enger - Chapter 19 #38
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Section: 19.03
Topic: Origins of Life

39. Mitochondria and chloroplasts probably formed as a result of
A. spontaneous generation.
B. endosymbiosis.
C. coacervates.
D. None of the above is correct.

Blooms Level: 2. Understand
Enger - Chapter 19 #39
Learning Outcome: Explain the endosymbiotic theory.
Section: 19.05
Section: 19.06
Topic: Origins of Life

40. The endosymbiotic theory is concerned with the development of
A. prokaryotic cells.
B. eukaryotic cells.
C. coacervates.
D. prebionts.

Blooms Level: 2. Understand
Enger - Chapter 19 #40
Learning Outcome: Explain the endosymbiotic theory.
Section: 19.05
Section: 19.06
Topic: Origins of Life

41. The first terrestrial organisms are found in the fossil record at about _____ million years ago.
A. 4
B. 40
C. 400
D. 4000

Blooms Level: 1. Remember
Enger - Chapter 19 #41
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.06
Topic: Origins of Life

42. Oparin and Haldane's hypothesis states that the
A. Earth's early atmosphere contained 0_2.
B. first organic macromolecules originated in Earth's early atmosphere.
C. first cells were autotrophs.
D. first cells originated in the oceans.

Blooms Level: 1. Remember
Enger - Chapter 19 #42
Learning Outcome: Describe the differences between the concepts of spontaneous generation and biogenesis.
Learning Outcome: Discuss current thinking about the origin of life.
Section: 19.04
Topic: Origins of Life

43. The first photosynthetic organisms probably
A. lived in the ocean.
B. were prokaryotic.
C. were cyanobacteria.
D. All of these answers are correct.

Blooms Level: 1. Remember
Enger - Chapter 19 #43
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Learning Outcome: Describe the way in which organisms have caused the atmosphere of the Earth to change.
Section: 19.05
Section: 19.06
Topic: Origins of Life

44. The theory of spontaneous generation was supported by
A. Redi.
B. Needham.
C. Spallanzani.
D. Pasteur.

Blooms Level: 1. Remember
Enger - Chapter 19 #44
Learning Outcome: Describe the differences between the concepts of spontaneous generation and biogenesis.
Section: 19.01
Section: 19.02
Topic: Origins of Life

45. The idea that living things only originate from other living things is
A. the theory of spontaneous generation.
B. the endosymbiotic theory.
C. Oparin and Haldane's hypothesis.
D. the theory of biogenesis.

Blooms Level: 1. Remember
Enger - Chapter 19 #45
Learning Outcome: Describe the differences between the concepts of spontaneous generation and biogenesis.
Section: 19.01
Section: 19.02
Topic: Origins of Life

46. The explanation of how eukaryotic cells came about is
A. the theory of spontaneous generation.
B. the endosymbiotic theory.
C. Oparin and Haldane's hypothesis.
D. the theory of biogenesis.

Blooms Level: 1. Remember
Enger - Chapter 19 #46
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Learning Outcome: Describe the way in which organisms have caused the atmosphere of the Earth to change.
Section: 19.05
Topic: Origins of Life

47. Redi concluded from his experiment that
A. maggots arise from decaying meat.
B. air is a "vital element" necessary for spontaneous generation.
C. living things arise from other living things.
D. microorganisms are present in the air.

Blooms Level: 1. Remember
Enger - Chapter 19 #47
Learning Outcome: Describe the differences between the concepts of spontaneous generation and biogenesis.
Learning Outcome: Explain how scientists have conducted experiments that test the ideas of spontaneous generation and biogenesis.
Section: 19.01
Topic: Origins of Life

48. Pasteur put the theory of spontaneous generation to rest by
A. employing a swan-neck flask.
B. being the first researcher to work under sterile conditions.
C. demonstrating the synthesis of organic molecules.
D. showing that maggots arise from eggs laid by flies.

Blooms Level: 1. Remember
Enger - Chapter 19 #48
Learning Outcome: Describe the differences between the concepts of spontaneous generation and biogenesis.
Learning Outcome: Explain how scientists have conducted experiments that test the ideas of spontaneous generation and biogenesis.
Section: 19.01
Topic: Origins of Life

49. Spallanzani's experiment was criticized because
A. he did not thoroughly sterilize his equipment.
B. he did not have a control group.
C. he sealed half of his containers, thereby excluding air.
D. his sample size was small.

Blooms Level: 1. Remember
Enger - Chapter 19 #49
Learning Outcome: Describe the differences between the concepts of spontaneous generation and biogenesis.
Learning Outcome: Explain how scientists have conducted experiments that test the ideas of spontaneous generation and biogenesis.
Section: 19.01
Topic: Origins of Life

50. Although they lived at different times, all of the following people performed experiments related to how life originated. The strongest support for biogenesis came from
A. Miller.
B. Fox.
C. Pasteur.
D. Needham.

Blooms Level: 1. Remember
Enger - Chapter 19 #50
Learning Outcome: Describe the differences between the concepts of spontaneous generation and biogenesis.
Learning Outcome: Explain how scientists have conducted experiments that test the ideas of spontaneous generation and biogenesis.
Section: 19.01
Section: 19.04
Topic: Origins of Life

51. According to one hypothesis, the first eukaryotic cells originated by
A. spontaneous generation.
B. biogenesis.
C. endosymbiosis.
D. mitosis.

Blooms Level: 1. Remember
Enger - Chapter 19 #51
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Learning Outcome: Describe the relationships among Bacteria, Archaea, and Eukarya.
Learning Outcome: Discuss current thinking about the origin of life.
Section: 19.02
Section: 19.04
Section: 19.05
Section: 19.06
Topic: Origins of Life

52. _____ was probably not present in the Earth's early atmosphere.
A. H_2O
B. NH_3
C. O_2
D. CO_2

Blooms Level: 1. Remember
Enger - Chapter 19 #52
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Section: 19.03
Section: 19.05
Topic: Origins of Life

53. The Earth's early atmosphere
A. was a reducing atmosphere.
B. contained large quantities of ozone.
C. was an oxidizing atmosphere.
D. was similar to today's atmosphere.

Blooms Level: 1. Remember
Enger - Chapter 19 #53
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Section: 19.03
Section: 19.05
Topic: Origins of Life

54. Endosymbiosis is a current theory that explains the origin of
A. eukaryotic cells from prokaryotic cells.
B. some eukaryotic algae from other eukaryotic cells.
C. both eukaryotic cells from prokaryotic cells and the origin of some eukaryotic algae from other eukaryotic cells.
D. None of these answers is correct.

Blooms Level: 1. Remember
Enger - Chapter 19 #54
Learning Outcome: Explain the endosymbiotic theory.
Section: 19.05
Section: 19.06
Topic: Origins of Life

55. Miller's apparatus synthesized
A. ammonia.
B. amino acids.
C. carbon dioxide.
D. DNA.

Blooms Level: 1. Remember
Enger - Chapter 19 #55
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.04
Topic: Origins of Life

56. Miller's apparatus was designed to
A. simulate the conditions of early Earth.
B. prove how complex organic molecules originated.
C. support the theory of biogenesis.
D. demonstrate how the first cells originated.

Blooms Level: 1. Remember
Enger - Chapter 19 #56
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.04
Topic: Origins of Life

57. The formation of the first macromolecules from the first simple organic molecules required
A. hydrolysis.
B. concentration of the simple molecules.
C. an oxidizing atmosphere.
D. spontaneous generation.

Blooms Level: 1. Remember
Enger - Chapter 19 #57
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.04
Topic: Origins of Life

58. A sphere formed by organic molecules surrounded by water molecules is called a
A. coacervate.
B. microsphere.
C. proteinoid.
D. protocell.

Blooms Level: 1. Remember
Enger - Chapter 19 #58
Learning Outcome: Discuss current thinking about the origin of life.
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.02
Section: 19.04
Topic: Origins of Life

59. Coacervates can
A. absorb chemicals from the environment.
B. separate their internal contents from their surroundings.
C. be synthesized in the lab.
D. All of the above are correct.

Blooms Level: 1. Remember
Enger - Chapter 19 #59
Learning Outcome: Discuss current thinking about the origin of life.
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.02
Section: 19.04
Topic: Origins of Life

60. Microspheres
A. have a boundary membrane.
B. are formed from heating protein-like molecules
C. contain macromolecules.
D. All of these answers are correct.

Blooms Level: 1. Remember
Enger - Chapter 19 #60
Learning Outcome: Discuss current thinking about the origin of life.
Learning Outcome: Explain the experimental evidence for the origin of life from inorganic material.
Section: 19.02
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Topic: Origins of Life

61. A probable sequence of the evolution of cells was
A. autotroph → aerobic heterotroph → anaerobic heterotroph.
B. anaerobic heterotroph → aerobic heterotroph → autotroph.
C. anaerobic heterotroph → autotroph → aerobic heterotroph.
D. aerobic heterotroph → autotroph → anaerobic heterotroph.

Blooms Level: 5. Evaluate
Enger - Chapter 19 #61
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.04
Section: 19.05
Section: 19.06
Topic: Origins of Life

62. The first cells were probably
A. Eukaryotic.
B. Archaea.
C. Aerobic.
D. Prokaryotic.

Blooms Level: 1. Remember
Enger - Chapter 19 #62
Learning Outcome: Describe different hypotheses for what the first living thing might have been like.
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.04
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Topic: Origins of Life

63. According to the endosymbiotic theory, _____ evolved from free-living prokaryotic cells.
A. nucleoli
B. mitochondria
C. ribosomes
D. Golgi bodies

Blooms Level: 2. Understand
Enger - Chapter 19 #63
Learning Outcome: Explain the endosymbiotic theory.
Section: 19.05
Section: 19.06
Topic: Origins of Life

64. Chloroplasts
A. contain bacterial type DNA.
B. contain bacterial type ribosomes.
C. reproduce independently of the cell.
D. All of these answers are correct.

Blooms Level: 2. Understand
Enger - Chapter 19 #64
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.05
Section: 19.06
Topic: Origins of Life

65. Earth has supported life for approximately
A. 20 billion years.
B. 3.8 - 3.7 billion years.
C. 1.5 billion years.
D. 700 - 800 million years.

Blooms Level: 1. Remember
Enger - Chapter 19 #65
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.05
Section: 19.06
Topic: Origins of Life

66. In the origin and development of the major types of living things, which of the following is necessary before any of the other events could take place?
A. Photosynthesis
B. Aerobic respiration
C. The formation of organic molecules
D. The formation of cells

Blooms Level: 1. Remember
Enger - Chapter 19 #66
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.05
Section: 19.06
Topic: Origins of Life

67. Which of the following supports the idea that eukaryotic cells were formed by the joining of different kinds of prokaryotic cells?
A. Plants have cell walls.
B. Mitochondria carry on photosynthesis.
C. Chloroplasts contain DNA.
D. Animal cells have mitochondria.

Blooms Level: 2. Understand
Enger - Chapter 19 #67
Learning Outcome: State the order and approximate times for major evolutionary events.
Section: 19.05
Section: 19.06
Topic: Origins of Life

68. According to the currently popular scientific theory for the origin of life, which of the following occurred before all of the others?
A. Eukaryotic organisms
B. Oxygen in the atmosphere
C. Prokaryotic organisms
D. Photosynthesis

Blooms Level: 2. Understand
Enger - Chapter 19 #68
Learning Outcome: Discuss current thinking about the origin of life.
Section: 19.02
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Section: 19.06
Topic: Origins of Life

69. The spontaneous generation of living things from nonliving things was thought to be common many years ago. Louis Pasteur used specially constructed flasks with a long S-shaped neck to prove that
A. spontaneous generation of organisms occurred in broth in the flasks.
B. oxygen was required to have living things present in the broth.
C. microorganisms had to enter the flask to get the broth to "spoil."
D. the broth "spoiled" even if organisms were not present.

Blooms Level: 1. Remember
Enger - Chapter 19 #69
Learning Outcome: Explain how scientists have conducted experiments that test the ideas of spontaneous generation and biogenesis.
Section: 19.01
Section: 19.04
Topic: Origins of Life

70. According to the currently popular scientific theory for the origin of life, which of the following processes originated after the others?
A. photosynthesis
B. aerobic respiration
C. anaerobic respiration
D. protein synthesis

Blooms Level: 2. Understand
Enger - Chapter 19 #70
Learning Outcome: Discuss current thinking about the origin of life.
Section: 19.02
Section: 19.05
Section: 19.06
Topic: Origins of Life

71. The protoplanet nebula model states that the simplest and most abundant gases would have been
A. hydrogen and helium.
B. oxygen and carbon dioxide.
C. nitrogen and hydrogen.
D. hydrogen and oxygen.

Blooms Level: 2. Understand
Enger - Chapter 19 #71
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Section: 19.03
Topic: Origins of Life

72. The spontaneous formation of organic molecules does not happen today because they are
A. consumed by organisms or oxidized to simpler inorganic compounds in the atmosphere.
B. destroyed by the increase in harmful radiation coming through holes in the ozone layer.
C. unable to form because of a lack of sufficient internal energy.
D. photosynthesis is all that is required.

Blooms Level: 2. Understand
Enger - Chapter 19 #72
Learning Outcome: Explain the chemical and physical events that must have occurred to have life originate on Earth.
Section: 19.04
Section: 19.05
Topic: Origins of Life

73. Early in the 1900s, Svante Arrhenius proposed the concept of
A. panspermia.
B. spontaneous generation.
C. autotroph theory.
D. endosymbiosis.

Blooms Level: 2. Understand
Enger - Chapter 19 #73
Learning Outcome: Describe the kinds of evidence used to suggest an extraterrestrial source for life on Earth.
Section: 19.02
Topic: Origins of Life

74. The scientific theories for the origin of life suggest that life arose
A. by endosymbiosis.
B. as a result of God's creation.
C. by deliberate design.
D. from natural processes and that these processes can be observed and evaluated by scientific experimentation.

Blooms Level: 2. Understand
Enger - Chapter 19 #74
Learning Outcome: Discuss current thinking about the origin of life.
Section: 19.02
Topic: Origins of Life

75. When we speculate about the origin of life from inorganic material it seems logical that several events or steps were necessary. Which of the following is not a part of these ideas?
A. Organic molecules must first be formed from inorganic molecules.
B. Basic organic molecules form RNA that can serve as the genetic material and catalyze other reactions.
C. RNA becomes self-replicating.
D. The inorganic molecules must be collected together and segregated from other molecules by a membrane.

Blooms Level: 2. Understand
Enger - Chapter 19 #75
Learning Outcome: Discuss current thinking about the origin of life.
Learning Outcome: Explain the chemical and physical events that must have occurred to have life originate on Earth.
Section: 19.04
Topic: Origins of Life

76. The nutrients utilized by the Archaea were most likely
A. sugars and proteins.
B. CO_2, CO, H_2, H_2S, N_2, and S.
C. vitamins and minerals.
D. carbohydrates and fats.

Blooms Level: 1. Remember
Enger - Chapter 19 #76
Learning Outcome: Describe the most probable physical conditions on early Earth and the changes thought to have happened before life could exist.
Learning Outcome: Explain the chemical and physical events that must have occurred to have life originate on Earth.
Section: 19.04
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Topic: Origins of Life

77. The idea that life came to Earth from a distant planet is called
A. spontaneous generation.
B. panspermia.
C. the heterotroph hypothesis.
D. endosymbiotic theory.

Blooms Level: 2. Understand
Enger - Chapter 19 #77
Learning Outcome: Describe the kinds of evidence used to suggest an extraterrestrial source for life on Earth.
Section: 19.02
Topic: Origins of Life

19 Summary

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