Biology The Core 3rd edition Simon Test Bank

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***Biology: The Core, 3e* (Simon)**
Chapter 2 The Chemistry of Life

1) The chemical name for table salt is *sodium chloride*, or simply NaCl. What type of chemical is NaCl?
A) A compound
B) An element
C) A molecule
D) An ion
Answer: A
Module: 2.1
Skill: Applying/Analyzing
Learning Outcome: 2.1

2) Identify the reactants in the following chemical reaction: $C_{10}H_8 + 12\ O_2 \rightarrow 10\ CO_2 + 4\ H_2O$
A) $C_{10}H_8$ and 10 CO_2
B) 12 O_2 and 4 H_2O
C) $C_{10}H_8$ and 12 O_2
D) 10 CO_2 and 4 H_2O
Answer: C
Module: 2.1
Skill: Applying/Analyzing
Learning Outcome: 2.1

3) During a chemical reaction, atoms are _____.
A) destroyed
B) created
C) rearranged
D) destroyed and created
Answer: C
Module: 2.1
Skill: Remembering/Understanding
Learning Outcome: 2.1

4) Which of the following statements regarding chemical reactions is *false*?
A) The products of a chemical reaction always have the same mass as the reactants.
B) During a chemical reaction, molecules are rearranged.
C) During a chemical reaction, atoms of one element can be converted into a different element.
D) There are chemical reactions close to you right now.
Answer: C
Module: 2.1
Skill: Remembering/Understanding
Learning Outcome: 2.1

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5) What is a trace element?

A) An element that is very common in nature
B) An element that is evenly distributed on the planet
C) An element that is required in miniscule amounts for life
D) An element that is used to identify the location of other elements
Answer: C
Module: 2.2
Skill: Remembering/Understanding
Learning Outcome: 2.1

6) What is the most common element in your body?
A) Oxygen
B) Water
C) Carbon
D) Sugar
Answer: A
Module: 2.2
Skill: Remembering/Understanding
Learning Outcome: 2.1

7) Which is *not* one of the four atoms that make up the bulk of living organisms?
A) Oxygen
B) Nitrogen
C) Calcium
D) Carbon
Answer: C
Module: 2.2
Skill: Remembering/Understanding
Learning Outcome: 2.1

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8) The typical carbon atom is described in the periodic table by the accompanying box. How many protons are in a typical oxygen atom?



A) 8
B) 12
C) 18
D) Not enough information given
Answer: A
Module: 2.2
Skill: Applying/Analyzing
Learning Outcome: 2.1

9) How many neutrons are in a typical oxygen atom?



A) 8
B) 12
C) 18
D) Not enough information given
Answer: A
Module: 2.2
Skill: Applying/Analyzing
Learning Outcome: 2.1
Global Learning: G4

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10) Which number represents the atomic weight of oxygen?



A) 6
B) 16
C) 18
D) Not enough information given
Answer: B
Module: 2.2
Skill: Applying/Analyzing
Learning Outcome: 2.1

11) The atomic number corresponds to the number of _____ in a specific element, while the atomic weight corresponds to the number of _____ in a specific element.
A) protons; neutrons
B) neutrons; protons
C) protons; protons and neutrons
D) protons and neutrons; neutrons
Answer: C
Module: 2.2
Skill: Remembering/Understanding
Learning Outcome: 2.1

12) In an atom, the number of neutrons determines most specifically the _____.
A) chemical element
B) isotope
C) ion state
D) chemical properties
Answer: B
Module: 2.3
Skill: Remembering/Understanding
Learning Outcome: 2.1

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13) The 2+ in Cu^{2+} tells us that this atom _____.

A) has two more neutrons than protons
B) has two more protons than electrons
C) has two more electrons than neutrons
D) has two more electrons than protons
Answer: B
Module: 2.3
Skill: Applying/Analyzing
Learning Outcome: 2.1

14) The number of electrons of an atom determines its _____.
A) chemical element
B) isotope
C) bonding properties
D) all of the above are correct
Answer: C
Module: 2.3
Skill: Remembering/Understanding
Learning Outcome: 2.1

15) The bond in which bonded atoms share electrons is called a(n) _____.
A) ionic bond
B) covalent bond
C) hydrogen bond
D) polar bond
Answer: B
Module: 2.4
Skill: Remembering/Understanding
Learning Outcome: 2.2

16) Which of the following bonds is the weakest?
A) The ionic bond
B) The covalent bond
C) The hydrogen bond
D) All three bonds are roughly equal in strength
Answer: C
Module: 2.4
Skill: Applying/Analyzing
Learning Outcome: 2.2

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17) While the maximum number of electrons required to fill the outermost shell of an atom varies depending on the size of the atom, almost all of the smaller atoms (atomic numbers 2-20) are considered stable, and thus nonreactive, when they contain _____ electron(s) in the outermost shell.

A) 1
B) 2
C) 8
D) 16
Answer: C
Module: 2.4
Skill: Evaluating/Creating
Learning Outcome: 2.1

18) What is the maximum number of single covalent bonds a carbon atom can form with other elements?
A) 1
B) 2
C) 3
D) 4
Answer: D
Module: 2.4
Skill: Applying/Analyzing
Learning Outcome: 2.2

19) Individual water molecules are held to one another by relatively weak _____ bonds.
A) covalent
B) hydrogen
C) ionic
D) nonpolar
Answer: B
Module: 2.4
Skill: Remembering/Understanding
Learning Outcome: 2.2

20) Why is one side of a single water molecule partially negative while the other side is partially positive?
A) Electron pairs are unevenly shared between the oxygen atom and the two hydrogen atoms.
B) Electron pairs are unevenly shared between the two hydrogen atoms.
C) Oxygen donates its electrons to hydrogen.
D) Hydrogen donates its electrons to oxygen.
Answer: A
Module: 2.4
Skill: Applying/Analyzing
Learning Outcome: 2.3

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21) Which of the following properties of water molecules has important implications to life?

A) High surface tension
B) The ability to dissolve polar substances
C) The ability of ice to float in water
D) All of the above are true
Answer: D
Module: 2.5
Skill: Remembering/Understanding
Learning Outcome: 2.3

22) Water is the least dense when it _____.
A) is frozen
B) is just above freezing
C) is at room temperature
D) is just below boiling
Answer: A
Module: 2.5
Skill: Remembering/Understanding
Learning Outcome: 2.3

23) A needle can be made to "float" on the surface tension of water. What causes this surface tension to form?
A) The adhesion of water molecules to the needle
B) The cohesion of water molecules to each other
C) The solubility of water
D) The heat capacity of water
Answer: B
Module: 2.5
Skill: Applying/Analyzing
Learning Outcome: 2.3
Global Learning: G5

24) Water "beads up" on synthetic fabric such as polyester but binds to cotton. What is the most likely explanation for this?
A) Polyester is not a naturally occurring substance, whereas cotton is a naturally occurring substance.
B) Polyester is more flexible than cotton.
C) Polyester fibers are thinner than cotton fibers.
D) Polyester is nonpolar, whereas cotton is polar.
Answer: D
Module: 2.5
Skill: Applying/Analyzing
Learning Outcome: 2.3
Global Learning: G5

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25) How can we explain that water is a solvent?

A) Water has a polar nature, and as such its polar molecules will bind to substances that have positive or negative charges.
B) Water is a heavy substance, and as such can disrupt pre-existing bonds.
C) Water is highly cohesive and adhesive, which allows it to bind to different substances as a solvent.
D) Water is very dense in its liquid state, which allows it to bind to different substances as a solvent.
Answer: A
Module: 2.5
Skill: Applying/Analyzing
Learning Outcome: 2.3
Global Learning: G5

26) When water melts from a solid ice cube to a liquid, its volume _____ and its mass _____.
A) Increases; decreases
B) Decreases; increases
C) Decreases; stays the same
D) Increases; stays the same
Answer: C
Module: 2.5
Skill: Applying/Analyzing
Learning Outcome: 2.3

27) Select the most complete explanation of what the pH scale measures.
A) The acidity of a solvent
B) The alkalinity of a solvent
C) The concentration of hydrogen ions in a solution
D) The concentration of buffers in a solution
Answer: C
Module: 2.6
Skill: Remembering/Understanding
Learning Outcome: 2.3
Global Learning: G5

28) What are the ecological consequences of acidification of rain and oceans?
A) They damage the health of ecosystems.
B) They do not have any consequences on ecosystems.
C) They improve the health of ecosystems.
D) Acid rain damages ecosystems, but ocean acidification improves the health of oceans.
Answer: A
Module: 2.6
Skill: Remembering/Understanding
Learning Outcome: 2.3

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29) Something with a pH of 5 would be _____.

A) acidic
B) basic
C) neutral
D) alkaline
Answer: A
Module: 2.6
Skill: Applying/Analyzing
Learning Outcome: 2.3

30) How do buffers minimize change in the pH of biological systems?
A) By absorbing H^+ ions when there is an excess
B) By donating H^+ ions when there is a shortage
C) Both of these
D) Neither of these
Answer: C
Module: 2.6
Skill: Remembering/Understanding
Learning Outcome: 2.3

31) Which of the following accurately describes the pH scale?
A) The pH scale runs from 0 (most basic) to 14 (most acidic), with 7 as a neutral.
B) The pH scale runs from 0 (most acidic) to 14 (most basic), with 7 as a neutral.
C) The pH scale runs from 0 (neutral) to 14 (most acidic), with 7 as an average acidity level.
D) The pH scale runs from 0 (most acidic) to 14 (neutral), with 7 as an average acidity level.
Answer: B
Module: 2.6
Skill: Remembering/Understanding
Learning Outcome: 2.3

32) Organic compounds are distinguished by molecules that contain _____ bonded to other elements.
A) nitrogen
B) carbon
C) oxygen
D) hydrogen
Answer: B
Module: 2.7
Skill: Remembering/Understanding
Learning Outcome: 2.4

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33) What are the four classes of large organic molecules important to life on Earth?

A) Carbohydrates, lipids, proteins, and enzymes
B) Carbohydrates, lipids, proteins, and sugars
C) Carbohydrates, proteins, nucleic acids, and sugars
D) Carbohydrates, proteins, lipids, and nucleic acids
Answer: D
Module: 2.7
Skill: Remembering/Understanding
Learning Outcome: 2.5

34) What is an organic compound?
A) A molecule that contains nitrogen bonded to other elements
B) A molecule that contains carbon bonded to other elements
C) A molecule that contains both carbon and nitrogen
D) A molecule that contains a nitrogen skeleton
Answer: B
Module: 2.7
Skill: Remembering/Understanding
Learning Outcome: 2.4
Global Learning: G5

35) Why is life based on carbon-based molecules?
A) Because carbon is found everywhere
B) Because carbon has unique ionic properties
C) Because a single carbon can bond with up to four other atoms
D) Because a single carbon can bond with up to eight other atoms
Answer: C
Module: 2.7
Skill: Remembering/Understanding
Learning Outcome: 2.4

36) Which of the following large organic molecules include table sugar?
A) Carbohydrates
B) Lipids
C) Proteins
D) Nucleic acids
Answer: A
Module: 2.9
Skill: Remembering/Understanding
Learning Outcome: 2.4

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37) The breaking of a large organic molecule into smaller, individual subunits involves multiple _____.

A) hydrolysis reactions
B) osmotic reactions
C) dehydration synthesis reactions
D) hydrosynthetic reactions
Answer: A
Module: 2.8
Skill: Remembering/Understanding
Learning Outcome: 2.4

38) The building of a large organic molecule from small subunits involves multiple _____.
A) hydrolysis reactions
B) osmotic reactions
C) dehydration synthesis reactions
D) hydrosynthetic reactions
Answer: C
Module: 2.8
Skill: Remembering/Understanding
Learning Outcome: 2.4

39) What are the monomers of proteins?
A) Glucose
B) Nucleic acids
C) Fatty acids
D) Amino acids
Answer: D
Module: 2.12
Skill: Remembering/Understanding
Learning Outcome: 2.5

40) What do we call the sum total of all the chemical reactions that take place in your body?
A) Catabolism
B) Anabolism
C) Embolism
D) Metabolism
Answer: D
Module: 2.8
Skill: Remembering/Understanding
Learning Outcome: 2.4

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41) What is another name for the polymers of carbohydrates?

A) Triglycerides
B) Polysaccharides
C) Polypeptides
D) Nucleotides
Answer: B
Module: 2.9
Skill: Remembering/Understanding
Learning Outcome: 2.5

42) Which of the following is *not* made from long chains of glucose?
A) Starch
B) Sucrose
C) Glycogen
D) Cellulose
Answer: B
Module: 2.9
Skill: Remembering/Understanding
Learning Outcome: 2.5

43) Which of the following represents a simple sugar (also called a monosaccharide)?
A) Lactose
B) Cellulose
C) Glucose
D) Sucrose (table sugar)
Answer: C
Module: 2.9
Skill: Remembering/Understanding
Learning Outcome: 2.5

44) Which of the following is a polysaccharide?
A) Glucose
B) Cellulose
C) Fructose
D) Sucrose
Answer: B
Module: 2.9
Skill: Remembering/Understanding
Learning Outcome: 2.5

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45) _____ is the polysaccharide most commonly found in highly fibrous foods such as celery.

A) Starch
B) Cellulose
C) Glycogen
D) Chitin
Answer: B
Module: 2.10
Skill: Remembering/Understanding
Learning Outcome: 2.5

46) What are isomers?
A) Two molecules that have the same arrangement of atoms
B) Two atoms that have the same ionic properties
C) Two molecules that have the same atoms arranged differently
D) Two elements that can bond with each other
Answer: C
Module: 2.9
Skill: Remembering/Understanding
Learning Outcome: 2.5

47) All lipids are _____.
A) water-loving molecules
B) hydrophilic
C) hydrophobic
D) hydrolytic
Answer: C
Module: 2.10
Skill: Remembering/Understanding
Learning Outcome: 2.5

48) Evaluate this statement: Cholesterol is a type of lipid, and thus all cholesterol lipids are bad for human health.
A) True, because high levels of cholesterol lead to increased heart disease.
B) True, because high levels of cholesterol lead to obesity.
C) False, because some types cholesterol increase heart disease, but other types are necessary, especially in the plasma membrane.
D) False, because cholesterol levels are not related to human health.
Answer: C
Module: 2.10
Skill: Applying/Analyzing
Learning Outcome: 2.5
Global Learning: G5

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49) What is the basic structure of a triglyceride?

A) A glycerol head and three fatty acid tails
B) A linear chain of fatty acids
C) A branched chain of fatty acids
D) A chain of fatty acid tails
Answer: A
Module: 2.10
Skill: Remembering/Understanding
Learning Outcome: 2.5

50) Which of the following dietary fats is considered to be the least healthy?
A) Saturated fat
B) Trans unsaturated fat
C) Cholesterol
D) All dietary fats are unhealthy
Answer: B
Module: 2.11
Skill: Remembering/Understanding
Learning Outcome: 2.5
Global Learning: G5

51) Oil hydrogenation can produce a product, such as vegetable shortening or margarine, that is spreadable at room temperature because of an unusual bond that does not occur naturally. What is the name of this category of lipid?
A) Saturated fat
B) Healthy fat
C) Trans fat
D) Cholesterol
Answer: C
Module: 2.11
Skill: Remembering/Understanding
Learning Outcome: 2.5
Global Learning: G5

52) Which would have the highest concentration of C–H bonds?
A) Saturated fat
B) Unsaturated fat
C) Trans fat
D) Cholesterol
Answer: A
Module: 2.11
Skill: Applying/Analyzing
Learning Outcome: 2.5

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53) Which of the following molecules is solid at room temperature?

A) Saturated fats
B) Unsaturated fats
C) Cholesterol
D) Both saturated and unsaturated fats
Answer: A
Module: 2.11
Skill: Remembering/Understanding
Learning Outcome: 2.5

54) What kind of bond joins amino acids together to form a protein?
A) Peptide bond
B) Hydrogen bond
C) Polar bond
D) Protein bond
Answer: A
Module: 2.12
Skill: Remembering/Understanding
Learning Outcome: 2.5

55) A polypeptide is _____.
A) a long chain of amino acids
B) a long chain of glucose
C) a long chain of fatty acids
D) a long chain of nucleic acids
Answer: A
Module: 2.11
Skill: Remembering/Understanding
Learning Outcome: 2.5

56) To a large extent, a protein's function is dependent upon its shape. What determines a protein's shape?
A) The location of the active site
B) The sequence of amino acids
C) The number of amino acids
D) The number of peptide bonds
Answer: B
Module: 2.12
Skill: Applying/Analyzing
Learning Outcome: 2.5

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57) Proteins are diverse molecules that perform a wide variety of functions. Which of the following is *not* a typical function of proteins?

A) Transport
B) Catalyze reactions via enzymes
C) Movement
D) Energy storage
Answer: D
Module: 2.12
Skill: Remembering/Understanding
Learning Outcome: 2.5

58) What might happen if a protein has a change in one amino acid?
A) The amino acid chain folds incorrectly.
B) The protein can no longer function properly.
C) The protein has a new shape.
D) All of these may happen.
Answer: D
Module: 2.12, 2.13
Skill: Applying/Analyzing
Learning Outcome: 2.5

59) Enzymes are a type of _____.
A) carbohydrate
B) protein
C) lipid
D) monomer
Answer: B
Module: 2.12, 2.13
Skill: Remembering/Understanding
Learning Outcome: 2.5

60) What will be accomplished by lowering the activation energy of a reaction?
A) The reaction will proceed more slowly.
B) The reaction will proceed more quickly.
C) The reaction will stop completely.
D) The reaction will reverse.
Answer: B
Module: 2.13
Skill: Applying/Analyzing
Learning Outcome: 2.5
Global Learning: G2

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61) What are inhibitors?

A) Molecules that allow reactions to proceed more quickly
B) Molecules that prevent enzymes from working
C) Molecules that inhibit protein synthesis
D) Molecules that bind to an enzyme to help its reaction
Answer: B
Module: 2.11
Skill: Remembering/Understanding
Learning Outcome: 2.5

62) An old home remedy for anemia was to drink from a jug of water into which was added a handful of iron nails. Why might this have been effective at treating certain forms of anemia?
Answer: Iron is an essential nutrient, and the water would have contained iron. If the anemia was the result of an iron deficiency, drinking from the nail water could have added the essential element to the diet.
Module: 2.2
Skill: Evaluating/Creating
Learning Outcome: 2.5
Global Learning: G2, G5

63) Which of the three gasses is the easiest to break apart: nitrogen gas (N_2), oxygen gas (O_2), or hydrogen gas (H_2)? Which is the most difficult to break apart? What accounts for the differences?
Answer: Hydrogen gas, with a single covalent bond, is the easiest to break apart. Nitrogen gas, with a triple covalent bond, is the most difficult. Oxygen gas has a double covalent bond, which is intermediate in strength to the weaker single and stronger triple bonds.
Module: 2.4
Skill: Applying/Analyzing
Learning Outcome: 2.2
Global Learning: G2

64) Why does sweating cool your skin on a hot, dry day but make you feel warmer on a hot, humid day?
Answer: Evaporating sweat cools the skin as the water and the heat it has absorbed move from the skin to the drier air. Sweat does not evaporate as well on a humid day, tending instead to build up on the skin, insulating the body rather than cooling it.
Module: 2.5
Skill: Evaluating/Creating
Learning Outcome: 2.3
Global Learning: G2

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65) The unique chemical qualities of individual amino acids do not directly determine the function of an enzyme. What, then, is the role of the individual amino acid's unique chemical qualities, and what directly determines the function of an enzyme?

Answer: The side groups of an amino acid are what give the amino acid its unique chemical qualities. These allow specific amino acids in the polypeptide chain to bind to other specific amino acids, which fold and twist the polypeptide into a three-dimensional shape. The shape may include an indentation called the "active site" that directly functions as the binding site for the substrate. Active sites often include cofactors and coenzymes that improve its functionality.
Module: 2.12, 2.13
Skill: Evaluating/Creating
Learning Outcome: 2.5
Global Learning: G2

66) Penicillin is a competitive inhibitor produced by a fungus in order to kill invading bacteria. It does this by mimicking the substrate required by the bacterium to build and repair its cell wall. Describe how mimicking the substrate would result in the death of the bacterium.
Answer: As a competitive inhibitor, it must bind to the active site of the bacterial enzyme where the correct substrate typically binds. Binding to the active site blocks the correct substrate from binding and prevents the correct products from being formed. Without these products, the bacterium cannot repair its cell wall and consequently dies.
Module: 2.13
Skill: Evaluating/Creating
Learning Outcome: 2.5
Global Learning: G5

67) List the different types of macromolecules of life, and for each one, list one of its functions and its main monomer.
Answer: There are 4 different types of macromolecules. One is carbohydrates, whose main monomer is a monosaccharide (or a glucose); its main function is energy storage. A second macromolecule type is lipids, whose main monomer is glycerol linked with several fatty acid tails; its function is also energy storage or insulation. A third is proteins, whose monomer is amino acids; proteins have many functions, including speeding reactions as enzymes. The last group of macromolecules is nucleic acids, whose monomer is a nucleotide; nucleic acids function to carry hereditary information.
Module: 2.7, 2.8, 2.9, 2.10
Skill: Applying/Analyzing
Learning Outcome: 2.5
Global Learning: G5

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