Biology The Core 2nd edition Simon Test Bank

SKU: 9780134152196-TEST-BANK

***Biology: The Core, 2e* (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) Compound
B) Element
C) Molecule
D) Ion
Answer: A
Module: 2.1
Skill: Remembering/Understanding
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: Remembering/Understanding
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) What is a trace element?
A) An element that is very rare
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

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5) 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

6) 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

7) The majority of the elements essential to life are found in what part of the periodic table?
A) The top third
B) The middle third
C) The bottom third
D) Evenly distributed throughout the periodic table
Answer: A
Module: 2.2
Skill: Applying/Analyzing
Learning Outcome: 2.1

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

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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

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) In an atom, the number of neutrons determines most specifically the _____.
A) 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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12) If the number of protons in an atom does not match the number of electrons, the atom is called an _____.
A) element
B) isotope
C) isomer
D) ion
Answer: D
Module: 2.3
Skill: Applying/Analyzing
Learning Outcome: 2.1

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) Identify the part of the atom that most determines the chemical properties of the atom.
A) The number of shells
B) The number of protons
C) The number of neutrons
D) The number of electrons
Answer: D
Module: 2.3
Skill: Remembering/Understanding
Learning Outcome: 2.2

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

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16) 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 (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: 2.2

17) 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
Global Learning: G4

18) 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

19) 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: 2.2

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20) Water is the least dense when it _____.
A) freezes
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

21) 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

22) 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

23) 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 hydroxide ions in a solute
Answer: C
Module: 2.6
Skill: Remembering/Understanding
Learning Outcome: 2.3

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24) 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

25) Something with a pH of 5 would be _____.
A) acidic
B) basic
C) neutral
D) alkaline
Answer: A
Module: 2.6
Skill: Remembering/Understanding
Learning Outcome: 2.3

26) 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

27) 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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28) 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: 2.4

29) Which of the following large organic molecules include table sugar?
A) Carbohydrates
B) Lipids
C) Proteins
D) Nucleic acids
Answer: A
Module: 2.7, 2.9
Skill: Remembering/Understanding
Learning Outcome: 2.4

30) 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: 2.5

31) 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: 2.5

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32) 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: 2.6

33) What is the sum total of all the chemical reactions that take place in your body called?
A) Catabolism
B) Anabolism
C) Embolism
D) Metabolism
Answer: D
Module: 2.8
Skill: Remembering/Understanding
Learning Outcome: 2.5

34) 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: 2.6

35) Which of the following is *not* made from long chains of glucose?
A) Starch
B) Monosaccharides
C) Glycogen
D) Cellulose
Answer: B
Module: 2.9
Skill: Remembering/Understanding
Learning Outcome: 2.6

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36) Based on the suffix, a molecule of "malt*ose*" is most likely what type of macromolecule?
A) Carbohydrate
B) Lipid
C) Protein
D) Nucleic acid
Answer: A
Module: 2.9
Skill: Applying/Analyzing
Learning Outcome: 2.6
Global Learning: G2

37) Which of the following represents a simple sugar (also called *monosaccharides*)?
A) Lactose
B) Cellulose
C) Glucose
D) Sucrose (table sugar)
Answer: C
Module: 2.9
Skill: Remembering/Understanding
Learning Outcome: 2.6

38) Which of the following is a polysaccharide?
A) Glucose
B) Cellulose
C) Fructose
D) Sucrose
Answer: A
Module: 2.9
Skill: Remembering/Understanding
Learning Outcome: 2.6

39) All lipids are _____.
A) water-loving molecules
B) hydrophilic
C) hydrophobic
D) hydrolytic
Answer: C
Module: 2.10
Skill: Remembering/Understanding
Learning Outcome: 2.6

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40) 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: 2.6

41) What is the basic structure of most lipids?
A) A glycerol head and up to three fatty acid tails
B) A linear chain of individual monomers
C) A branched chain of individual monomers
D) A chain of fatty acid tails
Answer: A
Module: 2.10
Skill: Remembering/Understanding
Learning Outcome: 2.6

42) Which of the following dietary fats is considered to be the least healthy?
A) Saturated fat
B) Unsaturated fat
C) Trans fat
D) Cholesterol
Answer: C
Module: 2.11
Skill: Remembering/Understanding
Learning Outcome: 2.6
Global Learning: G5

43) 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: 2.6
Global Learning: G5

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44) 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: 2.6

45) 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: 2.6

46) 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: 2.6

47) 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: 2.6

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48) 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 happen.
Answer: D
Module: 2.12, 2.13
Skill: Applying/Analyzing
Learning Outcome: 2.6

49) Organic molecules that end in the suffix "-ase" often function as _____ molecules.
A) structural
B) enzymatic
C) transport
D) storage
Answer: B
Module: 2.13
Skill: Applying/Analyzing
Learning Outcome: 2.6

50) 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: 2.6

51) 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: 2.6
Global Learning: G2

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52) 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: 2.1
Global Learning: G2, G5

53) 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

54) 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

55) 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: 2.6
Global Learning: G2

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56) 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: 2.6
Global Learning: G5

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