Test Bank for Campbell Biology 12th Edition by Urry

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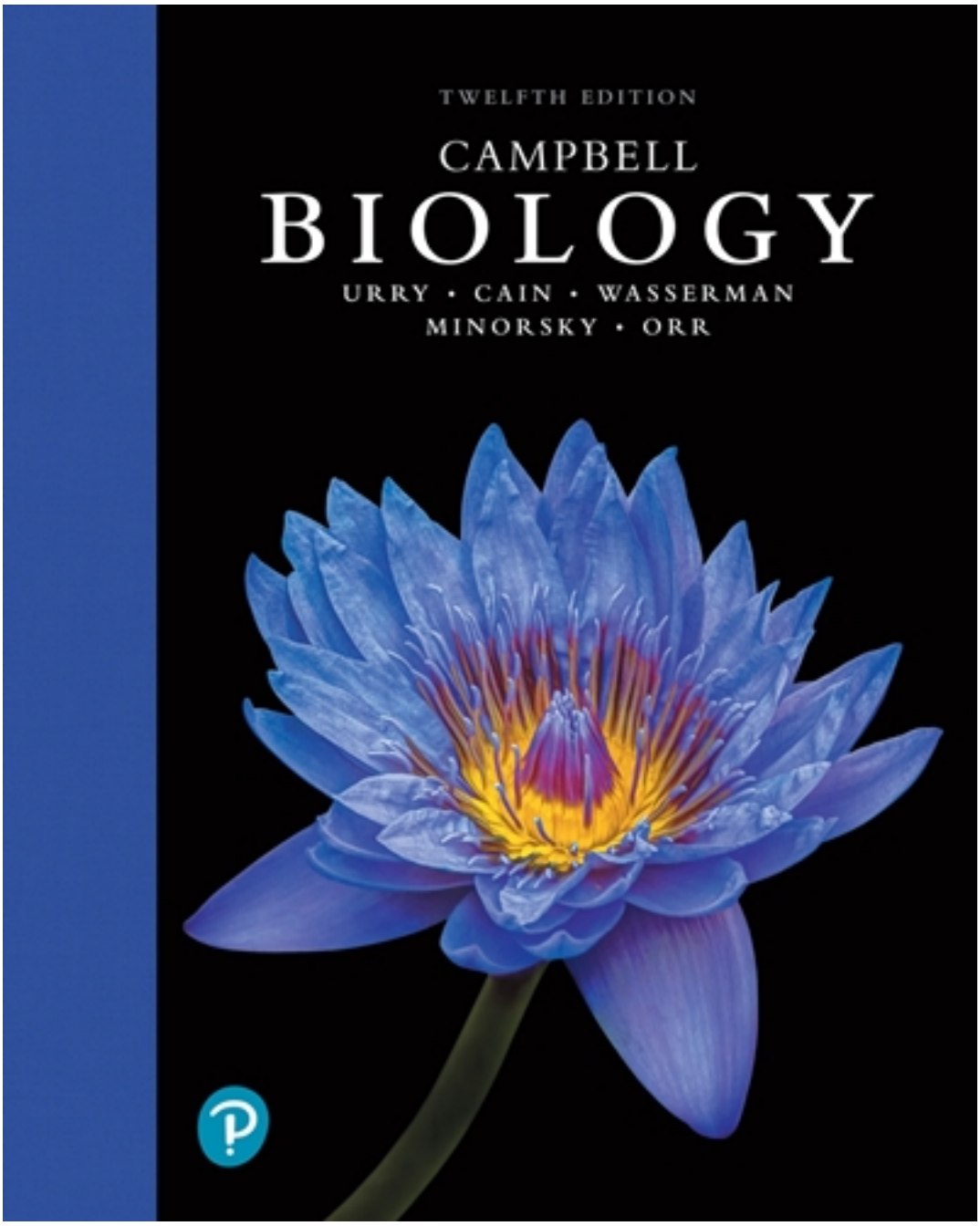


Test Bank

***Campbell Biology, 12e* (Urry)**
Chapter 2 The Chemical Context of Life

2.1 Multiple-Choice Questions

1) About 25 of the 92 natural elements are known to be essential to life. Four of these 25 elements make up approximately 96% of living matter. Which of the following elements account for most of the remaining 4% of an organism's mass?
A) carbon, oxygen, hydrogen, nitrogen
B) calcium, potassium, phosphorus, sulfur
C) oxygen, hydrogen, calcium, nitrogen
D) carbon, hydrogen, nitrogen, oxygen
Answer: B
Topic: Matter consists of chemical elements in pure form and in combinations called compounds
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.1, Global LO: G4, V&C LO: VC-SF

2) Trace elements are those required by an organism in only minute quantities. Which of the following is a trace element that is required by all forms of life?
A) arsenic
B) iodine
C) mercury
D) iron

Answer: D
Topic: Matter consists of chemical elements in pure form and in combinations called compounds
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.1, Global LO: G4, V&C LO: VC-EM

3) Which of the following statements is TRUE?
A) Carbon, hydrogen, oxygen, and calcium are the most abundant elements of living matter.
B) Some naturally occurring elements are toxic to organisms.
C) All life requires the same essential elements.
D) A patient suffering from a goiter should not consume seafood.
Answer: B
Topic: Matter consists of chemical elements in pure form and in combinations called compounds
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.1, Global LO: G4, V&C LO: VC-EM

4) Which of the following are compounds?
A) H_2O, O_2, and CH_4
B) H_2O and O_2
C) O_2 and CH_4
D) H_2O and CH_4, but not O_2
Answer: D
Topic: Matter consists of chemical elements in pure form and in combinations called compounds
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.1, Global LO: G1, V&C LO: VC-EM

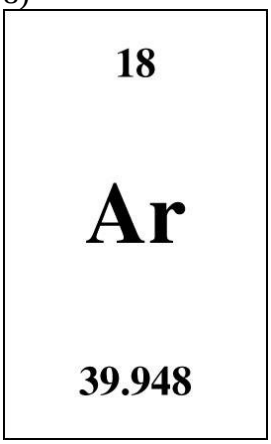
5) Atoms have no electric charge because they have _____.
A) uncharged neutrons in their nuclei
B) an equal number of protons and neutrons
C) an equal number of protons and electrons
D) an equal number of charged and uncharged subatomic particles
Answer: C
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

6) Which of the following is true of oxygen that has 8 protons, 8 neutrons, and 8 electrons?
A) It has a charge of +8.

B) It has a mass number of 8.
C) It has an atomic number of 8.
D) It has atomic number of 16.
Answer: C
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

7) How many electrons are present in a H- and H+ ion respectively?
A) 1,2
B) 2,1
C) 2,0
D) 0,2
Answer: C
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

8)



What is the atomic number of the neutral atom represented by the Periodic Table block in the figure?
A) 18
B) 19
C) 22
D) 39
Answer: A
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

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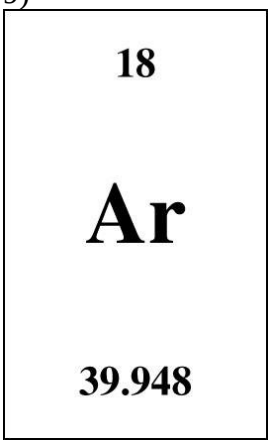
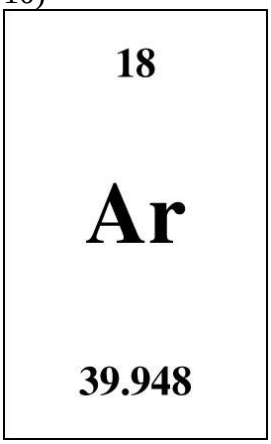


How many electrons are present in the neutral atom represented in the Periodic Table block in the figure?
A) 18
B) 19
C) 22
D) 40
Answer: C
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

10)



How many electrons are present in the +2 ionic form of the atom in the Periodic Table block shown in the figure?
A) 18
B) 19
C) 22
D) 40
Answer: C
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

11) Which of the following best explain why argon, which is a noble gas, does not react with other elements. Noble gases _____.
A) have completely paired up and stable electron shells
B) have very small atoms
C) are not found in abundance on our planet
D) have a high positive charge that repels most elements
Answer: A
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

12) An ion with six protons, seven neutrons, and a charge of 2+ has an atomic number of _____.
A) four
B) five
C) six
D) seven
Answer: C
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

13) Which of the following atoms has the smallest number of neutrons?
A) nitrogen-14
B) carbon-14
C) oxygen-16
D) neon-20
Answer: A
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

14) Molybdenum has an atomic number of 42. Several common isotopes exist, with mass numbers from 92-100. Based on this information, which of the following is also true of molybdenum?
A) Molybdenum atoms can have between 50 and 58 neutrons.
B) Molybdenum atoms can have between 50 and 58 protons.
C) Molybdenum atoms can have between 50 and 58 electrons.
D) Isotopes of molybdenum have different numbers of electrons.
Answer: A
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.2, Global LO: G7, V&C LO: VC-EM

15) An ion that consists of 7 protons, 6 neutrons, and 11 electrons has a net charge of _____.

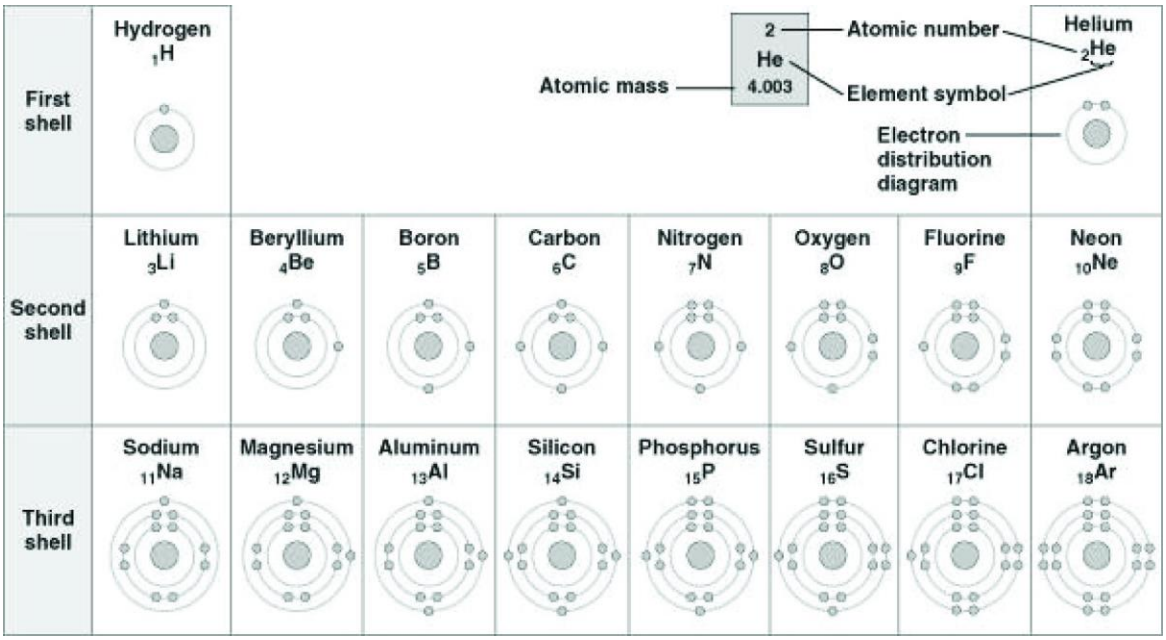
A) 4-
B) 5+
C) 5-
D) 4+
Answer: A
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-SF

16) The atomic number of nitrogen is 7. Which of the following explains the greater mass number of nitrogen-15 compared to nitrogen-14? Nitrogen-15 contains _____.
A) 7 neutrons and nitrogen-14 contains 8 neutrons
B) 8 neutrons and nitrogen-14 contains 7 neutrons
C) 8 protons and nitrogen 14 contains 7 protons
D) 15 protons and nitrogen-14 contains 14 protons
Answer: B
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-SF

17) Which of the following has the smallest total mass?
A) two electrons
B) two neutrons
C) 1 electron plus 1 neutron
D) 1 neutron plus 1 proton
Answer: A
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-SF

18) A neutral atom has 2, 8, 8 electrons in its first, second, and third energy levels. This information _____.
A) does not tell us about the atomic number of the element
B) does not tell us about the chemical properties of the element
C) does not tell us about the atomic mass of the element
D) does not tell us about the size of the element
Answer: C
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-SF

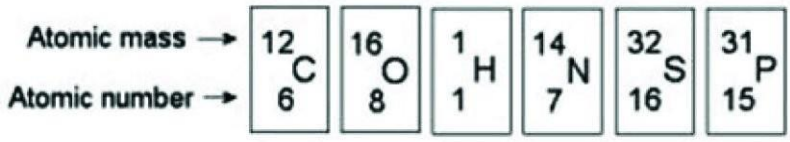
Refer to the following figure (first three rows of the periodic table) to answer the questions below.



19) What element does not react with other elements?
A) hydrogen
B) helium
C) oxygen
D) silicon
Answer: B
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 5-6: Evaluating/Creating
Learning Outcome: 2.2, Global LO: G3, V&C LO: VC-SF

20) Which pair of elements is most likely to react if bought together?
A) hydrogen and argon
B) sodium and chlorine
C) hydrogen and lithium
D) nitrogen and oxygen
Answer: B
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

Refer to the following figure to answer the questions below.



21) How many electrons are present in a Phosphorus 2+ atom?
A) 12
B) 13
C) 19
D) 34
Answer: B
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

22) How many electrons will a single atom of nitrogen with no charge and no bonds have in its valence shell?
A) 2
B) 5
C) 7
D) 14
Answer: B

Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

23) Oxygen has an atomic number of 8 and, most commonly, a mass number of 16. Thus, what is the atomic mass of an oxygen atom?
A) approximately 8 grams
B) approximately 8 daltons
C) approximately 16 grams
D) approximately 16 daltons
Answer: D
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

24) Elements ^{72}Zn, ^{75}As, and ^{74}Ge have the same number of _____.
A) protons
B) protons and electrons
C) neutrons
D) neutrons and electrons
Answer: C
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 5-6: Evaluating/Creating
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

25) To find out the number of neutrons in an atom, we need to know the following.
A) atomic number
B) electron number
C) mass number
D) mass and atomic number
Answer: D
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

26) Under which of the following conditions will an atom be the most stable?
A) when they have the fewest possible valence electrons
B) when they have the maximum number of unpaired electrons
C) when all of the electron orbitals in the valence shell are filled
D) when all electrons are paired
Answer: C
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

27) Which pair of elements in the diagram is most likely to form a covalent bond?
A) V and Z
B) V and Y
C) V and X
D) W and Z
Answer: B
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

28) In the above diagram, what kind of bond is most likely to form between V and Z?
A) ionic
B) covalent
C) hydrogen
D) van der Waals
Answer: A
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

29) Based on electron configuration, which of the elements would exhibit a chemical behavior similar to oxygen?
A) carbon
B) nitrogen
C) sulfur
D) phosphorus
Answer: C
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-EM

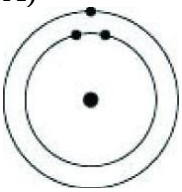
30) A salamander relies on hydrogen bonding to stick to various surfaces. Therefore, a salamander would have the greatest difficulty clinging to a _____.
A) slightly damp surface

B) surface of hydrocarbons
C) surface of mostly carbon-oxygen bonds
D) surface of mostly carbon-nitrogen bonds
Answer: B
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 5-6: Evaluating/Creating
Learning Outcome: 2.3, Global LO: G9, V&C LO: VC-SF

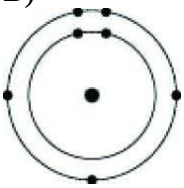
Use the following figure to answer the following questions.

31) Which of the following models represents an atom that is most likely to form a cation with a charge of +1?

A)



B)



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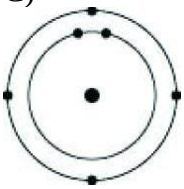
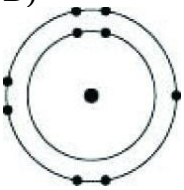


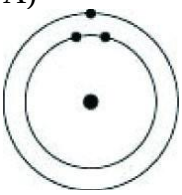
D)



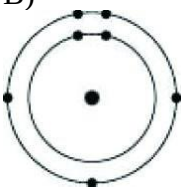
Answer: A
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.3, Global LO: G3, V&C LO: VC-SF

32) Which of the following models represents an atom that is most likely to form an anion with a charge of -1?

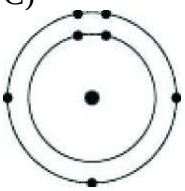
A)



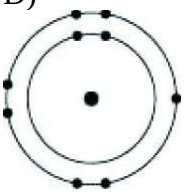
B)



C)



D)



Answer: D
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.3, Global LO: G3, V&C LO: VC-SF

33) Nitrogen (N) is more electronegative than hydrogen (H). Which of the following is a correct statement about the atoms in ammonia (NH_3)?

A) Each hydrogen atom has a partial positive charge; the nitrogen atom has a partial negative charge.
B) Ammonia has an overall positive charge.
C) Ammonia has an overall negative charge.
D) The nitrogen atom has a partial positive charge; each hydrogen atom has a partial negative charge.
Answer: A
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G9, V&C LO: VC-SF

34) In the following structure where A and B represent two different elements, the valency of A is _____ and B is _____.

A) one; three
B) one; five
C) three; five
D) eight; eight
Answer: A
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G4, V&C LO: VC-SF

35) A covalent bond is likely to be polar under which of the following conditions?
A) one of the atoms sharing electrons is more electronegative than the other atom
B) the two atoms sharing electrons are equally electronegative
C) carbon is one of the two atoms sharing electrons
D) the two atoms sharing electrons are of the same elements

Answer: A
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

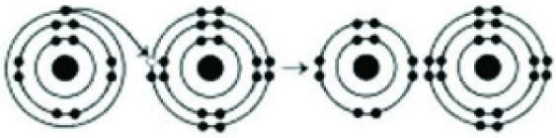
36) The atomic number of chlorine is 17. The atomic number of magnesium is 12. Given this information, what is the formula for magnesium chloride?
A) MgCl
B) $MgCl_2$
C) Mg_2Cl
D) $MgCl_3$
Answer: B
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

37) How many electron pairs are shared between carbon atoms in a molecule that has the formula C_2H_4?
A) one
B) two
C) three
D) four
Answer: B
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

38) Which of the following types of bond is broken when water evaporates?
A) nonpolar covalent bonds
B) ionic bonds
C) hydrogen bonds
D) polar covalent bonds
Answer: C
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

39) Van der Waals interactions may result under which of the following conditions?
A) electrons are not symmetrically distributed in a molecule
B) molecules held by ionic bonds react with water
C) two polar covalent bonds react
D) a hydrogen atom loses an electron
Answer: A
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

Refer to the following figure to answer the questions below.

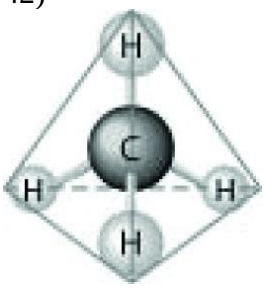


40) Considering that the reactants have no charge, what are the products of the reaction shown above?
A) a cation with a net charge of +1 and an anion with a net charge of +1
B) a cation with a net charge of -1 and an anion with a net charge of -1
C) a cation with a net charge of -1 and an anion with a net charge of +1
D) a cation with a net charge of +1 and an anion with a net charge of -1
Answer: D
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

41) What is the atomic number of the cation formed in the reaction in the illustration?
A) 8
B) 10
C) 11
D) 16

Answer: C
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

42)



Which of the following factors contribute to the tetrahedral shape of the above molecule?
A) the shape of the two *p* orbitals in the carbon atom
B) the shape of the one *s* orbital in the carbon atom
C) the shape of the sp^3 hybrid orbitals of the electrons shared between the carbon and hydrogen atoms
D) hydrogen bonding configurations between the carbon and hydrogen atoms
Answer: C
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G3, V&C LO: VC-EM

43) How many electrons participate in a triple covalent bond?
A) 3

B) 6
C) 9
D) 12
Answer: B
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G3, V&C LO: VC-EM

44) If an atom has a charge of +1, which of the following must be true?
A) It has two more protons than neutrons.
B) It has the same number of protons as electrons.
C) It has one more electron than it does protons.
D) It has one more proton than it does electrons.
Answer: D
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

45) Elements found in the first two columns of the periodic table contain outer electron shells that are _____; these elements tend to form _____ in solution.
A) almost empty; cations
B) almost empty; anions
C) almost full; cations
D) almost full; anions
Answer: A
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

46) An atom has four electrons in its valence shell. What types of covalent bonds is it capable of forming?
A) single, double, or triple
B) single and double only
C) single bonds only
D) double bonds only
Answer: A
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

47) Which one of the following describes the correct trends in electronegativity in the periodic table?
A) increases across a period and decreases down a group
B) decreases across a period and decreases down a group
C) increases across a period and increases down a group
D) decreases across a period and increases down a group
Answer: A
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

48) Nitrogen (N) normally forms three covalent bonds with a valence of five. However, ammonium has four covalent bonds, each to a different hydrogen (H) atom (H has a valence of one). What do you predict to be the charge on ammonium?
A) +1
B) -1
C) +2
D) -2
Answer: A
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

49) Which of the following types of representation would work best to indicate the type and number of atoms in a molecule?
A) molecular formula
B) structural formula
C) ball-and-stick model
D) space-filling model
Answer: A
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

50) How is a covalent bond formed?
A) two atoms share two pairs of electrons
B) two atoms share two electrons
C) two atoms share one electron
D) one atom loses a pair of electrons to the other
Answer: B
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-EM

Refer to the following figure to answer the questions below.

$3H_2 + N_2 \leftrightarrow 2NH_3$

51) Which of the following is true for the above reaction?
A) the reaction is nonreversible
B) hydrogen and nitrogen are the reactants of the reverse reaction
C) ammonia is being formed and decomposed simultaneously
D) only the forward or reverse reactions can occur at one time
Answer: C
Topic: Chemical reactions make and break chemical bonds
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.4, Global LO: G1, V&C LO: VC-EM

52) Which of the following factors will increase the rate of reaction in the forward direction?
A) addition of nitrogen
B) addition of ammonia
C) addition of hydrogen
D) addition of both nitrogen and hydrogen
Answer: D
Topic: Chemical reactions make and break chemical bonds
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.4, Global LO: G1, V&C LO: VC-EM

53) Which of the following correctly describes *chemical equilibrium*?
A) Forward and reverse reactions continue with no net effect on the concentrations of the reactants and products.
B) Concentrations of products are higher than the concentrations of the reactants.
C) There are equal concentrations of products and reactants while forward and reverse reactions continue.
D) There are equal concentrations of reactants and products, and the reactions have stopped.
Answer: A
Topic: Chemical reactions make and break chemical bonds
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.4, Global LO: G1, V&C LO: VC-EM

2.2 Student Edition End-of-Chapter Questions

1) Compared with ^{31}P, the radioactive isotop ^{32}P has _____.
A) a different atomic number
B) one more proton
C) one more electron
D) one more neutron
Answer: D
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-SF

2) In the term *trace element*, the adjective *trace* means that _____.
A) the element is required in very small amounts
B) the element can be used as a label to trace atoms through an organism's metabolism
C) the element is very rare on Earth
D) the element enhances health but is not essential for the organism's long-term survival
Answer: A
Topic: Matter consists of chemical elements in pure form and in combinations called compounds
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.1, Global LO: G1, V&C LO: VC-SF

3) The reactivity of an atom arises from _____.
A) the average distance of the outermost electron shell from the nucleus
B) the existence of unpaired electrons in the valence shell
C) the sum of the potential energies of all the electron shells
D) the potential energy of the valence shell
Answer: B
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-SF

4) Which statement is true of all atoms that are anions?
A) The atom has more electrons than protons.
B) The atom has more protons than electrons.
C) The atom has fewer protons than does a neutral atom of the same element.
D) The atom has more neutrons than protons.
Answer: A
Topic: An element's properties depend on the structure of its atoms
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.2, Global LO: G1, V&C LO: VC-SF

5) Which of the following statements correctly describes any chemical reaction that has reached equilibrium?
A) The concentrations of products and reactants are equal.
B) The reaction is now irreversible.
C) Both forward and reverse reactions have halted.
D) The rates of the forward and reverse reactions are equal.
Answer: D
Topic: Chemical reactions make and break chemical bonds
Bloom's Taxonomy: Levels 1-2: Remembering/Understanding
Learning Outcome: 2.4, Global LO: G1, V&C LO: VC-SF

6) We can represent atoms by listing the number of protons, neutrons, and electrons–for example, $2p^+$, $2n^0$, $2e^-$ for helium. Which of the following represents the ^{18}O isotope of oxygen?
A) $7p^+$, $2n^0$, $9e^-$
B) $8p^+$, $10n^0$, $8e^-$
C) $9p^+$, $9n^0$, $9e^-$
D) $10p^+$, $8n^0$, $9e^-$
Answer: B
Topic: Chemical reactions make and break chemical bonds
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.4, Global LO: G1, V&C LO: VC-SF

7) The atomic number of sulfur is 16. Sulfur combines with hydrogen by covalent bonding to form a compound, hydrogen sulfide. Based on the number of valence electrons in a sulfur atom, predict the molecular formula of the compound.
A) HS
B) HS_2
C) H_2S
D) H_4S
Answer: C
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.3, Global LO: G1, V&C LO: VC-SF

8) What coefficients must be placed in the following blanks so that all atoms are accounted for in the products?

$C_6H_{12}O_6 \rightarrow$ _____ C_2H_6O + _____ CO_2
A) 2; 1
B) 3; 1
C) 1; 3
D) 2; 2
Answer: D
Topic: Chemical reactions make and break chemical bonds
Bloom's Taxonomy: Levels 3-4: Applying/Analyzing
Learning Outcome: 2.4, Global LO: G3, V&C LO: VC-SF