

Campbell Biology 12th edition Urry Test Bank

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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

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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) H₂O, O₂, and CH₄
- B) H₂O and O₂
- C) O₂ and CH₄
- D) H₂O and CH₄, but not O₂

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.

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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)

18
Ar
39.948

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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9)

18
Ar
39.948

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)

18
Ar
39.948

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+

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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

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

First shell	Hydrogen ${}^1_1\text{H}$	2 He 4.003 Atomic number Element symbol Atomic mass Electron distribution diagram						Helium ${}^2_2\text{He}$
Second shell	Lithium ${}^3_3\text{Li}$	Beryllium ${}^4_4\text{Be}$	Boron ${}^5_5\text{B}$	Carbon ${}^6_6\text{C}$	Nitrogen ${}^7_7\text{N}$	Oxygen ${}^8_8\text{O}$	Fluorine ${}^9_9\text{F}$	Neon ${}^{10}_{10}\text{Ne}$
Third shell	Sodium ${}^{11}_{11}\text{Na}$	Magnesium ${}^{12}_{12}\text{Mg}$	Aluminum ${}^{13}_{13}\text{Al}$	Silicon ${}^{14}_{14}\text{Si}$	Phosphorus ${}^{15}_{15}\text{P}$	Sulfur ${}^{16}_{16}\text{S}$	Chlorine ${}^{17}_{17}\text{Cl}$	Argon ${}^{18}_{18}\text{Ar}$

19) What element does not react with other elements?

- A) hydrogen
- B) helium
- C) oxygen
- D) silicon

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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.

Atomic mass →	12	16	1	14	32	31
	C	O	H	N	S	P
Atomic number →	6	8	1	7	16	15

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

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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

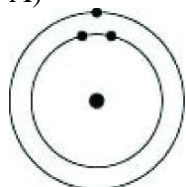
Learning Outcome: 2.3, Global LO: G9, V&C LO: VC-SF

Use the following figure to answer the following questions.

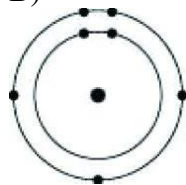


31) Which of the following models represents an atom that is most likely to form a cation with a charge of +1?

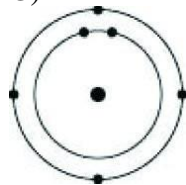
A)



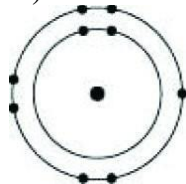
B)



C)



D)



Answer: A

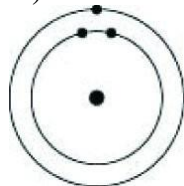
Topic: The formation and function of molecules and ionic compounds depend on chemical bonding between atoms

Bloom's Taxonomy: Levels 3-4: Applying/Analyzing

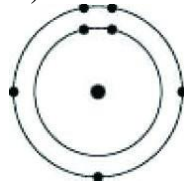
Learning Outcome: 2.3, Global LO: G3, V&C LO: VC-SF

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

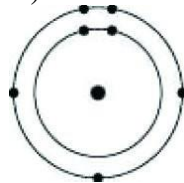
A)



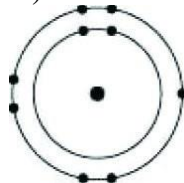
B)



C)



D)



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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) MgCl₂
- C) Mg₂Cl
- D) MgCl₃

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

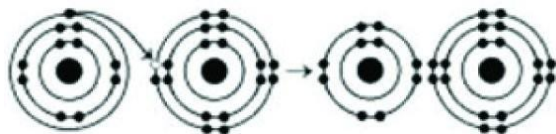
Answer: A

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

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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

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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

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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

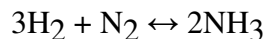
Answer: B

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.



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

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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 isotope ^{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 [TBEXAM.COM](https://www.tbexam.com).

- 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

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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) HS₂
- C) H₂S
- D) H₄S

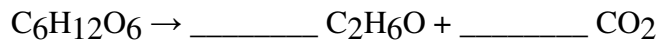
Answer: C

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?



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

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