

***Hole's Essentials of Human Anatomy & Physiology  
13th edition Shier Test Bank***

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## Chapter 02 Chemical Basis of Life **Answer Key**

### Multiple Choice Questions

1. All of the food that we eat, liquids that we drink and medications that we take are
- A.** chemicals.
  - B. vitamins.
  - C. proteins.
  - D. nucleic acids.
  - E. carbohydrates.

*Accessibility: Keyboard Navigation  
Bloom's Level: 2. Understand  
HAPS Topic: Module C01 Atoms and molecules.  
Section: 02.01  
Topic: Atoms and molecules*

### Fill in the Blank Questions

2. Understanding \_\_\_\_\_ is essential for understanding anatomy and physiology because body structures and functions result from chemical changes.

**chemistry**

*Accessibility: Keyboard Navigation  
Bloom's Level: 2. Understand  
HAPS Topic: Module C01 Atoms and molecules.  
Section: 02.01  
Topic: Atoms and molecules*

### True / False Questions

3. Chemistry is the branch of science that deals with the composition of matter.

**TRUE**

*Accessibility: Keyboard Navigation  
Bloom's Level: 1. Remember  
HAPS Topic: Module C01 Atoms and molecules.  
Section: 02.02  
Topic: Atoms and molecules*

## Multiple Choice Questions

4. Which of the following substances is NOT an element?

- A. iron
- B. oxygen
- C. water**
- D. carbon
- E. hydrogen

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Atoms and molecules*

*Topic: Inorganic compounds and solutions*

## True / False Questions

5. Matter is anything that has weight and takes up space.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

## Fill in the Blank Questions

6. \_\_\_\_\_ is defined as anything that has weight and takes up space.

**Matter**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

7. All matter is composed of atoms of fundamental substances called \_\_\_\_\_.

**elements**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

### Multiple Choice Questions

8. Which elements make up 95% (by weight) of the human body?

- A. carbon, hydrogen, oxygen, nitrogen
- B. carbon, hydrogen, oxygen, calcium
- C. carbon, hydrogen, calcium, nitrogen
- D. carbon, hydrogen, selenium, sodium
- E. sodium, calcium, nitrogen, selenium

Accessibility: Keyboard Navigation  
Bloom's Level: 1. Remember  
HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.  
HAPS Topic: Module C01 Atoms and molecules.  
Section: 02.02  
Topic: Atoms and molecules

### True / False Questions

9. An element with an atomic number of 6 contains 12 protons.

**FALSE**

Accessibility: Keyboard Navigation  
Bloom's Level: 4. Analyze  
HAPS Objective: C01.01d Distinguish among the terms atomic number, mass number and atomic weight with respect to the structure of an atom.  
HAPS Topic: Module C01 Atoms and molecules.  
Section: 02.02  
Topic: Atoms and molecules

### Fill in the Blank Questions

10. At present, there are 90 known naturally occurring \_\_\_\_\_.

**elements**

Accessibility: Keyboard Navigation  
Bloom's Level: 1. Remember  
HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.  
HAPS Topic: Module C01 Atoms and molecules.  
Section: 02.02  
Topic: Atoms and molecules

## Multiple Choice Questions

11. Which of the following is the number of elements living organisms require?

- A. 10
- B. 15
- C. 20**
- D. 90
- E. 144

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

## True / False Questions

12. The atomic weight of an atom of an element equals the number of neutrons in its nucleus.

**FALSE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.01d Distinguish among the terms atomic number, mass number and atomic weight with respect to the structure of an atom.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

## Fill in the Blank Questions

13. The atomic \_\_\_\_\_ of an atom of an element equals the number of protons and neutrons in its nucleus.

**weight**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.01d Distinguish among the terms atomic number, mass number and atomic weight with respect to the structure of an atom.*

*Section: 02.02*

*Topic: Atoms and molecules*

14. The number of protons in the atoms of a particular element is called the element's atomic \_\_\_\_\_.

**number**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.01d Distinguish among the terms atomic number, mass number and atomic weight with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

15. Each element is composed of characteristic tiny particles called \_\_\_\_\_.

**atoms**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

16. The parts of an atom that lack an electrical charge are called \_\_\_\_\_.

**neutrons**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

17. When atoms combine with other atoms, interactions occur between their \_\_\_\_\_ shells.

**electron**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atom's chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

HAPS Topic: Module C02 Chemical bonding.

Section: 02.02

Topic: Atoms and molecules

Topic: Chemical bonding

## Multiple Choice Questions

18. The electrons of an atom occupy one or more areas of space called

- A. bonds.
- B. shells.**
- C. regions.
- D. ions.
- E. nuclei.

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

19. The electrons in the outermost shell of an atom determine its

- A. shape.
- B. weight.
- C. chemical behavior.**
- D. mass.
- E. atomic number.

Accessibility: Keyboard Navigation

Bloom's Level: 2. Understand

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atom's chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

HAPS Topic: Module C02 Chemical bonding.

Section: 02.02

Topic: Atoms and molecules

Topic: Chemical bonding

20. The atoms of the isotopes of a particular element vary in the number of

- A. electrons.
- B. protons.
- C. neutrons.**
- D. nuclei.
- E. electron shells.

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Objective: C01.01c Explain how ions and isotopes are produced by changing the relative number of specific subatomic particles with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

## True / False Questions

21. Sodium and chloride ions readily combine because they have opposite charges.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C01.01c Explain how ions and isotopes are produced by changing the relative number of specific subatomic particles with respect to the structure of an atom.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

22. An atom that has gained or lost electrons is called an ion.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.01c Explain how ions and isotopes are produced by changing the relative number of specific subatomic particles with respect to the structure of an atom.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

### Fill in the Blank Questions

23. Atoms that gain or lose electrons become electrically charged and are called \_\_\_\_\_.

**ions**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.01c Explain how ions and isotopes are produced by changing the relative number of specific subatomic particles with respect to the structure of an atom.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

24. The type of chemical bond formed when atoms share electrons is called \_\_\_\_\_.

**covalent**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.*

*HAPS Topic: Module C02 Chemical bonding.*

*Section: 02.02*

*Topic: Chemical bonding*

### Multiple Choice Questions

25. The first electron shell of an atom can hold a maximum of

- A. 1 electron.
- B.** 2 electrons.
- C. 4 electrons.
- D. 8 electrons.
- E. 16 electrons.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

### True / False Questions

26. A covalent bond is formed by two atoms that share electrons.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.*

*HAPS Topic: Module C02 Chemical bonding.*

*Section: 02.02*

*Topic: Chemical bonding*

27. The molecular formula for compounds like sodium chloride (NaCl) give the relative amounts of each element present.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

### Multiple Choice Questions

28. The formula H<sub>2</sub>O means
- A. an atom contains 2 hydrogen molecules and 1 oxygen molecule.
  - B. an atom contains 1 hydrogen atom and 2 oxygen molecules.
  - C. a molecule contains 2 hydrogen atoms and 1 oxygen atom.**
  - D. a molecule contains 1 hydrogen atom and 2 oxygen atoms.
  - E. a molecule contains 2 hydrogen atoms and no oxygen atoms.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

### True / False Questions

29. If two pairs of electrons are shared, the resulting bond is called a double covalent bond.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.*

*HAPS Topic: Module C02 Chemical bonding.*

*Section: 02.02*

*Topic: Chemical bonding*

### Fill in the Blank Questions

30. The type of chemical bond formed when ions with opposite electrical charges are attracted to one another is called \_\_\_\_\_.

**ionic**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.*

*HAPS Topic: Module C02 Chemical bonding.*

*Section: 02.02*

*Topic: Chemical bonding*

### Multiple Choice Questions

31. The attraction of the positive hydrogen end of a polar molecule to the negative nitrogen or oxygen end of another polar molecule is called a(an)
- A. ionic bond.
  - B. double bond.
  - C. triple bond.
  - D.** hydrogen bond.
  - E. covalent bond.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.*

*HAPS Topic: Module C02 Chemical bonding.*

*Section: 02.02*

*Topic: Chemical bonding*

### True / False Questions

32. When two or more atoms bond, they form a new kind of particle called a molecule.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

### Fill in the Blank Questions

33. When atoms of different elements bond, they form molecules called \_\_\_\_\_.

**compounds**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

### True / False Questions

34. A molecule of a compound always contains definite kinds and numbers of atoms.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

35. Water is an example of a compound.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Atoms and molecules*

36. A molecular formula represents the numbers and types of atoms in a molecule.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

### Fill in the Blank Questions

37. A \_\_\_\_\_ formula shows how atoms are joined and arranged in various molecules.

**structural**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

### True / False Questions

38. If the bonds of a reactant molecule break so that simpler molecules, atoms or ions form, the reaction is an exchange reaction.

**FALSE**

*Accessibility: Keyboard Navigation*

Bloom's Level: 2. Understand  
HAPS Objective: C04.03 Define and give examples of dehydration synthesis and hydrolysis reactions.  
HAPS Topic: Module C02 Chemical bonding.  
Section: 02.02  
Topic: Chemical bonding

### Fill in the Blank Questions

39. A \_\_\_\_\_ reaction is symbolized as  $A+B \rightarrow AB$ .

**synthesis**

Accessibility: Keyboard Navigation  
Bloom's Level: 2. Understand  
HAPS Objective: C04.03 Define and give examples of dehydration synthesis and hydrolysis reactions.  
HAPS Topic: Module C01 Atoms and molecules.  
HAPS Topic: Module C02 Chemical bonding.  
Section: 02.02  
Topic: Atoms and molecules  
Topic: Chemical bonding

40. A \_\_\_\_\_ reaction is symbolized as  $AB \rightarrow A+B$ .

**decomposition**

Accessibility: Keyboard Navigation  
Bloom's Level: 2. Understand  
HAPS Objective: C04.03 Define and give examples of dehydration synthesis and hydrolysis reactions.  
HAPS Topic: Module C01 Atoms and molecules.  
HAPS Topic: Module C02 Chemical bonding.  
Section: 02.02  
Topic: Atoms and molecules  
Topic: Chemical bonding

### Multiple Choice Questions

41. A chemical reaction in which pairs of two different molecules trade positions is called a(an) \_\_\_\_\_ reaction.

- A. decomposition
- B. exchange**
- C. reversible
- D. synthesis
- E. irreversible

Accessibility: Keyboard Navigation  
Bloom's Level: 2. Understand  
HAPS Topic: Module C01 Atoms and molecules.  
HAPS Topic: Module C02 Chemical bonding.  
Section: 02.02  
Topic: Atoms and molecules  
Topic: Chemical bonding

## True / False Questions

42. When two or more atoms (reactants) bond to form a more complex structure (product) the reaction is called synthesis.

**TRUE**

Accessibility: Keyboard Navigation  
Bloom's Level: 2. Understand  
HAPS Objective: C04.03 Define and give examples of dehydration synthesis and hydrolysis reactions.  
HAPS Topic: Module C01 Atoms and molecules.  
HAPS Topic: Module C02 Chemical bonding.  
Section: 02.02  
Topic: Atoms and molecules  
Topic: Chemical bonding

## Fill in the Blank Questions

43. The opposite of a decomposition reaction is called a \_\_\_\_\_ reaction.

**synthesis**

Accessibility: Keyboard Navigation  
Bloom's Level: 1. Remember  
HAPS Objective: C04.03 Define and give examples of dehydration synthesis and hydrolysis reactions.  
HAPS Topic: Module C01 Atoms and molecules.  
HAPS Topic: Module C02 Chemical bonding.  
Section: 02.02  
Topic: Atoms and molecules  
Topic: Chemical bonding

## Multiple Choice Questions

44. A decomposition reaction can be symbolized as \_\_\_\_\_.

- A.  $A+B \rightarrow C+D$   
B.  $A+B \rightarrow AB$   
**C.  $AB \rightarrow A+B$**   
D.  $C+D \rightarrow AB$   
E.  $AB + CD \rightarrow AC + BD$

Accessibility: Keyboard Navigation  
Bloom's Level: 2. Understand  
HAPS Objective: C04.03 Define and give examples of dehydration synthesis and hydrolysis reactions.  
HAPS Topic: Module C01 Atoms and molecules.  
HAPS Topic: Module C02 Chemical bonding.  
Section: 02.02

### True / False Questions

45. A pH value indicates the hydrogen ion concentration in solutions, including body fluids.

**TRUE**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Section: 02.02

Topic: Inorganic compounds and solutions

### Fill in the Blank Questions

46. pH is a measure of \_\_\_\_\_ ion concentration.

**hydrogen**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Section: 02.02

Topic: Inorganic compounds and solutions

### True / False Questions

47. The pH scale ranges from 0 to 14.

**TRUE**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Section: 02.02

Topic: Inorganic compounds and solutions

### Fill in the Blank Questions

48. A pH of \_\_\_\_\_ is the midpoint of the pH scale and signifies equal numbers of hydrogen and hydroxide ions.

7 or  
7

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.*

*HAPS Objective: C03.05 State acidic, neutral, and alkaline pH values.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Inorganic compounds and solutions*

49. A solution that contains more hydrogen ions than hydroxide ions is \_\_\_\_\_.

**acidic**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Inorganic compounds and solutions*

## Multiple Choice Questions

50. Which term describes a solution that contains more hydroxide ions than hydrogen ions?

- A.** basic
- B. neutral
- C. low pH
- D. acidic
- E. None of the above

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Inorganic compounds and solutions*

51. Each whole number on the pH scale represents a \_\_\_\_\_ - fold difference in hydrogen ion concentration.

- A. 15
- B. 100
- C. 20
- D.** 10
- E. 2

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.*

52. As hydrogen ion concentration increases, the pH number

- A. gets.
- B. gets smaller.**
- C. stays the same.
- D. becomes negative.
- E. approaches 14.

Accessibility: Keyboard Navigation

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Objective: C03.05 State acidic, neutral, and alkaline pH values.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Section: 02.02

Topic: Inorganic compounds and solutions

53. A solution that has a pH of 6 has ten times the hydrogen ion concentration of a solution with a pH of

- A. 7.**
- B. 5.
- C. 8.
- D. 2.
- E. 0.6.

Accessibility: Keyboard Navigation

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Section: 02.02

Topic: Inorganic compounds and solutions

### True / False Questions

54. A substance that releases hydrogen ions in water is a base.

**FALSE**

Accessibility: Keyboard Navigation

Bloom's Level: 2. Understand

HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.

HAPS Topic: Module C03 Inorganic compounds and solutions.

Section: 02.02

Topic: Inorganic compounds and solutions

### Fill in the Blank Questions

55. An \_\_\_\_\_ is defined as a substance that ionizes in water.

**electrolyte**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes and radioisotopes.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Inorganic compounds and solutions*

### True / False Questions

56. An acid is defined as an electrolyte that releases hydroxide ions (OH<sup>-</sup>) in water.

**FALSE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Inorganic compounds and solutions*

### Multiple Choice Questions

57. A person has alkalosis if the blood pH

- A. rises above 7.0.
- B. drops below 7.0.
- C.** rises above 7.4.
- D. drops below 7.4.
- E. steadily decreases.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*HAPS Objective: C03.05 State acidic, neutral, and alkaline pH values.*

*Section: 02.02*

*Topic: Inorganic compounds and solutions*

58. As a group, compounds that release ions when they dissolve in water are called

- A. acids.
- B. bases.
- C. salts.
- D.** electrolytes.
- E. solvents.

*Accessibility: Keyboard Navigation*

Bloom's Level: 1. Remember  
HAPS Topic: Module C03 Inorganic compounds and solutions.  
Section: 02.02  
Topic: Inorganic compounds and solutions

59. Chemicals that resist changes in pH are called

- A. buffers.
- B. electrolytes.
- C. acids.
- D. bases.
- E. none of the above.

Accessibility: Keyboard Navigation  
Bloom's Level: 1. Remember  
HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.  
HAPS Topic: Module C03 Inorganic compounds and solutions.  
Section: 02.02  
Topic: Inorganic compounds and solutions

### True / False Questions

60. Buffers combine with hydrogen ions when  $H^+$  is in excess or they donate hydroxide ions when  $H^+$  is depleted.

**FALSE**

Accessibility: Keyboard Navigation  
Bloom's Level: 2. Understand  
HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.  
HAPS Topic: Module C03 Inorganic compounds and solutions.  
Section: 02.02  
Topic: Inorganic compounds and solutions

### Fill in the Blank Questions

61. \_\_\_\_\_ are chemicals that resist changes in pH.

**Buffers**

Accessibility: Keyboard Navigation  
Bloom's Level: 2. Understand  
HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.  
HAPS Topic: Module C03 Inorganic compounds and solutions.  
Section: 02.02  
Topic: Inorganic compounds and solutions

## True / False Questions

62. A salt is a compound composed of oppositely charged ions.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C03.03 Define the term salt and give examples of physiological significance.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Inorganic compounds and solutions*

## Multiple Choice Questions

63. At the cellular level of organization, biology becomes the study of

- A. organs.
- B.** chemistry.
- C. tissues.
- D. organ systems.
- E. human populations.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.03*

*Topic: Atoms and molecules*

64. Which of the following chemicals is NOT an inorganic substance?

- A. water
- B.** protein
- C. sodium chloride
- D. carbon dioxide
- E. oxygen

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*HAPS Objective: C04.01 Define the term organic molecule.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.03*

*Topic: Inorganic compounds and solutions*

*Topic: Organic compounds*

## True / False Questions

65. Many inorganic substances dissociate in water to release ions.

**TRUE**

*Accessibility: Keyboard Navigation  
Bloom's Level: 2. Understand  
HAPS Topic: Module C03 Inorganic compounds and solutions.  
Section: 02.03  
Topic: Inorganic compounds and solutions*

### Fill in the Blank Questions

66. Organic substances always contain the elements hydrogen and \_\_\_\_\_.

**carbon**

*Accessibility: Keyboard Navigation  
Bloom's Level: 1. Remember  
HAPS Objective: C04.01 Define the term organic molecule.  
HAPS Topic: Module C04 Organic compounds.  
Section: 02.03  
Topic: Organic compounds*

### Multiple Choice Questions

67. Inorganic substances that usually dissociate in water are called

- A. organic compounds.
- B. non-electrolytes.
- C. electrolytes.**
- D. lipids.
- E. carbohydrates.

*Accessibility: Keyboard Navigation  
Bloom's Level: 1. Remember  
HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes and radioisotopes.  
HAPS Topic: Module C03 Inorganic compounds and solutions.  
Section: 02.03  
Topic: Inorganic compounds and solutions*

### True / False Questions

68. Water accounts for 2/3 of the weight of an adult human.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*  
*HAPS Objective: C03.01 Discuss the physiologically important properties of water.*  
*Section: 02.03*

### Fill in the Blank Questions

69. \_\_\_\_\_ is the most abundant compound in living material.

**Water**

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*HAPS Objective: C03.01 Discuss the physiologically important properties of water.*  
*Section: 02.03*

### Multiple Choice Questions

70. Carbon dioxide is

- A. inhaled in large quantities from the environment.
- B.** a waste product of metabolic processes.
- C. an element.
- D. a salt.
- E. an electrolyte.

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*HAPS Objective: C11.01 Define the term cellular respiration.*  
*HAPS Topic: Module C11 Cellular respiration.*  
*Section: 02.03*  
*Topic: Cellular respiration*

### True / False Questions

71. Certain cellular organelles use oxygen to release energy from glucose.

**TRUE**

*Accessibility: Keyboard Navigation*  
*Bloom's Level: 1. Remember*  
*HAPS Objective: C11.01 Define the term cellular respiration.*  
*HAPS Topic: Module C11 Cellular respiration.*  
*Section: 02.03*  
*Topic: Cellular respiration*

## Multiple Choice Questions

72. Which of the following is NOT organic?

- A. A carbohydrate
- B. A protein
- C. A lipid
- D. Carbon dioxide**
- E. A nucleic acid

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*HAPS Objective: C04.01 Define the term organic molecule.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.03*

*Topic: Organic compounds*

73. The different types of carbohydrates do NOT include

- A. monosaccharides.
- B. disaccharides.
- C. proteins.**
- D. polysaccharides.
- E. glucose.

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.03*

*Topic: Organic compounds*

## True / False Questions

74. The building blocks of fat molecules are amino acids.

**FALSE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.03*

*Topic: Organic compounds*

## Fill in the Blank Questions

75. \_\_\_\_\_ are lipids used primarily to store energy for cellular activities.

**Fats**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.*

*HAPS Objective: C04.04e Discuss physiological and structural roles in the human body of carbohydrates, proteins, lipids and nucleic acids.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.03*

*Topic: Organic compounds*

### **True / False Questions**

76. Cholesterol is a protein.

**FALSE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.03*

*Topic: Organic compounds*

77. Steroid molecules have four connected rings of carbon atoms.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.03*

*Topic: Organic compounds*

78. The building blocks of proteins are amino acids.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.03*

*Topic: Organic compounds*

### **Fill in the Blank Questions**

79. \_\_\_\_\_ are the building blocks of nucleic acids.

**Nucleotides**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C04.04a Identify the monomers and polymers of carbohydrates, proteins, lipids and nucleic acids.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.03*

*Topic: Organic compounds*

**True / False Questions**

80. Proteins include DNA and RNA.

**FALSE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C04.04c Provide specific examples of carbohydrates, proteins, lipids and nucleic acids.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.03*

*Topic: Organic compounds*

**Multiple Choice Questions**

81. Neutrons are located in the \_\_\_\_\_ of an atom and they have a "charge" that is \_\_\_\_\_.

- A. nucleus, negative
- B.** nucleus, neutral
- C. shells, negative
- D. nucleus, positive

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

82. Electrons are located in the \_\_\_\_\_ of an atom and they have a "charge" that is \_\_\_\_\_.

- A. nucleus, negative
- B. nucleus, neutral
- C.** shells, negative
- D. nucleus, positive

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

83. Protons are located in the \_\_\_\_\_ of an atom and they have a "charge" that is \_\_\_\_\_.

- A. nucleus, negative
- B. nucleus, neutral
- C. shells, negative
- D.** nucleus, positive

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

84. The branch of science that deals with the composition of matter is \_\_\_\_\_.

- A. histology
- B.** chemistry
- C. physiology
- D. biology
- E. cytology

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.03 Compare and contrast the terms atoms, molecules, elements, and compounds.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.01*

*Topic: Atoms and molecules*

## True / False Questions

85. Carbon, oxygen, sodium and hydrogen compose over 95% (by weight) of the human body.

**FALSE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C04.01 Define the term organic molecule.*

*HAPS Objective: C04.04b Compare and contrast general molecular structure of carbohydrates, proteins, lipids and nucleic acids.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.02*

*Topic: Organic compounds*

86. Atoms of different elements vary in size, weight and ways they interact with atoms or different elements.

**TRUE**

Accessibility: Keyboard Navigation

Bloom's Level: 2. Understand

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atom's chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

87. Protons are the subatomic particles that determine an atom's bonding behavior.

**FALSE**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atom's chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

88. Protons and electrons are similar in size.

**FALSE**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

## Fill in the Blank Questions

89. The number of protons plus the number of \_\_\_\_\_ is approximately equal to the atomic weight.

**neutrons**

Accessibility: Keyboard Navigation

Bloom's Level: 2. Understand

HAPS Objective: C01.01d Distinguish among the terms atomic number, mass number and atomic weight with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

## True / False Questions

90. All isotopes of an element have the same number of electrons.

**TRUE**

Accessibility: Keyboard Navigation

Bloom's Level: 3. Apply

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes and radioisotopes.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

### Fill in the Blank Questions

91. Of the three common forms of radiation, \_\_\_\_\_ radiation is most penetrating and similar to X-rays.

**gamma**

Accessibility: Keyboard Navigation

Bloom's Level: 2. Understand

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes and radioisotopes.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

92. In an atom, the first shell contains a maximum of \_\_\_\_\_ electrons.

**2 or  
two**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atom's chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

93. In an atom, the second shell contains a maximum of \_\_\_\_\_ electrons.

**8 or  
eight**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atom's chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

94. The chemical behavior of atoms results from interactions among their \_\_\_\_\_.

**electrons**

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.01b Relate the number of electrons in an electron shell to an atom's chemical stability and its ability to form chemical bonds with respect to the structure of an atom.

HAPS Topic: Module C01 Atoms and molecules.

## Multiple Choice Questions

95. Atoms that lose or gain electrons become electrically charged particles called \_\_\_\_\_.

- A.** ions
- B. molecules
- C. protons
- D. isotopes
- E. radioisotopes

Accessibility: Keyboard Navigation

Bloom's Level: 1. Remember

HAPS Objective: C01.02 Compare and contrast the terms ions, electrolytes, free radicals, isotopes and radioisotopes.

HAPS Topic: Module C01 Atoms and molecules.

Section: 02.02

Topic: Atoms and molecules

96. When atoms form bonds by sharing electrons, the bond formed is a type of \_\_\_\_\_ bond.

- A. ionic
- B.** covalent
- C. van der Waals
- D. hydrogen

Accessibility: Keyboard Navigation

Bloom's Level: 3. Apply

HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Topic: Module C02 Chemical bonding.

Section: 02.02

Topic: Chemical bonding

97. In a water molecule, shared electrons spend more time at the oxygen pole than the hydrogen pole, an example of \_\_\_\_\_ bonds.

- A.** polar covalent
- B. non-polar covalent
- C. ionic
- D. hydrogen

Accessibility: Keyboard Navigation

Bloom's Level: 3. Apply

HAPS Objective: C02.01b Explain the mechanism of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.

HAPS Topic: Module C02 Chemical bonding.

Section: 02.02

Topic: Chemical bonding

## Fill in the Blank Questions

98. The smallest subatomic particle is the \_\_\_\_\_.

**electron**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 1. Remember*

*HAPS Objective: C01.01a Describe the charge, mass, and relative location of electrons, protons and neutrons with respect to the structure of an atom.*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

99.  $FX \rightarrow F + X$  is an example of a \_\_\_\_\_ reaction.

**decomposition**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

100.  $X + Y \rightarrow XY$  is an example of a \_\_\_\_\_ reaction.

**synthesis**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

101. In \_\_\_\_\_ reactions, parts of one molecule can be removed and added to a different molecule.

**exchange**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Topic: Module C01 Atoms and molecules.*

*Section: 02.02*

*Topic: Atoms and molecules*

## Multiple Choice Questions

102. Collectively, these bonds are responsible for the surface tension of water, but individually they are weak bonds.

- A. ionic
- B. covalent
- C. hydrogen**
- D. peptide
- E. disulfide

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C02.01a List each type of bond in order by relative strength with respect to non-polar covalent, polar covalent, ionic, and hydrogen bonds.*

*HAPS Objective: C02.01c Provide biologically significant examples of each type of non-polar covalent, polar covalent, ionic, and hydrogen bonds.*

*HAPS Objective: C03.01 Discuss the physiologically important properties of water.*

*HAPS Topic: Module C02 Chemical bonding.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Topic: Chemical bonding*

*Topic: Inorganic compounds and solutions*

103. If solution A has a pH of 6 and solution B has a pH of 3, then \_\_\_\_\_.

- A. solution B has 3 times more  $H^+$  than A
- B. solution B has 3 times less  $H^+$  than A
- C. solution B has 30 times more  $H^+$  than A
- D. solution B has 1000 times more  $H^+$  than A**
- E. solution B has 1000 times less  $H^+$  than A

*Accessibility: Keyboard Navigation*

*Bloom's Level: 4. Analyze*

*HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Inorganic compounds and solutions*

### Fill in the Blank Questions

104. \_\_\_\_\_ are chemicals that resist pH changes.

**buffers**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Inorganic compounds and solutions*

105. Normal blood pH range is \_\_\_\_\_.

**7.35 - 7.45**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 2. Understand*

*HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Inorganic compounds and solutions*

### **True / False Questions**

106. As the concentration of hydrogen ions increases, a solution's pH decreases.

**TRUE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*HAPS Objective: C03.04 Define the terms pH, acid, base, and buffer and give examples of physiological significance.*

*HAPS Objective: C03.05 State acidic, neutral, and alkaline pH values.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*Section: 02.02*

*Topic: Inorganic compounds and solutions*

107. Water, salts, oxygen and proteins are all examples of inorganic substances.

**FALSE**

*Accessibility: Keyboard Navigation*

*Bloom's Level: 3. Apply*

*HAPS Objective: C03.01 Discuss the physiologically important properties of water.*

*HAPS Objective: C04.01 Define the term organic molecule.*

*HAPS Topic: Module C03 Inorganic compounds and solutions.*

*HAPS Topic: Module C04 Organic compounds.*

*Section: 02.03*

*Topic: Inorganic compounds and solutions*

*Topic: Organic compounds*