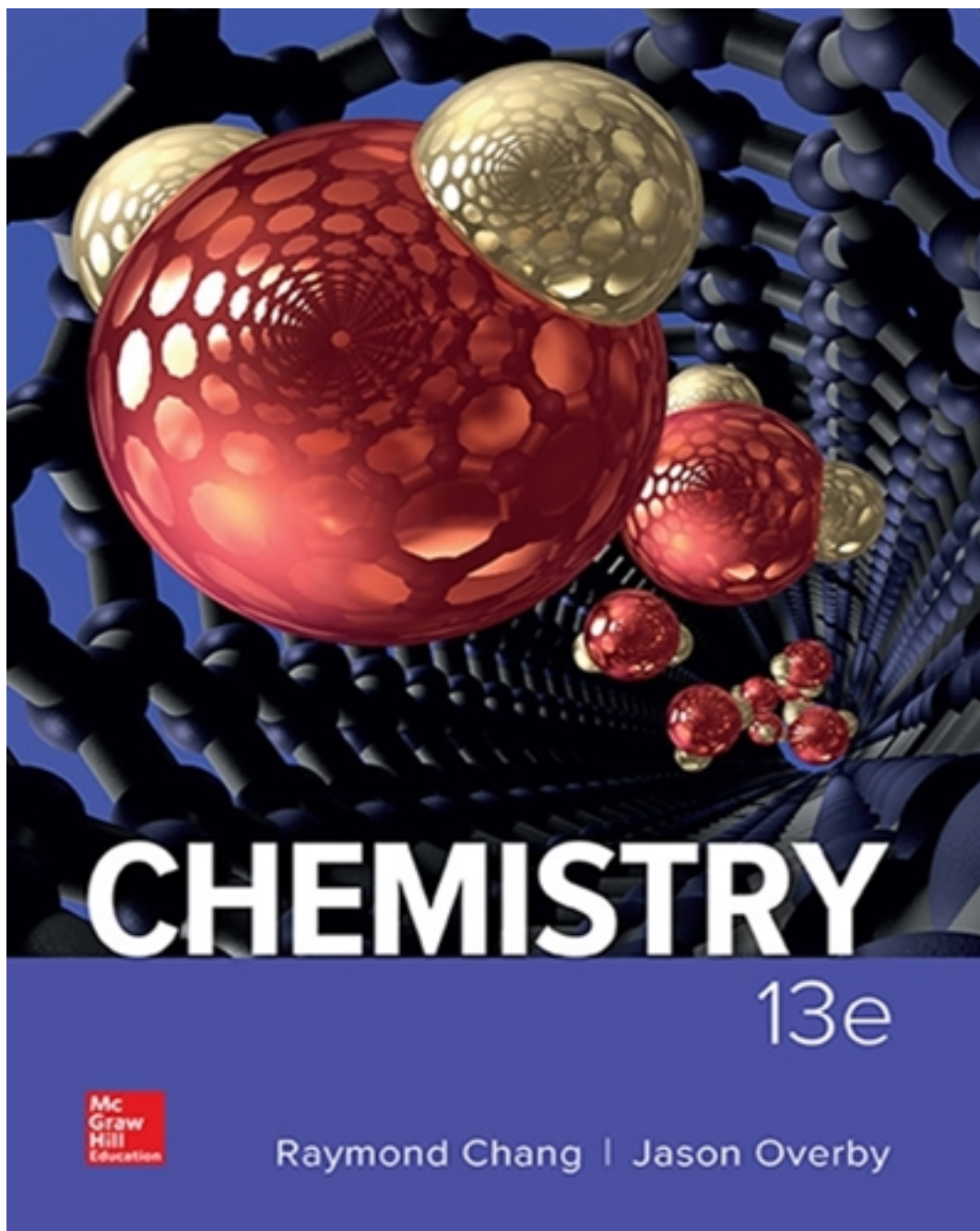


# Test Bank for Chemistry 13th Edition by Chang

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# Test Bank

## Chapter 02 Atoms, Molecules, and Ions

### Multiple Choice Questions

1.

In a cathode ray tube

- A. electrons pass from the anode to the cathode.
- B.** electrons pass from the cathode to the anode.
- C. protons pass from the anode to the cathode.
- D. protons pass from the cathode to the anode.

*Bloom's Level: 4. Analyze*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.02*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

2. The scientist who determined the magnitude of the electric charge of the electron was

- A. John Dalton.
- B.** Robert Millikan.
- C. J. J. Thomson.
- D. Henry Moseley.
- E. R. Chang.

*Bloom's Level: 1. Remember*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.02*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

3. When J. J. Thomson discovered the electron, what physical property of the electron did he measure?

- A. its charge,  $e$
- B.** its charge-to-mass ratio,  $e/m$
- C. its temperature,  $T$
- D. its mass,  $m$
- E. its atomic number,  $Z$

*Bloom's Level: 4. Analyze*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.02*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

4. Which of the following scientists developed the nuclear model of the atom?

- A. John Dalton
- B. Robert Millikan
- C. J. J. Thomson
- D. Henry Moseley
- E.** Ernest Rutherford

*Bloom's Level: 1. Remember*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.02*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

5. Rutherford's experiment with alpha particle scattering by gold foil established that

- A.** protons are not evenly distributed throughout an atom.
- B. electrons have a negative charge.
- C. electrons have a positive charge.
- D. atoms are made of protons, neutrons, and electrons.
- E. protons are 1840 times heavier than electrons.

*Bloom's Level: 4. Analyze*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.02*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

6. Atoms of the same element with different mass numbers are called
- A. ions.
  - B. neutrons.
  - C. allotropes.
  - D. chemical families.
  - E. isotopes.**

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

7. An atom of the isotope  $^{137}\text{Ba}$  consists of how many protons (p), neutrons (n), and electrons (e)?
- A. 56 p, 137 n, 56 e
  - B. 56 p, 81 n, 56 e**
  - C. 137 p, 81 n, 56 e
  - D. 56 p, 56 n, 56 e
  - E. 81 p, 56 n, 81 e

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

8. Give the number of protons (p), neutrons (n), and electrons (E) in one atom of  $^{238}\text{U}$ .
- A. 146 p, 92 n, 92 e
  - B. 92 p, 92 n, 92 e
  - C. 92 p, 146 n, 92e**
  - D. 146 p, 28 n, 146 e
  - E. 238 p, 146 n, 238 e

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

9. Which of the following are isotopes?

- A.  $^{14}\text{C}$  and  $^{13}\text{C}$
- B.  $^{14}\text{C}$  and  $^{14}\text{N}$
- C.  $^{14}\text{N}$  and  $^{14}\text{N}^{3-}$
- D.  $^{12}\text{C}$  and  $^{12}\text{CO}$
- E.  $^{14}\text{N}$  and  $^{14}\text{N}_2$

*Bloom's Level: 4. Analyze*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

10.

Complete the following chart, in order from left to right

Isotope	Mass Number	Protons	Neutrons	Electrons
$^{14}\text{N}$				

- A. 14, 7, 7, 7
- B. 14, 7, 14, 7
- C. 7, 7, 7, 7
- D. 7, 14, 7, 7
- E. Some other answer

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

11.

Complete the following chart, in order from left to right

Isotope	Mass Number	Protons	Neutrons	Electrons
	40	19		19

- A.  $^{40}\text{Zr}$ , 21
- B.  $^{19}\text{K}$ , 40
- C.  $^{21}\text{K}$ , 19
- D.**  $^{40}\text{K}$ , 21
- E.  $^{38}\text{Sr}$ , 19

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

12.

Complete the following chart, in order from left to right

Isotope	Mass Number	Protons	Neutrons	Electrons
		40	57	40

- A.**  $^{97}\text{Zr}$ , 97
- B.  $^{40}\text{Zr}$ , 57
- C.  $^{57}\text{La}$ , 40
- D.  $^{97}\text{Bk}$ , 80
- E.  $^{80}\text{Hg}$ , 97

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

13.

Complete the following chart, in order from left to right

Ion	Mass Number	Protons	Neutrons	Electrons
$^{40}\text{Ca}^{2+}$				

- A. 40, 20, 20, 20
- B.** 40, 20, 20, 18
- C. 20, 20, 40, 20
- D. 40, 20, 20, 22
- E. 20, 40, 20, 22

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

14.

Complete the following chart, in order from left to right

Ion	Mass Number	Protons	Neutrons	Electrons
	4	2		0

- A.**  $^4\text{He}$ , 2
- B.  $^4\text{Be}$ , 4
- C.  $^4\text{Be}$ , 2
- D.  $^4\text{He}$ , 4
- E.  $^2\text{H}$ , 2

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

15. The elements in a column of the periodic table are known as

- A. metalloids.
- B. a period.
- C. noble gases.
- D.** a group.
- E. nonmetals.

*Bloom's Level: 1. Remember*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.04*

*Subtopic: Elements and the Periodic Table*

*Topic: Components of Matter*

16. Which of the following elements is most likely to be a good conductor of electricity?

- A. N
- B. S
- C. He
- D. Cl
- E.** Fe

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.04*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

17. Which of the following elements is chemically similar to magnesium?

- A. sulfur
- B.** calcium
- C. iron
- D. nickel
- E. potassium

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.04*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

18. Which of the following elements is chemically similar to oxygen?

- A. sulfur
- B. calcium
- C. iron
- D. nickel
- E. sodium

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.04*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

19. Which of the following elements is chemically similar to potassium?

- A. calcium
- B. arsenic
- C. phosphorus
- D. cerium
- E. cesium

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.04*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

20. An *anion* is defined as

- A. a charged atom or group of atoms with a net negative charge.
- B. a stable atom.
- C. a group of stable atoms.
- D. an atom or group of atoms with a net positive charge.

*Bloom's Level: 1. Remember*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.05*

*Subtopic: Molecules and Ions*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

21. Which one of the following is an ion?

- A.** B<sup>3+</sup>
- B. NaCl
- C. He
- D. <sup>14</sup>C
- E. none of the above

*Bloom's Level: 4. Analyze*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.05*  
*Subtopic: Molecules and Ions*  
*Topic: Components of Matter*

22. Which one of the following elements is most likely to form a 2+ ion?

- A.** calcium
- B. carbon
- C. fluorine
- D. oxygen
- E. sodium

*Bloom's Level: 4. Analyze*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.05*  
*Subtopic: Molecules and Ions*  
*Topic: Components of Matter*

23. Which one of the following elements is most likely to form a 2- ion?

- A. scandium
- B.** selenium
- C. silicon
- D. strontium
- E. iodine

*Bloom's Level: 4. Analyze*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.05*  
*Subtopic: Molecules and Ions*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

24. A magnesium ion,  $\text{Mg}^{2+}$ , has
- A. 12 protons and 13 electrons.
  - B. 24 protons and 26 electrons.
  - C.** 12 protons and 10 electrons.
  - D. 24 protons and 22 electrons.
  - E. 12 protons and 14 electrons.

*Bloom's Level: 4. Analyze*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.05*  
*Subtopic: Molecules and Ions*  
*Topic: Components of Matter*

25. An aluminum ion,  $\text{Al}^{3+}$ , has:
- A. 13 protons and 13 electrons
  - B. 27 protons and 24 electrons
  - C. 16 protons and 13 electrons
  - D.** 13 protons and 10 electrons
  - E. 10 protons and 13 electrons

*Bloom's Level: 4. Analyze*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.05*  
*Subtopic: Molecules and Ions*  
*Topic: Components of Matter*

26. An oxide ion,  $\text{O}^{2-}$ , has:
- A.** 8 protons and 10 electrons
  - B. 10 protons and 8 electrons
  - C. 8 protons and 9 electrons
  - D. 8 protons and 7 electrons
  - E. 10 protons and 7 electrons

*Bloom's Level: 4. Analyze*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.05*  
*Subtopic: Molecules and Ions*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

27. A phosphide ion has:
- A. 10 protons and 13 electrons
  - B. 12 protons and 15 electrons
  - C. 15 protons and 15 electrons
  - D.** 15 protons and 18 electrons
  - E. 18 protons and 21 electrons

*Bloom's Level: 4. Analyze*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.05*  
*Subtopic: Molecules and Ions*  
*Topic: Components of Matter*

28. An iron(II) ion has:
- A.** 24 electrons and a charge of 2+
  - B. 24 electrons and a charge of 2-
  - C. 26 electrons and a charge of 2+
  - D. 28 electrons and a charge of 2+
  - E. 28 electrons and a charge of 2-

*Bloom's Level: 4. Analyze*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.05*  
*Subtopic: Molecules and Ions*  
*Topic: Components of Matter*

29. How many protons and electrons are present in one  $\text{Br}^-$  ion?
- A. 35 p, 35 e
  - B. 80 p, 81 e
  - C. 35 p, 34 e
  - D.** 35 p, 36 e
  - E. 80 p, 34 e

*Bloom's Level: 4. Analyze*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.05*  
*Subtopic: Molecules and Ions*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

30.

What are the two different ions present in the compound CaS?

- A.  $\text{Ca}^+$ ,  $\text{S}^-$
- B.  $\text{Ca}^{2-}$ ,  $\text{S}^{2+}$
- C.  $\text{Ca}^-$ ,  $\text{S}^+$
- D.**  $\text{Ca}^{2+}$ ,  $\text{S}^{2-}$
- E. Ca, S

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.06*

*Subtopic: Molecules and Ions*

*Topic: Components of Matter*

31. What are the two different ions present in the compound  $\text{Na}_2\text{S}$ ?

- A.  $\text{Na}_2^+$ ,  $\text{S}^{2-}$
- B.**  $\text{Na}^+$ ,  $\text{S}^{2-}$
- C.  $\text{Na}^{2+}$ ,  $\text{S}^{2-}$
- D.  $\text{Na}^+$ ,  $\text{S}^-$
- E.  $\text{Na}^{2+}$ ,  $\text{S}^-$

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.06*

*Subtopic: Molecules and Ions*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

32. What are the two different ions present in the compound  $\text{Li}_3\text{N}$ ?

- A.**  $\text{Li}^+$ ,  $\text{N}^{3-}$
- B.  $\text{Li}_3^+$ ,  $\text{N}^-$
- C.  $\text{Li}_3^{3+}$ ,  $\text{N}^{3-}$
- D.  $\text{Li}^+$ ,  $\text{N}^-$
- E.  $\text{Li}^{3+}$ ,  $\text{N}^{3-}$

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.06*

*Subtopic: Molecules and Ions*

*Topic: Components of Matter*

33. What are the two different ions present in the compound  $\text{FeCl}_3$ ?

- A.  $\text{Fe}^{2+}$ ,  $\text{Cl}_3^-$
- B.  $\text{Fe}^{3+}$ ,  $\text{Cl}^{3-}$
- C.  $\text{Fe}^+$ ,  $\text{Cl}^-$
- D.**  $\text{Fe}^{3+}$ ,  $\text{Cl}^-$
- E.  $\text{Fe}^+$ ,  $\text{Cl}^-$

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.06*

*Subtopic: Molecules and Ions*

*Topic: Components of Matter*

34. What are the ions present in the compound  $\text{CO}_2$ ?

- A.  $\text{C}^{4+}$ ,  $2 \text{O}^{2-}$
- B.  $\text{C}^{2+}$ ,  $2 \text{O}^-$
- C.  $\text{C}^{2+}$ ,  $\text{O}^{2-}$
- D.  $\text{C}^{2+}$ ,  $\text{O}_2^{2-}$
- E.** no ions present

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.06*

*Subtopic: Molecules and Ions*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

35. What are the ions present in the compound  $\text{CH}_4$ ?

- A.  $\text{C}^{4+}$ ,  $\text{H}^+$
- B.  $\text{C}^{4-}$ ,  $\text{H}^+$
- C.  $\text{C}^-$ ,  $\text{H}^+$
- D.  $\text{C}^{4-}$   $\text{H}^{4+}$
- E.** no ions present

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.06*

*Subtopic: Molecules and Ions*

*Topic: Components of Matter*

36. Which of the following is an example of an empirical formula?

- A.  $\text{C}_9\text{H}_{12}$
- B.**  $\text{C}_9\text{H}_{18}\text{Cl}_2$
- C.  $\text{C}_6\text{H}_6$
- D.  $\text{N}_2\text{O}_4$
- E.  $\text{C}_2\text{H}_2\text{O}_2$

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.06*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

37. What is the empirical formula for  $\text{C}_{10}\text{H}_{22}\text{O}_2$ ?

- A.  $\text{C}_{10}\text{H}_{22}\text{O}_2$
- B.**  $\text{C}_5\text{H}_{11}\text{O}$
- C.  $\text{C}_{20}\text{H}_{44}\text{O}_4$
- D.  $\text{C}_2\text{H}_{11}\text{O}$
- E.  $\text{C}_5\text{H}_{11}\text{O}_2$

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.06*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

38. What is the empirical formula for  $C_6H_{14}O$ ?

- A.**  $C_6H_{14}O$
- B.  $C_3H_7O$
- C.  $C_2H_7O$
- D.  $C_{12}H_{28}O_2$
- E. CHO

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.06*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

39. What is the ion  $ClO_4^-$  named?

- A. chloride ion
- B. chlorite ion
- C. hypochlorite ion
- D. perchlorite ion
- E.** perchlorate ion

*Bloom's Level: 1. Remember*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

40. What is the formula for the ionic compound containing calcium ions and nitrate ions?

- A.  $Ca_3N_2$
- B.**  $Ca(NO_3)_2$
- C.  $Ca_2NO_3$
- D.  $Ca_2NO_2$
- E.  $CaNO_3$

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

41. What is the formula for the ionic compound containing calcium ions and oxide ions?

- A.** CaO
- B. Ca<sub>2</sub>O
- C. CaO<sub>2</sub>
- D. Ca<sub>3</sub>O
- E. CaO<sub>3</sub>

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

42. What is the formula for the ionic compound containing iron (III) ions and iodide ions?

- A. FeI
- B. Fe<sub>2</sub>I
- C. FeI<sub>2</sub>
- D.** FeI<sub>3</sub>
- E. Fe<sub>3</sub>I

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

43. What is the formula for the ionic compound containing sodium ions and nitride ions?

- A. NaN
- B. Na<sub>2</sub>N
- C. NNa<sub>2</sub>
- D.** Na<sub>3</sub>N
- E. NNa<sub>3</sub>

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

44. What is the formula for the ionic compound containing barium ions and sulfate ions?

- A.** BaSO<sub>4</sub>
- B. Ba<sub>2</sub>SO<sub>4</sub>
- C. BaS
- D. Ba(SO<sub>4</sub>)<sub>2</sub>
- E. Ba<sub>3</sub>S<sub>2</sub>

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

45. What are the two different ions present in the compound Al(NO<sub>3</sub>)<sub>3</sub>?

- A. Al<sup>3+</sup>, (NO<sub>3</sub>)<sub>3</sub><sup>-</sup>
- B. Al<sup>+</sup>, NO<sub>3</sub><sup>-</sup>
- C.** Al<sup>3+</sup>, NO<sub>3</sub><sup>-</sup>
- D. Al<sup>3+</sup>, NO<sub>3</sub><sup>3-</sup>
- E. Al<sup>+</sup>, (NO<sub>3</sub>)<sub>3</sub><sup>-</sup>

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

46. What are the two different ions present in the compound NH<sub>4</sub>NO<sub>3</sub>?

- A. NH<sub>4</sub><sup>-</sup>, NO<sub>3</sub><sup>+</sup>
- B.** NH<sub>4</sub><sup>+</sup>, NO<sub>3</sub><sup>-</sup>
- C. N<sup>3-</sup>, H<sup>+</sup>, O<sup>2-</sup>
- D. NH<sub>4</sub><sup>3+</sup>, NO<sup>4-</sup>
- E. NH<sub>4</sub><sup>+</sup>, NO<sup>3-</sup>

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

47. Which is the correct formula for iron(II) phosphate?

- A.  $\text{Fe}_2\text{PO}_4$
- B.  $\text{Fe}_3(\text{PO}_4)_2$**
- C.  $\text{Fe}_2\text{PO}_3$
- D.  $\text{Fe}(\text{PO}_4)_2$
- E.  $\text{Fe}(\text{PO}_3)_2$

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

48. Which of the following is the formula for hydroiodic acid?

- A.  $\text{HIO}_4$
- B.  $\text{HIO}_3$
- C.  $\text{HIO}_2$
- D.  $\text{HIO}$
- E.  $\text{HI}$**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

49. The formula for calcium phosphate is

- A.  $\text{CaPO}_4$ .
- B.  $\text{Ca}_3(\text{PO}_4)_2$ .**
- C.  $\text{Ca}_2(\text{PO}_4)_3$ .
- D.  $\text{Ca}_3\text{P}_2$ .
- E.  $\text{Ca}_3(\text{PO}_3)_2$ .

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

50. The formula for magnesium sulfate is

- A. MnS
- B. MgS
- C. MnSO<sub>3</sub>
- D.** MgSO<sub>4</sub>
- E. MgSO<sub>3</sub>

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

51. The formula for sodium sulfide is

- A. NaS.
- B. K<sub>2</sub>S.
- C. NaS<sub>2</sub>.
- D.** Na<sub>2</sub>S.
- E. SeS.

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

52. The name for NH<sub>4</sub>NO<sub>3</sub> is

- A.** ammonium nitrate.
- B. ammonium nitrogen trioxide.
- C. ammonia nitrogen oxide.
- D. hydrogen nitrogen oxide.
- E. hydrogen nitrate.

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

53. The name for  $\text{Ba}(\text{OH})_2$  is

- A. barium hydrogen oxide.
- B. boron hydroxide.
- C. barium hydrate.
- D. beryllium hydroxide.
- E.** barium hydroxide.

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

54. The name for  $\text{KHCO}_3$  is

- A. calcium bicarbonate.
- B. calcium carbonate.
- C. potassium carbonate.
- D. calcium hydrogen carbon trioxide.
- E.** potassium hydrogen carbonate.

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

55. The name for  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  is

- A. copper sulfate acid.
- B. copper sulfate pentahydrate.
- C. copper(II) sulfate acid.
- D.** copper(II) sulfate pentahydrate.
- E. copper(V) sulfate hydrate.

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

56. Give the formula for cobalt(II) chlorate dihydrate.

- A.  $\text{CoCl}_2 \cdot 2\text{H}_2\text{O}$
- B.  $\text{CoClO}_3(\text{H}_2\text{O})_2$
- C.  $\text{Co}(\text{ClO}_3)_2(\text{H}_2\text{O})_2$
- D.**  $\text{Co}(\text{ClO}_3)_2 \cdot 2\text{H}_2\text{O}$
- E.  $\text{Co}_2(\text{ClO}_3)_3 \cdot 2\text{H}_2\text{O}$

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

57. Name the compound  $\text{Co}(\text{NO}_3)_2$ .

- A. Cobalt (I) nitrate
- B.** Cobalt (II) nitrate
- C. Cobalt (I) nitride
- D. Cobalt nitrite
- E. Cobalt (II) nitride

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

58. Name the compound  $\text{CuSO}_4$ .

- A. Copper (I) sulfate
- B. Copper (I) sulfite
- C. Copper (II) sulfite
- D.** Copper (II) sulfate
- E. Copper (IV) sulfate

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

59. Name the compound  $\text{Al}_2\text{O}_3$ .

- A.** Aluminum oxide
- B. Aluminum (II) oxide
- C. Dialuminum trioxide
- D. Aluminum trioxide
- E. Aluminum (I) oxide

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

60. Which is the formula for lead(IV) chloride?

- A.  $\text{Pb}_4\text{Cl}$
- B.  $\text{PbCl}_2$
- C.  $\text{PbCl}_3$
- D.**  $\text{PbCl}_4$
- E.  $\text{Pb}_2\text{Cl}_4$

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

61. What type of compound is  $\text{Mg}(\text{NO}_3)_2$ ?

- A.** Ionic
- B. Molecular
- C. Acid
- D. Base
- E. Hydrate

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

62. What type of compound is  $\text{NH}_4\text{NO}_3$ ?

- A.** Ionic
- B. Molecular
- C. Acid
- D. Base
- E. Hydrate

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

63. What type of compound is  $\text{IF}_5$ ?

- A. Ionic
- B.** Molecular
- C. Acid
- D. Base
- E. Hydrate

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

64. What type of compound is  $\text{HBrO}_2$ ?

- A. Ionic
- B. Binary
- C.** Acid
- D. Base
- E. Hydrate

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

65. What type of compound is NaOH?

- A. Binary
- B. Molecular
- C. Acid
- D. Base**
- E. Hydrate

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

66. What type of compound is H<sub>2</sub>SO<sub>3</sub>?

- A. Ionic
- B. Binary
- C. Acid**
- D. Base
- E. Hydrate

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

67. What type of compound is NH<sub>3</sub>?

- A. Ionic
- B. Ternary
- C. Acid
- D. Base**
- E. Hydrate

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

68. Name the acid  $\text{H}_3\text{PO}_4$  (dissolved in water).

- A.** Phosphoric acid
- B. Phosphorous acid
- C. Hydrogen phosphate acid
- D. Hydrophosphate acid
- E. Hydrophosphoric acid

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

69. Name the acid  $\text{H}_2\text{SO}_3$  (dissolved in water).

- A. Sulfuric acid
- B.** Sulfurous acid
- C. Hydrosulfuric acid
- D. Persulfuric acid
- E. Hyposulfurous acid

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

70. The chemical formula for iron(II) nitrate is

A.  $\text{Fe}_2(\text{NO}_3)_3$ .

B.

$\text{Ir}(\text{NO}_2)_2$ .

C.  $\text{Fe}_2\text{N}_3$ .

**D.**  $\text{Fe}(\text{NO}_3)_2$ .

E.  $\text{Fe}(\text{NO}_2)_2$ .

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

71. Name the compound  $\text{Co}_2(\text{SO}_3)_3$ .

A. cobalt sulfate

B. cobalt(II) sulfite

C. cobalt(II) sulfate

**D.** cobalt(III) sulfite

E. cobalt(III) sulfate

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

72. Name the compound  $\text{CrO}_3$ .

- A. chromium oxide
- B. chromium(II) oxide
- C. chromium(III) trioxide
- D. chromium(III) oxide
- E.** chromium(VI) oxide

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

73. Name the compound  $\text{Cl}_2\text{O}_5$ .

- A. chlorine pentoxide
- B. dichlorine pentoxygen
- C.** dichlorine pentoxide
- D. chloride oxide
- E. dichloride pentoxide

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

74. Name the compound  $\text{N}_2\text{O}_4$ .

- A. nitrous oxide
- B. dinitrogen pentoxide
- C. nitrogen oxide
- D.** dinitrogen tetroxide
- E. nitrogen tetroxide

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

75. Name the compound  $\text{NO}_2$ .

- A. mononitrogen dioxygen
- B. nitrogen dioxide**
- C. dinitrogen monoxide
- D. nitrogen oxide
- E. nitrite

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

76. Name the compound  $\text{SO}_3$ .

- A. sulfur trioxide**
- B. sulfate
- C. sulfite
- D. sulfur trioxygen
- E. sulfur oxide

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

77. The straight chain hydrocarbon that contains six carbon atoms is

- A. propane.
- B. butane.
- C. pentane.
- D. hexane.**
- E. heptane.

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.08*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

78. What is the law of conservation of mass?
- A. Gravity and mass have the same meaning.
  - B. Matter can be neither created nor destroyed.**
  - C. Mass can never be changed to energy.
  - D. Mass and volume will always be equal.
  - E. Mass can be destroyed but only when it is conserved.

*Bloom's Level: 1. Remember*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.01*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

79. Of the following which is NOT a contribution of Marie Curie?
- A. Discovered two new elements
  - B. Her scientific studies were awarded a Nobel Prize in chemistry.
  - C. She discovered the Law of Conservation of Mass.**
  - D. She suggested the term "radioactivity."
  - E. Her scientific studies were awarded a Nobel Prize in physics.

*Bloom's Level: 1. Remember*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.02*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

80. Which listing provides the three common types of radiation that can be produced by the decay of radioactive substances like uranium?
- A. Alpha, beta, pi rays
  - B. Alpha, beta, gamma rays**
  - C. Delta, beta, gamma rays
  - D. Delta, beta, pi rays
  - E. Alpha, sigma, pi rays

*Bloom's Level: 2. Understand*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.02*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

81. Which scientist is credited with suggesting the name "radioactivity" to describe the spontaneous emission of particles and/or radiation?

- A. Ernst Rutherford
- B. J.J. Thomson
- C. Johannes Geiger
- D. Raymond Chang
- E.** Marie Curie

*Bloom's Level: 1. Remember*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.02*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

**True / False Questions**

82. Select True or False: Using a cathode ray tube, J. J. Thomson determined the magnitude of the electric charge on the electron.

**FALSE**

*Bloom's Level: 2. Understand*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.02*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

83. Select True or False: When a beam of alpha particles passes between two electrically charged plates, the beam is deflected toward the positive plate.

**FALSE**

*Bloom's Level: 2. Understand*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.02*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

84. Select True or False: The proton is about 1840 times heavier than the electron.

**TRUE**

*Bloom's Level: 2. Understand*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.02*  
*Subtopic: Structure of the Atom*  
*Topic: Components of Matter*

**Multiple Choice Questions**

85. How many electrons, protons, and neutrons does an iron-55 atom have?

- A.** 26 electrons, 26 protons, and 29 neutrons
- B. 55 electrons, 26 protons, and 29 neutrons
- C. 26 electrons, 55 protons, and 29 neutrons
- D. 26 electrons, 26 protons, and 55 neutrons
- E. 29 electrons, 26 protons, and 26 neutrons

*Bloom's Level: 4. Analyze*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.03*  
*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*  
*Topic: Components of Matter*

86. How many protons are there in one atom of nickel?

- A. 31
- B. 59
- C.** 28
- D. 42
- E. None of the above are correct

*Bloom's Level: 4. Analyze*  
*Difficulty: Easy*  
*Gradable: automatic*  
*Section: 02.03*  
*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

87. How many protons are there in one atom of magnesium?

- A. 24
- B. 11
- C. 10
- D. 12**
- E. None of the above are correct

*Bloom's Level: 4. Analyze*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

88. How many protons are there in one atom of xenon?

- A. 54**
- B. 77
- C. 131
- D. 78
- E. None of the above are correct

*Bloom's Level: 4. Analyze*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

89. Almost all the mass of an atom is concentrated in the \_\_\_\_\_.

- A. electrons
- B. protons
- C. nucleus**
- D. neurons
- E. alpha particles

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

90. The atomic number is equal to the number of \_\_\_\_\_ in the nucleus of each atom of an element.

- A. neutrons
- B.** protons
- C. neutrons
- D. alpha particles
- E. gamma rays

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

**True / False Questions**

91. Select True or False: The number of neutrons in all atoms of an element is the same.

**FALSE**

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

**Multiple Choice Questions**

92. How many protons are there in one atom of uranium?

A. 238

B. 146

**C. 92**

D. 99

E. None of the above are correct

*Bloom's Level: 4. Analyze*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

**True / False Questions**

93. Select True or False: Isotopes are atoms of the same element that have the same atomic number but different mass numbers.

**TRUE**

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

**Multiple Choice Questions**

94.

The table below describes four atoms.

	Atom A	Atom B	Atom C	Atom D
Number of protons	79	80	80	79
Number of neutrons	118	120	118	120
Number of electrons	79	80	80	79

Which atoms represent the same element?

- A. A and B represent the same element
- B. A and C represent the same element
- C. A and D represent the same element**
- D. B and C represent the same element
- E. C and D represent the same element

*Bloom's Level: 5. Evaluate*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

95.

Consider a neutral atom of the following isotope of sulfur:



How many electrons, protons, and neutrons does the atom contain?

- A. 16 electrons, 16 protons, and 18 neutrons
- B. 18 electrons, 16 protons, and 18 neutrons
- C. 18 electrons, 16 protons, and 16 neutrons
- D. 18 electrons, 18 protons, and 18 neutrons
- E. None of the above are correct

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

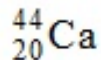
*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

96.

How many electrons, protons, and neutrons are in a neutral atom of the following isotope of calcium?



- A. 24 electrons, 24 protons, and 24 neutrons
- B. 20 electrons, 24 protons, and 20 neutrons
- C. 24 electrons, 20 protons, and 20 neutrons
- D. 20 electrons, 20 protons, and 24 neutrons**
- E. None of the above are correct

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

97.

How many electrons, protons, and neutrons are in a neutral atom of the following isotope of krypton?



- A. 36 electrons, 48 protons, and 36 neutrons
- B. 84 electrons, 24 protons, and 36 neutrons
- C. 36 electrons, 36 protons, and 48 neutrons**
- D. 36 electrons, 36 protons, and 84 neutrons
- E. None of the above are correct

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

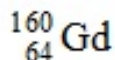
*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*

98.

How many electrons, protons, and neutrons are in a neutral atom of the following isotope of gadolinium?



- A. 64 electrons, 64 protons, and 160 neutrons
- B. 64 electrons, 64 protons, and 96 neutrons**
- C. 96 electrons, 96 protons, and 64 neutrons
- D. 64 electrons, 96 protons, and 96 neutrons
- E. None of the above are correct

*Bloom's Level: 4. Analyze*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.03*

*Subtopic: Atomic Number, Mass Number, Atomic Symbol, and Isotopes*

*Topic: Components of Matter*



Chapter 02 - Atoms, Molecules, and Ions

100. Use the periodic table above to locate where the alkaline earth metals are located.

- A. Group 1A
- B. Group 2B
- C. Group 2A**
- D. Group 7A
- E. Group 8A

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.04*

*Subtopic: Elements of the Periodic Table*

*Topic: Components of Matter*

101. Use the periodic table above to locate where the halogen elements are located.

- A. Group 1A
- B. Group 2B
- C. Group 3A
- D. Group 7A**
- E. Group 8A

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.04*

*Subtopic: Elements of the Periodic Table*

*Topic: Components of Matter*

102. Use the periodic table above to locate where the noble gases are located.

- A. Group 1A
- B. Group 2B
- C. Group 3A
- D. Group 7A
- E. Group 8A**

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.04*

*Subtopic: Elements of the Periodic Table*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

103. The elements known as the halogens are useful as disinfectants. Of the following which is NOT a halogen?

- A. Bromine
- B. Fluorine
- C. Iodine
- D.** Oxygen
- E. Chlorine

*Bloom's Level: 4. Analyze*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.04*

*Subtopic: Elements of the Periodic Table*

*Topic: Components of Matter*

104. Which, if any, defines the term *molecule*?

- A. A molecule represents the simplest ratio of atoms in a compound.
- B. A molecule is a unit that cannot be broken down by normal forces.
- C.** A molecule is an aggregate of at least two atoms in a definite arrangement held together by chemical forces.
- D. A molecule must be composed of three atoms
- E. None of the above

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.05*

*Subtopic: Molecules and Ions*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

105. There are the seven elements that naturally occur as diatomic molecules. This list contains four of those plus one that does not fit this distinction. Which one of the following does not occur naturally as a diatomic molecule?

- A. Hydrogen
- B. Fluorine
- C. Nitrogen
- D.** Neon
- E. Chlorine

*Bloom's Level: 2. Understand*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.05*

*Subtopic: Molecules and Ions*

*Topic: Components of Matter*

### True / False Questions

106. Select True or False: An ion is an atom or group of atoms that has a net positive or negative charge.

**TRUE**

*Bloom's Level: 2. Understand*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.05*

*Subtopic: Molecules and Ions*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

**Multiple Choice Questions**

107. A molecule of antifreeze, ethylene glycol, has the formula  $C_2H_4(OH)_2$ . How many atoms are there in one molecule of antifreeze?

A. 10

**B. 8**

C. 6

D. 3

E. None of the above

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.05*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

108. How many carbon atoms are in one molecule of  $CH_3(CH_2)_3CH_3$ ?

A. 10

B. 8

**C. 5**

D. 3

E. None of the above

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.05*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

109.

How many hydrogen atoms are in one molecule of  $\text{CH}_3(\text{CH}_2)_3\text{CH}_3$ ?

- A. 10
- B. 12**
- C. 14
- D. 16
- E. None of the above

*Bloom's Level: 3. Apply*

*Difficulty: Easy*

*Gradable: automatic*

*Section: 02.05*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

110. The formula for isopropyl alcohol is sometimes written as  $(\text{CH}_3)_2\text{CHOH}$  to better indicate how the atoms are connected. How many hydrogen atoms would be contained in 3 dozen isopropyl alcohol molecules?

- A. 36
- B. 180
- C. 242
- D. 288**
- E. None of the above

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.05*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

**True / False Questions**

111. Select True or False: An allotrope is one of the two or more distinct forms of an element.

**TRUE**

*Bloom's Level: 2. Understand  
Difficulty: Easy  
Gradable: automatic  
Section: 02.06  
Subtopic: Chemical Formulas  
Topic: Components of Matter*

112. Select True or False: An empirical formula tell us which ions are present in a compound and gives the whole-number ratio of the atoms of these elements in the compound.

**FALSE**

*Bloom's Level: 2. Understand  
Difficulty: Easy  
Gradable: automatic  
Section: 02.06  
Subtopic: Chemical Formulas  
Topic: Components of Matter*

**Multiple Choice Questions**

113. Give the formula for potassium oxide.

- A. KO
- B. KO<sub>2</sub>
- C. K<sub>2</sub>O**
- D. K<sub>2</sub>O<sub>4</sub>
- E. KO<sub>3</sub>

*Bloom's Level: 3. Apply  
Difficulty: Medium  
Gradable: automatic  
Section: 02.07  
Subtopic: Chemical Formulas  
Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

114. Give the formula for magnesium chloride.

- A. MgCl
- B. Mg<sub>2</sub>Cl
- C. MnCl<sub>2</sub>
- D.** MgCl<sub>2</sub>
- E. MnCl

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

115. Give the formula for carbon disulfide.

- A. CsS<sub>2</sub>
- B. C<sub>3</sub>S<sub>4</sub>
- C. C<sub>2</sub>S
- D. CS
- E.** CS<sub>2</sub>

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

116. Give the formula for potassium hydroxide.

- A.** KOH
- B. K(OH)<sub>2</sub>
- C. KO
- D. K<sub>2</sub>(OH)<sub>4</sub>
- E. K(OH)<sub>3</sub>

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

117. Give the formula for nickel(II) sulfite.

- A. NiSO
- B. NiSO<sub>3</sub>**
- C. Ni<sub>2</sub>SO<sub>4</sub>
- D. Ni<sub>2</sub>(SO<sub>3</sub>)
- E. NiS<sub>2</sub>

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

118. Name the following binary compound: FeS.

- A. Iron sulfide
- B. Iron (I) sulfide
- C. Iron (II) sulfide**
- D. Iron sulfite
- E. Iron (I) sulfite

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

119. Name the following binary compound: NaH.

- A. Sodium hydroxide
- B. Nitrogen hydroxide
- C. Sodium hydrogen
- D. Sodium hydride**
- E. Sodium halide

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

120. Name the following binary compound:  $\text{MnCl}_2$ .

- A. Magnesium chloride
- B. Manganese chloride (II)
- C. Manganese (II) chloride**
- D. Manganese (I) chloride
- E. Magnesium (II) chloride

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

121. The following binary compound,  $\text{Fe}_2\text{O}_3$ , can be named Iron (III) oxide. What is another acceptable name for the compound?

- A. Iron trioxide
- B. Ferric oxide**
- C. Ferrous oxide
- D. Hydrated iron
- E. Diiron oxide

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Nomenclature*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

122. The following compound,  $\text{CuCO}_3$ , can be named copper (II) carbonate. What is another acceptable name for the compound?

- A. Cuprous carbonate
- B. Copper carbon oxide
- C. Cupric trioxide
- D. Cupric carbontrioxide
- E. Cupric carbonate**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

123. Name the following compound:  $\text{K}_3\text{PO}_4$ .

- A. Tripotassium phosphorus tetraoxide
- B. Potassium phosphate**
- C. Tripotassium phosphate
- D. Potassium phosphite
- E. Potassium phosphide

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

124. Name the following compound:  $\text{Al}(\text{NO}_2)_2$ .

- A. Aluminum nitrate
- B. Aluminum dinitrate
- C. Aluminum dinitrite
- D. Aluminum nitrite**
- E. aluminum dinitrogen oxide

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

125. Name the following compound:  $\text{Cl}_2\text{O}_7$ .

- A. Chlorine oxide
- B. Dichlorine heptoxide**
- C. Dichlorine hexoxide
- D. Dichlorine octaoxide
- E. Dichlorine sevenoxide

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

126. Give the formula of magnesium nitrate.

- A.  $\text{MnNO}_3$
- B.  $\text{Mg}(\text{NO}_3)_2$**
- C.  $\text{Mg}(\text{NO}_2)_2$
- D.  $\text{Mn}(\text{NO}_3)_2$
- E.  $\text{MgNO}$

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Chemical Formulas*

127. Give the formula of calcium phosphate.

- A.  $\text{Ca}_3(\text{PO}_4)_2$**
- B.  $\text{Ca}_2(\text{PO}_4)_2$
- C.  $\text{Ca}_3(\text{PO}_4)_3$
- D.  $\text{Ca}_2(\text{PO}_4)_4$
- E.  $\text{Ca}_4(\text{PO}_4)_2$

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

128. Give the formula of iron(II) phosphate.

- A.**  $\text{Fe}_3(\text{PO}_4)_2$
- B.  $\text{Fe}_2(\text{PO}_4)_2$
- C.  $\text{Fe}_3(\text{PO}_4)_3$
- D.  $\text{Fe}_2(\text{PO}_4)_4$
- E.  $\text{Fe}_4(\text{PO}_4)_2$

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

129. Give the formula of copper(II) bromide.

- A.  $\text{Cu}_2\text{Br}$
- B.**  $\text{CuBr}_2$
- C.  $\text{Cu}_3\text{Br}_4$
- D.  $\text{Cu}_2\text{B}$
- E.  $\text{Cu}_2\text{Br}_4$

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

130. Give the formula of ammonium sulfate.

- A.  $(\text{NH}_4)_2\text{SO}_3$
- B.  $\text{NH}_4 \text{SO}_4$
- C.  $(\text{NH}_4)_3\text{SO}_4$
- D.**  $(\text{NH}_4)_2\text{SO}_4$
- E.  $(\text{NH}_4)_2(\text{SO}_4)_2$

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

**True / False Questions**

131. Select True or False: The formula of hydrochloric acid is HCl.

**TRUE**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

132. Select True or False: The formula of carbonic acid is HCO<sub>3</sub>.

**FALSE**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

133. Select True or False: The formula of nitrous acid is HNO<sub>3</sub>.

**FALSE**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

134. Select True or False: The formula of sulfuric acid is H<sub>2</sub>SO<sub>4</sub>.

**TRUE**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

135. Select True or False: The name of HF is hydrofluoric acid.

**TRUE**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

**Multiple Choice Questions**

136. What is the name of  $\text{H}_3\text{PO}_3$ ?

- A. Phosphoric acid
- B.** Phosphorous acid
- C. Hydrophosphoric acid
- D. Hydrophosphorous acid
- E. None of the above

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

137. What is the correct formula of ammonia?

- A.  $\text{NH}_2$
- B.  $\text{NH}$
- C.**  $\text{NH}_3$
- D.  $\text{AH}_3$
- E.  $\text{N}_2\text{H}_4$

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

138. What is the formula of lead(II) chloride?

- A. PbCl
- B. PbCl<sub>2</sub>**
- C. Pb<sub>2</sub>Cl
- D. PbCl<sub>3</sub>
- E. Pb<sub>2</sub>Cl<sub>2</sub>

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

### True / False Questions

139. Select True or False: The formula of calcium carbonate is CaCO<sub>3</sub>.

**TRUE**

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

### Multiple Choice Questions

Chapter 02 - Atoms, Molecules, and Ions

140. Of the following which is the formula of an anion that contains a metal?

- A.**  $\text{Cr}_2\text{O}_7^{2-}$
- B.  $\text{NH}_4^+$
- C.  $\text{SO}_4^{2-}$
- D.  $\text{SO}_3^{2-}$
- E.  $\text{NO}_3^-$

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

### True / False Questions

141. Select True or False: The following is the formula of a cation that contains a nonmetal:

$\text{NH}_4^+$ .

**TRUE**

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

**Multiple Choice Questions**

142. Which of the following is an example of an anion that contains a metal?

- A. Ammonium
- B. Chromate**
- C. Sulfate
- D. Nitrate
- E. Phosphate

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

**True / False Questions**

143. Select True or False: The following list shows the nitride ion, nitrate ion, and nitrite ion, in order.

$\text{N}^{3-}$ ,  $\text{NO}_3^-$ , and  $\text{NO}_2^-$

**TRUE**

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

144. Select True or False: The following list shows the sulfide ion, sulfate ion, and sulfite ion, in order.



**FALSE**

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

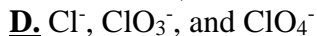
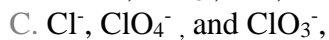
*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

### Multiple Choice Questions

145. Which list shows the correct order for the chloride ion, chlorate ion, and perchlorate ion, in that order?



*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

**True / False Questions**

146. Select True or False: The correct order for chloric acid, chlorous acid, and hypochlorous acid, is in this order:  $\text{HClO}_3$ ,  $\text{HClO}_2$ ,  $\text{HClO}$  in that order.

**TRUE**

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

**Multiple Choice Questions**

147. Which of the following is the correct formula for the ammonium ion?

A.  $\text{NH}_3$

B.  $\text{NH}_2$

**C.  $\text{NH}_4^+$**

D.  $\text{NH}_4^-$

E.  $\text{NH}_2^+$

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.07*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

148. What is the formula for dinitrogen monoxide?

- A.** N<sub>2</sub>O
- B. NO
- C. NO<sub>2</sub>
- D. N<sub>2</sub>O<sub>2</sub>
- E. 2NO

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

**True / False Questions**

149. Select True or False: The correct formula for dibromine heptoxide is Br<sub>2</sub>O<sub>6</sub>.

**FALSE**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

150. Select True or False: The correct formula for xenon difluoride is XF<sub>2</sub>.

**FALSE**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

**Multiple Choice Questions**

151. What is the correct formula for xenon hexafluoride?

- A.  $X_6F$
- B.  $Xe_6F$
- C.  $XeF_6$**
- D.  $Xe_6F_6$
- E.  $XF_6$

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

**True / False Questions**

152. Select True or False: The correct formula for the compound hydrogen peroxide is  $H_2O_2$ .

**TRUE**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.07*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

153. Select True or False: The correct name of the compound  $CH_3CH_2OH$  is ethanol.

**TRUE**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.08*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

**Multiple Choice Questions**

154. What is the correct name of the compound  $\text{CH}_3\text{CH}_2\text{NH}_2$ ?

- A. Methyl, ethyl amine
- B. Ethylene ammonia
- C. Aminoethylene
- D.** Ethylamine
- E. Ethylammonia

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.08*  
*Subtopic: Nomenclature*  
*Topic: Components of Matter*

**True / False Questions**

155. Select True or False: The correct formula for octane is  $\text{C}_8\text{H}_{18}$ .

**TRUE**

*Bloom's Level: 3. Apply*  
*Difficulty: Medium*  
*Gradable: automatic*  
*Section: 02.08*  
*Subtopic: Chemical Formulas*  
*Topic: Components of Matter*

Chapter 02 - Atoms, Molecules, and Ions

**Multiple Choice Questions**

156. What is the formula for nonane?

A.  $C_8H_{18}$

**B.  $C_9H_{20}$**

C.  $C_{10}H_{20}$

D.  $C_9H_{22}$

E.  $C_9H_{24}$

*Bloom's Level: 3. Apply*

*Difficulty: Medium*

*Gradable: automatic*

*Section: 02.08*

*Subtopic: Chemical Formulas*

*Topic: Components of Matter*