Name Class Date

CHAPTER 3 STUDY GUIDE

# Matter and Change

## SECTION 3.1 *Matter*

*In your textbook, you learned about elements and atomic structure. You may u*se each of the terms below just once, or not at all to complete the passage.

A) atom B) element C) nucleus D) neutrons

A(n) (1) _____ is a substance that cannot be broken down into simpler substances. A(n) (2) _____ is the smallest particle of matter having all that element's characteristics. It is made up of smaller particles. The (3) _ _ _ _ _ _ _ _ is made up of protons and neutrons.

A) electrons B) nucleus C) neutrons D) protons

Small particles that have mass and positive electrical charges are (4) _ _ _ _ _ _. Particles that have about the same mass as protons, but that are electrically neutral are (5)_ _ _ _ _ _ _ _. Surrounding the nucleus of an atom are tiny particles called (6) _____, which have little mass, but have negative electrical charges that are exactly the same magnitude as the positive charges of protons.

A) atomic number B) Energy level C) Isotopes D) Radioactive decay

*In your textbook, read about atomic structure and isotopes. Complete each statement.*

7. The number of protons in an atom's nucleus is the _____.

8. When atoms of the same element have different mass numbers, they are known as _ _ _ _ _ _ _ of that element.

9. The spontaneous process through which unstable nuclei emit radiation is called _ _ _ _ _ _ _

10. A(n) _ _ _ _ _ _ _ represents the area in an atom where an electron is most likely to be found.

A) atomic number B) mass number C) Ions

*In your textbook, read about atomic structure and isotopes. Complete each statement.*

11. An atom that gains or loses an electron and has an electric charge is called a(n) _____

12. The combined number of protons and neutrons is the _____

13. The _ _ _ _ is the average of the mass numbers of the isotopes of an element.

## SECTION 3.1 *Matter continued*

*In your textbook, read about electrons in energy levels and isotopes.*

**Circle the letter of the choice that best completes the statement or answers the question.**

14. How many electrons can be held in the innermost energy level of atoms?
**a.** 2 **b.** 8 **c.** 18 **d.** 32

**15.** How many electrons can the first energy level hold at its maximum?
**a. 1** **b.** 2 **c.** 8 **d.** 18 **e.** 32

**16.** Many elements are mixtures of
**a.** oxygen. b. electrons. c. neutrons. **d.** isotopes.

17, The chemical behavior of different elements is determined by the
**a.** number of electrons in the innermost energy level.
**b.** number of electrons in the middle energy level.
**c.** number of electrons in the outermost energy level.
**d.** total number of electrons in all of the energy levels.

**18.** How many electrons can an atom's third energy level hold?
**a.** 2 b. 8 **c.** 18 d. 32

**19.** Elements with a full outermost energy level are
**a.** unlikely to combine chemically with other elements.
b. likely to combine chemically with other elements.
c. likely to combine with inert elements.
**d.** likely to combine with many elements at one time.

**20.** The identity of an element is defined by its number of
**a.** electrons.
b. protons.
c. neutrons.
d. isotopes.

**21.** How many electrons can an atom's second energy level hold?
**a.** 2 **b.** 8 **c.** 18 d, 32

## SECTION 3.2 *Combining Matter*

*In your textbook, read about different types of bonds, chemical reactions, and mixtures.* For each item in Column write the letter of the matching item in Column B.

| Column A | Column B |
|---|---|
| _____ 22. A combination of two or more components that retain their identity | a. acid |
| _____ 23. The attraction of two atoms for a shared pair of electrons that hold the atoms together | b. compound |
| _____ 24. A substance that is composed of atoms of two or more different elements that are chemically combined | c. covalent bond |
| _____ 25. A solution containing a substance that produces hydrogen ions ($H^+$) in water | d. mixture |

| | |
|---|---|
| _____ 26. Bond in which valence electrons are shared by all atoms | a. ionic bond |
| _____ 27. Composed of two or more atoms held together by covalent bonds | b. metellic bond |
| _____ 28. A homogeneous mixture | c. molecule |
| _____ 29. The attractive force between two ions of opposite charge | d. solution |

| | |
|---|---|
| _____ 30. The forces that hold the elements together in a compound | a. solid solution |
| _____ 31. A solid homogeneous mixture | b. base |
| _____ 32. A solution characterized by the formation of hydroxide ions ($OH^-$) | c. chemical bonds |
| _____ 33. The change of one or more substances into other substances | d. chemical reaction |

SECTION 3.2 *Combining Matter, continued*

*In your textbook, read about chemical bonds.*

**Complete the table below by writing the type or types of chemical bond found in the type of matter on the left. Use the following types of chemical bonds: *covalent, ionic, metallic.***

| Matter | Type of Chemical Bond Present |
|---|---|
| 34. Molecule | A) covalent, B) ionic, C) metallic. |
| 35. Hydrogen gas (H2) | A) covalent, B) ionic, C) metallic. |
| 36. Magnesium oxide (MgO) | A) covalent, B) ionic, C) metallic. |
| 37. Metal | A) covalent, B) ionic, C) metallic. |
| 38. Table salt (NaCl) | A) covalent, B) ionic, C) metallic. |
| 39. Sodium monoxide (Na20) | A) covalent, B) ionic, C) metallic. |
| 40. Water | A) covalent, B) ionic, C) metallic. |

*In your textbook, read about chemical reactions and mixtures.*

**Examine equations A and B below. Then answer the questions.**

(A) $2H_2 + O_2 \Rightarrow 2H_2O$ (B) $H_2CO_3 \rightarrow H^+ + HCO_3^-$

A B 41. Which equation represents the formation of water?

A B 42. Which equation represents the formation of an acid solution?

A) 2 B) 4 43. How many atoms of oxygen (0) are on both sides of equation A?

A) 2 B) 4 C) 8 44. How many atoms of hydrogen (H) are on both sides of equation A?

A) 2 B) 4 C) 1 45. How many atoms of hydrogen (H) are on both sides of equation B?

A B 46. In which equation are carbonic acid molecules broken apart into hydrogen ions and bicarbonate ions?

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CHAPTER 3 STUDY GUIDE

## sEc110N 3.3 *States of Matter*

*In your textbook, read about the cycles of matter and the different states of matter.* **For each statement below, select (A)** *true* **or (B)** *false.*

A) True B) False 47 Most solids have a *crystalline structure* in which the particles are arranged in regular geometric patterns.

A) True B) False 48. Hot, highly ionized, electrically conducting gas is called *plasma*.

A) True B) False 49. The change of state from solid to gas without an intermediate liquid state is called *evaporation*.

A) True B) False 50. A *glass* is a solid that consists of densely packed atoms arranged at random.

A) True B) False 51. The change from a solid to a liquid is called *condensation*.

A) True B) False 52. The process of changing from a liquid to a gas is called sublimation.

A) True B) False 53. There are only *three* main basic states of matter in the universe.

A) True B) False 54. *Matter* cannot be created or destroyed.

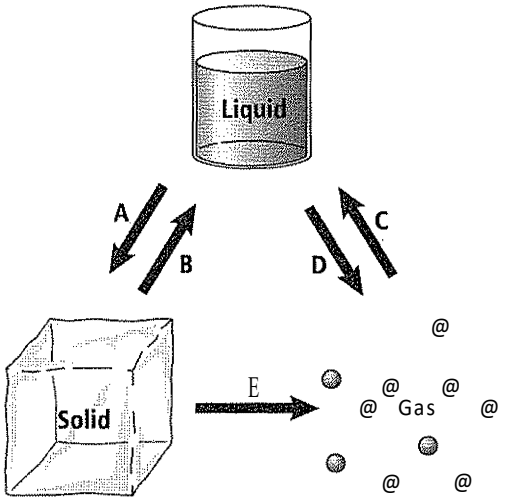
*In your class, you learned about the states of matter.* **Complete the table by filling in the missing information, by selecting the BEST answer from the choice listed**

**The States of Matter**

| State of Matter | Definition of State | Example |
|---|---|---|
| 55. | Hot, highly ionized, electrically conducting gases<br>e.g. Lightning, neon sign, the Sun, other stars | A). Plasma B. Liquid C. Solid D. Gas |
| 56. | Made of densely packed arrangement of particles, has definite volume but not its own shape | A). Plasma B. Liquid C. Solid D. Gas |
| 57. | Made of densely packed particles arranged in a definite pattern; has both a definite shape and volume | A). Plasma B. Liquid C. Solid D. Gas |
| 58. | Made of widely separated particles moving at high speeds; Has NO definite shape and volume<br>Helium | A). Plasma B. Liquid C. Solid D. Gas |

## SECTION 3.3 *States of Matter,* *continued*

*In your notes, demonstrate the understanding of the changes of state of matter.*
**Examine the diagram below. Then answer the NEXT 5 questions.**




59. What change of state is represented by arrow A?

A) Melting B) Evaporation C) Freezing D) Condensation E) Sublimation

60. What change of state is represented by arrow B?

A)Melting B) Evaporation C) Freezing D) Condensation E) Sublimation

61. What change of state is represented by arrow C?

A)Melting B) Evaporation C) Freezing D) Condensation E) Sublimation

62. What change of state is represented by arrow D?

A)Melting B) Evaporation C) Freezing D) Condensation E) Sublimation

63. What change of state is represented by arrow E?

A)Melting B) Evaporation C) Freezing D) Condensation E) Sublimation

64. How is thermal energy involved in the processes of melting and evaporation?

A) absorb thermal energy

B) release thermal energy

65. How is thermal energy involved in the processes of freezing and condensation?

A) absorb thermal energy

B) release thermal energy