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CHAPTER 3 STUDY GUIDE

Matter and Change

SECTION 3.1 *Matter*

In your textbook, read about elements and atomic structure.
Use each of the terms below just once to complete the passage, or not at all.

A atom B electrons C. nucleus D. protons E. element

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. 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 electrons
B. element
C. neutrons

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 #
B. Energy level
C. Isotopes
D. Radioactive decay

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.

A. atomic #
B. mass #
C. Ions

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 fourth energy level hold?
a. 2 **b.** 8 **c.** 18 **d.** 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

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CHAPTER 3 STUDY GUIDE

SECTION 3.2 *Combining Matter*

In your textbook, read about different types of bonds, chemical reactions, and mixtures.
For each item in Column A, 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. metallic 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

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CHAPTER 3 STUDY GUIDE

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.*

A B C

Matter	Type of Chemical Bond Present
34. Molecule	
35. Hydrogen gas (H_2)	
36. Magnesium oxide (MgO)	
37. Metal	
38. Table salt (NaCl)	
39. Sodium monoxide (Na_2O)	
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. $H_2CO_3 \rightarrow H^+ + HCO_3^-$ C. 2 D. 4. E. Can not tell

_____ 41. Which equation represents the formation of water?

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

_____ 43. How many atoms of oxygen (O) are on both sides of equation A?

_____ 44. How many atoms of hydrogen (H) are on both sides of equation A?

_____ 45. How many atoms of hydrogen (H) are on both sides of equation 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

SECTION 3.3 *States of Matter*

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

_____ 47. Most solids have a crystalline structure in which the particles are arranged in regular geometric patterns.

_____ 48. Hot, highly ionized, electrically conducting gas is called plasma.

_____ 49. The change of state from solid to gas without an intermediate liquid state is called evaporation.

_____ 50. A glass is a solid that consists of densely packed atoms arranged at random.

_____ 51. The change from a solid to a liquid is called condensation.

_____ 52. The process of changing from a liquid to a gas is called sublimation.

_____ 53. There are only three states of matter in the universe.

_____ 54. Matter cannot be created or destroyed.

In your textbook, read about the states of matter.
Complete the table by filling in the missing information, By selecting the best answer from the choice below.

The States of Matter

State of Matter	Definition of State	Example
55.	Hot, highly ionized, electrically conducting gases	
56.	Made of densely packed arrangement of particles; has definite volume but not its own shape	
57.	Made of densely packed particles arranged in a definite pattern; has both a definite shape and volume	
58.	made of widely separated particles moving at high speeds; has NO definite shape and volume.	

A. Plasma B. Liquid C. Solid D. gas

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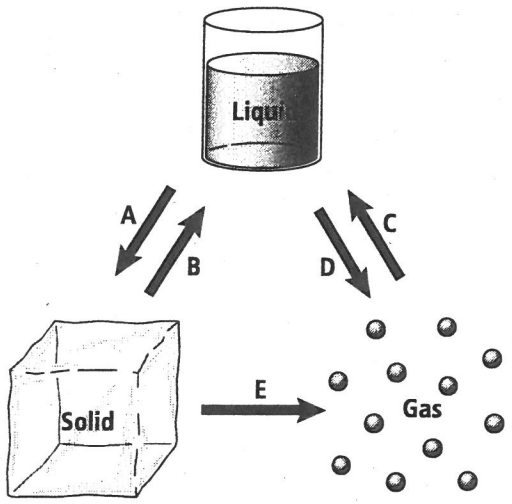
CHAPTER 3 STUDY GUIDE

SECTION 3.3 *States of Matter, continued*

In your textbook, read about changes of state. next 5
Examine the diagram below. Then answer the questions.



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

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

A B C D E.

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

A B C D E.

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

A B C D E.

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

A B C D E.

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

A B C D E.

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