

States of Matter Worksheets

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CHAPTER **1** States of Matter Worksheets

CHAPTER OUTLINE

- 1.1 Solids, Liquids, Gases, and Plasmas
 - 1.2 Behavior of Gases
 - 1.3 Changes of State
-

1.1 Solids, Liquids, Gases, and Plasmas

Lesson 4.1: True or False

Name _____ Class _____ Date _____

Determine if the following statements are true or false.

- _____ 1. A liquid takes the volume of its container.
- _____ 2. Particles of amorphous solids have no definite pattern.
- _____ 3. A beef steak is an example of a crystalline solid.
- _____ 4. Viscosity causes water to curve upward at the top rim of a glass.
- _____ 5. There is more gas than any other state of matter in the universe.
- _____ 6. All states of matter have a fixed mass and fixed volume.
- _____ 7. The volume and shape of a solid can never change.
- _____ 8. Surface tension explains why water forms droplets.
- _____ 9. Water has greater viscosity than any other liquid.
- _____ 10. A gas spreads out to fill all available space.

Lesson 4.1: Critical Reading

Name _____ Class _____ Date _____

Read this passage from the text and answer the questions that follow.

Energy and States of Matter

Why do different states of matter have different properties? It's because of differences in energy at the level of atoms and molecules, the tiny particles that make up matter. Energy is the ability to cause changes in matter. Energy that causes matter to move is called kinetic energy. According to the kinetic theory of matter, the particles that make up matter have kinetic energy and are constantly moving.

So why don't all the particles move apart? Particles of matter of the same substance, such as the same element, are attracted to one another. This force of attraction tends to pull the particles closer together. The particles need a lot of kinetic energy to overcome the force of attraction and move apart. It's like a tug of war between opposing forces. The kinetic energy of individual particles is on one side, and the force of attraction between different particles is on the other side. The outcome of the "war" depends on the state of matter.

- In solids, particles don't have enough kinetic energy to overcome the force of attraction between them. The particles are packed closely together and cannot move around. All they can do is wiggle, or vibrate, in place. This explains why solids have a fixed volume and a fixed shape.
- In liquids, particles have enough kinetic energy to partly overcome the force of attraction between them. They can slide past one another but not pull apart. This explains why liquids can change shape but have a fixed

volume.

- In gases, particles have a lot of kinetic energy. They can completely overcome the force of attraction between them and move apart. This explains why gases have neither a fixed volume nor a fixed shape.

Questions

1. Create a table comparing and contrasting solids, liquids, and gases.
2. Relate the kinetic theory of matter to states of matter.

Lesson 4.1: Multiple Choice

Name _____ Class _____ Date _____

Circle the letter of the correct choice.

1. What happens when matter changes state?
 - a. Its chemical properties change.
 - b. Its physical properties change.
 - c. The energy of its particles remains the same.
 - d. two of the above
2. The volume and shape of a solid could be changed by
 - a. placing it in a container with a different shape.
 - b. putting it in a container with a different volume.
 - c. cutting or breaking it.
 - d. all of the above
3. An example of an amorphous solid is
 - a. candle wax.
 - b. table salt.
 - c. cellulose.
 - d. none of the above
4. Surface tension is a force that affects
 - a. gases.
 - b. plasmas.
 - c. solids.
 - d. liquids.
5. Which statement is true about plasma?
 - a. It has a fixed volume.
 - b. It has a fixed shape.
 - c. It contains ions.
 - d. It does not occur in nature.
6. Which state of matter has particles with the least energy?
 - a. plasma
 - b. gas
 - c. liquid
 - d. solid
7. The volume of a gas is

- a. fixed.
- b. viscous.
- c. the same as its container.
- d. equal to its mass.

Lesson 4.1: Matching

Name _____ Class _____ Date _____

Match each definition with the correct term.

Definitions

- _____ 1. state of matter that lacks a fixed volume and a fixed shape
- _____ 2. state of matter with a fixed volume and a fixed shape
- _____ 3. energy that moves matter
- _____ 4. ability to cause changes in matter
- _____ 5. state of matter with a fixed volume but not a fixed shape
- _____ 6. state of matter that consists of ions
- _____ 7. solid, liquid, gas, or plasma

Terms

- a. solid
- b. liquid
- c. gas
- d. plasma
- e. kinetic energy
- f. state of matter
- g. energy

Lesson 4.1: Fill in the Blank

Name _____ Class _____ Date _____

Fill in the blank with the appropriate term.

1. State of matter is a(n) _____ property of matter.
2. Water in the gaseous state is called _____.
3. Water in the solid state is called _____.
4. The force that pulls particles at the surface of a liquid toward other liquid particles is _____.
5. A liquid's resistance to flowing is known as _____.
6. The northern lights glow because of matter in the _____ state.
7. The particles of _____ solids are arranged in a regular repeating pattern.

Lesson 4.1: Critical Writing

Name _____ Class _____ Date _____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Describe in detail the relationship between matter and energy.

1.2 Behavior of Gases

Lesson 4.2: True or False

Name _____ Class _____ Date _____

Determine if the following statements are true or false.

- _____ 1. Particles of a gas move only when they are heated.
- _____ 2. The pressure a gas exerts depends only on its volume.
- _____ 3. For gas at a given temperature, volume and pressure change in opposite directions.
- _____ 4. Gas bubbles in water get bigger when they are under less pressure.
- _____ 5. Heating a gas causes its particles to move more slowly.
- _____ 6. Air pressure in a tire increases after you start driving because the air gets warmer.
- _____ 7. As you go higher above Earth's surface, the pressure of the atmosphere increases.
- _____ 8. Cooling a gas in a closed container causes its pressure to decrease.
- _____ 9. Adding more gas to a closed container has no effect on its pressure.
- _____ 10. Adding energy to a gas raises its temperature.

Lesson 4.2: Critical Reading

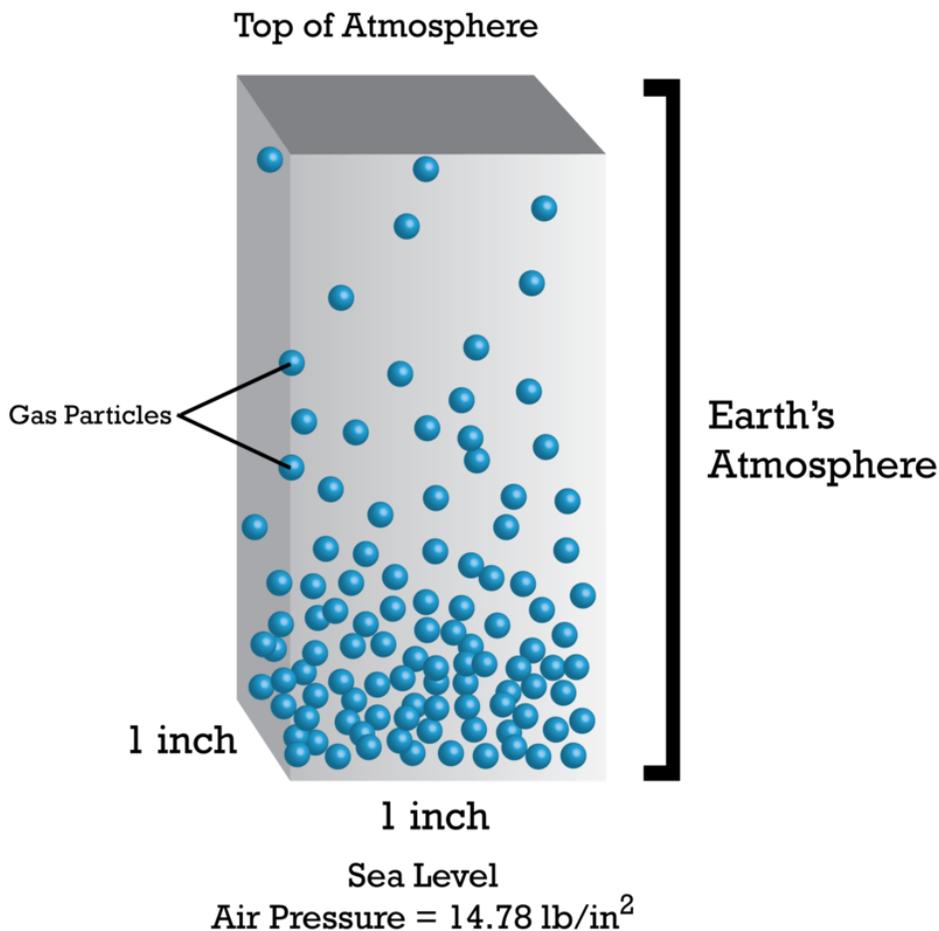
Name _____ Class _____ Date _____

Read this passage from the text and answer the questions that follow.

What Is Pressure?

The molecules of a gas are constantly moving and bumping into things. The force of the particles against whatever they bump into creates pressure. Pressure is defined as the amount of force pushing against a given area. How much pressure a gas exerts depends on the amount of gas. The more gas particles there are, the greater the pressure.

You usually cannot feel it, but air has pressure. The gases in Earth's atmosphere exert pressure against everything they contact. The atmosphere rises high above Earth's surface and contains a huge number of individual gas particles (see diagram below). As a result, the pressure of the tower of air above a given spot on Earth's surface is substantial. If you were standing at sea level, the pressure would be 10.14 newtons per square centimeter (14.7 pounds per square inch).



Questions

1. Explain why gases exert pressure.
2. Describe how the pressure exerted by Earth's atmosphere changes with altitude. Explain why atmospheric pressure changes in this way.

Lesson 4.2: Multiple Choice

Name _____ Class _____ Date _____

Circle the letter of the correct choice.

1. The molecules of gas in a closed container
 - a. keep bumping into each other.
 - b. are always moving.
 - c. exert pressure.
 - d. all of the above
2. For a fixed volume of gas, the gas's pressure depends on
 - a. its mass.
 - b. its temperature.
 - c. the shape of its container.

- d. two of the above
3. The pressure of a gas can be increased by
- increasing its temperature.
 - decreasing its temperature.
 - increasing its volume.
 - decreasing its mass.
4. What *always* happens when a gas is heated?
- Its volume increases.
 - Its pressure increases.
 - Its particles gain kinetic energy.
 - all of the above
5. If you put an inflated balloon inside a freezer, you can predict that it will shrink based on
- Boyles' law.
 - Charles's law.
 - Amontons's law.
 - none of the above
6. Increasing the volume of a gas decreases its
- mass.
 - pressure.
 - temperature.
 - kinetic energy.
7. At sea level, the pressure of Earth's atmosphere is
- 14.7 lb/cm^2
 - 14.7 N/in^2
 - 10.14 N/cm^2
 - 10.14 lb/in^2

Lesson 4.2: Matching

Name _____ Class _____ Date _____

Match each definition with the correct term.

Definitions

- _____ 1. law relating the temperature and pressure of a constant volume of gas
- _____ 2. amount of force pushing against a given area
- _____ 3. state of matter that lacks a fixed volume and a fixed shape
- _____ 4. law relating the volume and pressure of gas at a constant temperature
- _____ 5. average kinetic energy of particles of matter
- _____ 6. amount of space that matter occupies
- _____ 7. law relating the temperature and volume of gas at a constant pressure

Terms

- a. Amontons's law

- b. Boyle's law
- c. Charles's law
- d. pressure
- e. volume
- f. temperature
- g. gas

Lesson 4.2: Fill in the Blank

Name _____ Class _____ Date _____

Fill in the blank with the appropriate term.

1. The force of gas particles bumping into the sides of their container creates _____.
2. The pressure of Earth's atmosphere is greatest at _____.
3. Pressure and volume of a gas have a(n) _____ relationship.
4. The gas laws describe the relationships among pressure, volume, and _____ of a given amount of gas.
5. If you heat a fixed volume of gas, its pressure _____.
6. A gas will take up more space if its temperature _____.
7. As the volume of a gas increases, its pressure _____.

Lesson 4.2: Critical Writing

Name _____ Class _____ Date _____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

For a given amount of gas, describe the relationships among pressure, volume, and temperature of the gas.

1.3 Changes of State

Lesson 4.3: True or False

Name _____ Class _____ Date _____

Determine if the following statements are true or false.

- _____ 1. Matter rarely changes state.
- _____ 2. A gas changes directly to a solid by freezing.
- _____ 3. The average kinetic energy of particles of matter can be measured with a thermometer.
- _____ 4. All matter has the same freezing and boiling points.
- _____ 5. A liquid can change to a gas without boiling.
- _____ 6. The melting point of a substance is the same as its freezing point.
- _____ 7. Iron melts at a lower temperature than water.
- _____ 8. Evaporation occurs only at the exposed surface of a liquid.
- _____ 9. Vaporization explains why a mud puddle dries up on a sunny day.
- _____ 10. Ice changes directly to water vapor through the process of deposition.

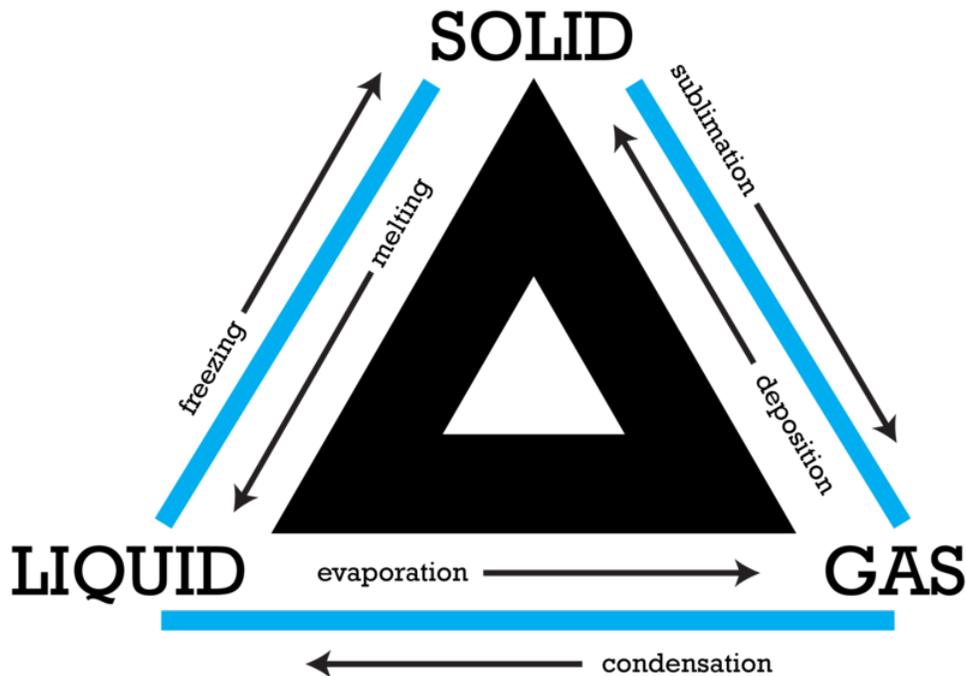
Lesson 4.3: Critical Reading

Name _____ Class _____ Date _____

Read this passage from the text and answer the questions that follow.

Changes of State

Changes of state are physical changes in matter. They are reversible changes that do not involve changes in matter's chemical makeup or chemical properties. Common changes of state include melting, freezing, sublimation, deposition, condensation, and vaporization. You can see how each process changes the state of matter in the diagram below.



The particles of matter are constantly moving. They move most quickly in gases, less quickly in liquids, and most slowly in solids. When matter changes state, it either loses or absorbs energy. For example, when matter changes from a liquid to a solid, it loses energy, because particles of solids have less energy than particles of liquids. When it changes from a solid to a liquid, it absorbs energy.

Questions

1. Which process changes a gas to a liquid? What happens during this process?
2. Create a table to show how energy changes in each of the processes in the diagram above.

Lesson 4.3: Multiple Choice

Name _____ Class _____ Date _____

Circle the letter of the correct choice.

1. The process in which clouds form is
 - a. sublimation.
 - b. evaporation.
 - c. condensation.
 - d. none of the above
2. Which statement is true about changes of state?
 - a. They involve energy.
 - b. They cannot be undone.
 - c. They involve chemical processes.
 - d. They change the chemical makeup of matter..
3. Liquid water changes to ice when
 - a. the water loses energy.

- b. the water gains energy.
 - c. melting occurs.
 - d. two of the above
4. Melting point is the temperature at which matter changes to a
- a. gas.
 - b. liquid.
 - c. solid.
 - d. plasma.
5. The boiling point of water is
- a. 0 °C.
 - b. 32 °F.
 - c. 98 °F.
 - d. 100 °C.
6. The bubbles in boiling water contain
- a. air.
 - b. salt.
 - c. liquid water.
 - d. water vapor.
7. Which statement is true about evaporation?
- a. It occurs when a liquid boils.
 - b. It occurs when a liquid reaches its boiling point.
 - c. It happens more quickly at higher temperatures.
 - d. all of the above

Lesson 4.3: Matching

Name _____ Class _____ Date _____

Match each definition with the correct term.

Definitions

- _____ 1. process in which a liquid changes to a gas without boiling
- _____ 2. process in which a liquid changes to a solid
- _____ 3. process in which a gas changes to a liquid
- _____ 4. process in which a solid changes to a liquid
- _____ 5. process in which a liquid boils and changes to a gas
- _____ 6. process in which a gas changes directly to a solid
- _____ 7. process in which a solid changes directly to a gas

Terms

- a. condensation
- b. deposition
- c. evaporation
- d. freezing

- e. melting
- f. sublimation
- g. vaporization

Lesson 4.3: Fill in the Blank

Name _____ Class _____ Date _____

Fill in the blank with the appropriate term.

1. During a change of state _____ is either lost or gained.
2. _____ is the average kinetic energy of particles of matter.
3. The temperature at which a liquid changes to a solid is its _____.
4. The melting point of ice is _____ °C.
5. A gas condenses when it is cooled below its _____.
6. Changes of state are _____ changes in matter.
7. The process in which frost forms on a window is _____.

Lesson 4.3: Critical Writing

Name _____ Class _____ Date _____

Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how temperature of matter is related to changes of state.