

Chapter 8

MATTER AND TEMPERATURE

Chapter 8 Assessment

Vocabulary

Select the correct term to complete the sentences.

atom	Fahrenheit	heterogeneous mixture
Celsius	absolute zero	element
gas	plasma	intermolecular forces
compound	pure substance	solid
melting point	thermal energy	thermometer
homogeneous mixture	liquid	mixture
Kelvin scale	boiling point	molecule

Section 8.1

1. A pure substance that cannot be broken down into simpler substances by physical or chemical means is a(n) ____.
2. The smallest particle of an element is a(n) ____.
3. A(n) ____ is a substance that contains two or more elements that are chemically joined.
4. A(n) ____ is a group of two or more atoms joined together by chemical bonds.
5. A(n) ____ cannot be separated into other types of matter by physical means.
6. Matter that contains a combination of different elements and/or compounds and can be separated by physical means is called a(n) ____.
7. A(n) ____ is a mixture that is the same throughout.
8. A(n) ____ is a mixture that is not the same throughout.

Section 8.2

9. ____ is a temperature scale in which water freezes at 32 degrees.

10. ____ is a temperature scale in which water freezes at 0 degrees.
11. Energy due to temperature is called ____.
12. You measure temperature with a(n) ____.
13. The lowest possible temperature is called ____.
14. The ____ is a temperature scale that starts with absolute zero.

Section 8.3

15. A(n) ____ holds its shape.
16. A(n) ____ does not hold its shape but has a fixed volume.
17. A(n) ____ does not hold its shape and takes on the volume of its container.
18. The forces that determine the phase of matter are known as ____.
19. The temperature at which a substance changes from solid to liquid is called ____.
20. The temperature at which a substance changes from liquid to gas is called ____.
21. ____ is a phase of matter in which some of the atoms begin to break apart.

Concepts

Section 8.1

1. What is Brownian motion? How does it provide evidence that matter is made of atoms and molecules?
2. Explain the differences between elements and compounds.
3. What are the two major categories of matter?

- Name three foods not mentioned in the text that would be classified as heterogeneous mixtures, and three foods that are homogeneous mixtures.
- Explain the difference between the two kinds of pure substances.
- Explain the difference between an atom and a molecule.

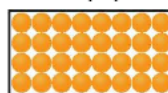
Section 8.2

- Compare the Celsius temperature scale with the Fahrenheit scale by answering the following questions.
 - Which is the larger change in temperature, 1°C or 1°F ?
 - What are the melting points and boiling points of water on each scale?
 - Why are two different scales used?
- What are the formulas for converting Fahrenheit to Celsius and Celsius to Fahrenheit?
- Since it is fairly easy to tell when the temperature is high or low, why do we need thermometers, thermistors, and other devices for measuring temperature?
- Compare the Celsius temperature scale with the Kelvin scale by answering the following questions.
 - Which is the larger change in temperature, 1K or 1°C ?
 - What are the freezing points and boiling points of water on each scale?
 - Why are two different scales used?
- What is the difference between 0° on the Celsius scale and absolute zero?
- Absolute zero is considered the lowest possible temperature. What is the highest possible temperature?

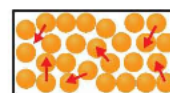
Section 8.3

- A liquid takes the shape of its container, but why doesn't a liquid expand to fill the container completely?

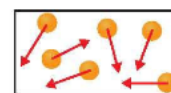
- Why doesn't a solid flow?
- Name one similarity between gases and liquids.
- Identify the phase represented by each diagram below and describe its basic properties.



(A)



(B)



(C)

- What is sublimation?
- Explain how a liquid can enter the gas phase without reaching its boiling point.
- Which has more thermal energy: gas, plasma, or liquid?
- What is the most common phase of matter in the universe?

Problems**Section 8.1**

- Describe a method you would use to separate chicken soup into the individual forms of matter from which it is made.
- Describe a method you would use to separate a mixture of sugar and water.

Section 8.2

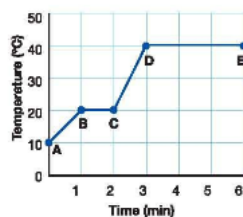
- Calculate the average human body temperature, 98.6°F , on the Celsius scale.
- Convert -20°C to the Kelvin scale.
- What is the Celsius equivalent of 100K ?
- A pizza box says to bake the pizza at 450°F but your oven measures temperature in Celsius. At what temperature should you set the oven?

Chapter 8

MATTER AND TEMPERATURE

Section 8.3

7. The diagram to the right shows a graph of temperature vs. time for a material that starts as a solid. Heat is added at a constant rate. Using the diagram, answer the following questions.



- During which time interval does the solid melt?
 - During which time interval is the material all liquid?
 - What is the boiling point of the substance?
 - Does it take more heat to melt the solid or boil the liquid?
8. About 70 percent of the Earth's surface is covered by water. There is water underground, and even in the atmosphere. What is water's state at each of the following temperatures?
- Temperatures below 0 degrees Celsius
 - Temperatures between 0 and 100 degrees Celsius
 - Temperatures above 100 degrees Celsius

Applying Your Knowledge**Section 8.1**

- Identify each of the following in your classroom, school cafeteria, or home.
 - 5 homogeneous mixtures
 - 5 heterogeneous mixtures
 - 3 elements
 - 5 compounds
- Design a poster to illustrate the classification of matter. Provide examples of everyday materials that belong in each category.

- Air is a homogeneous mixture. Conduct research to find out the gases found in air and the percentage of each. Make a pie chart illustrating your findings.

Section 8.2

- If you keep lowering the temperature of a material, the molecules vibrate less and less. If you could eventually reach a low enough temperature, the molecules might not vibrate at all. Is this possible, and what does it mean for the temperature scale? Is it possible to keep lowering the temperature indefinitely?
- In the 1860s, English physicist James Clerk Maxwell and Austrian physicist Ludwig Boltzmann first gave a rigorous analysis of temperature in terms of the average kinetic energy of the molecules of a substance. Explore their lives and their contributions to the development of the theory of temperature.

Section 8.3

- Design a poster or model to summarize the differences between a solid, liquid, gas, and plasma.
- Create a chart that illustrates the following phase changes: melting, boiling, freezing, evaporation, condensation, and sublimation.
- Plasmas, or ionized gases as they are sometimes called, are of great interest both physically and technologically. Do some research to find out why plasmas are of great interest to scientists and manufacturers. Describe at least two current uses of plasmas, and describe one way scientists and engineers hope to use plasmas in the future.