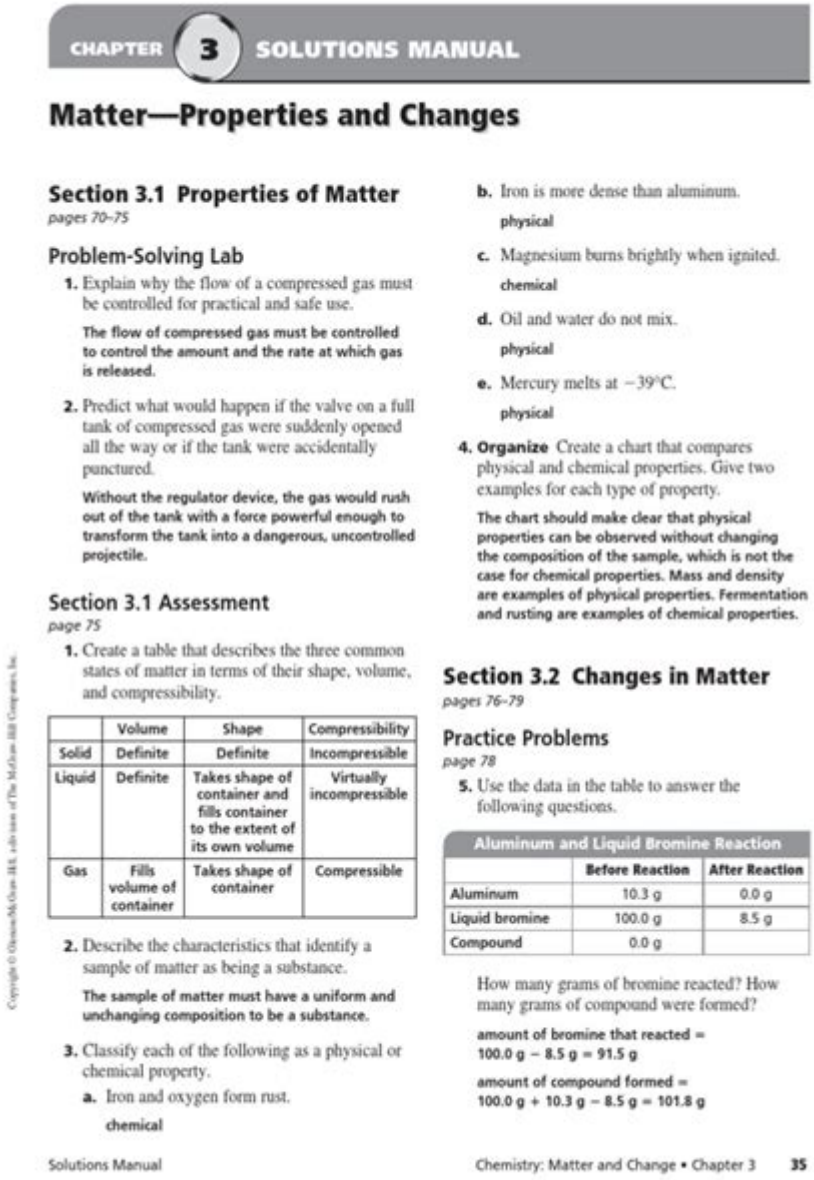
Chapter 3 Matter Properties And Changes Assessment Answers



CHAPTER 3 SOLUTIONS MANUAL

Matter—Properties and Changes

Section 3.1 Properties of Matter

pages 70–75

Problem-Solving Lab

1. Explain why the flow of a compressed gas must be controlled for practical and safe use.

   The flow of compressed gas must be controlled to control the amount and the rate at which gas is released.

2. Predict what would happen if the valve on a full tank of compressed gas were suddenly opened all the way or if the tank were accidentally punctured.

   Without the regulator device, the gas would rush out of the tank with a force powerful enough to transform the tank into a dangerous, uncontrolled projectile.

Section 3.1 Assessment

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1. Create a table that describes the three common states of matter in terms of their shape, volume, and compressibility.

	Volume	Shape	Compressibility
Solid	Definite	Definite	Incompressible
Liquid	Definite	Takes shape of container and fills container to the extent of its own volume	Virtually incompressible
Gas	Fills volume of container	Takes shape of container	Compressible

2. Describe the characteristics that identify a sample of matter as being a substance.

   The sample of matter must have a uniform and unchanging composition to be a substance.

3. Classify each of the following as a physical or chemical property.

   a. Iron and oxygen form rust.

   chemical

   b. Iron is more dense than aluminum.

   physical

   c. Magnesium burns brightly when ignited.

   chemical

   d. Oil and water do not mix.

   physical

   e. Mercury melts at −39°C.

   physical

4. **Organize** Create a chart that compares physical and chemical properties. Give two examples for each type of property.

   The chart should make clear that physical properties can be observed without changing the composition of the sample, which is not the case for chemical properties. Mass and density are examples of physical properties. Fermentation and rusting are examples of chemical properties.

Section 3.2 Changes in Matter

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Practice Problems

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5. Use the data in the table to answer the following questions.

Aluminum and Liquid Bromine Reaction

	Before Reaction	After Reaction
Aluminum	10.3 g	0.0 g
Liquid bromine	100.0 g	8.5 g
Compound	0.0 g	

How many grams of bromine reacted? How many grams of compound were formed?

amount of bromine that reacted =
100.0 g − 8.5 g = 91.5 g

amount of compound formed =
100.0 g + 10.3 g − 8.5 g = 101.8 g

Chapter 3 Matter Properties and Changes Assessment Answers are essential for students and educators alike, as they provide a comprehensive understanding of the physical and chemical properties of matter, as well as how these properties change under different conditions. This chapter often serves as a foundation for more advanced topics in chemistry and physics, making it crucial for students to grasp the concepts thoroughly. In this article, we will explore key ideas related to matter properties and changes, outline assessment strategies, and provide practical examples to help students achieve success in their studies.

Understanding Matter: Properties and Changes

Matter is anything that has mass and occupies space. It is composed of atoms and molecules and is classified

into various categories based on its properties. The study of matter involves understanding both its characteristics and how it can change.

Physical Properties of Matter

Physical properties are those that can be observed or measured without changing the substance's chemical identity. Some key physical properties include:

- **Color:** The visual appearance of a substance.
- **Density:** The mass per unit volume of a substance, often expressed in grams per cubic centimeter (g/cm^3).
- **Melting Point:** The temperature at which a solid becomes a liquid.
- **Boiling Point:** The temperature at which a liquid becomes a gas.
- **Solubility:** The ability of a substance to dissolve in another substance, typically in water.

Understanding these properties allows students to categorize and compare different types of matter, which is essential for solving problems related to physical changes.

Chemical Properties of Matter

Chemical properties describe a substance's ability to undergo chemical changes and form new substances. Important chemical properties include:

- **Reactivity:** How readily a substance combines with other substances.
- **Flammability:** The ability of a substance to ignite and burn.
- **pH:** A measure of how acidic or basic a solution is.
- **Oxidation States:** The degree of oxidation of an atom in a compound.

Understanding chemical properties is critical for predicting how substances will interact in various chemical reactions.

Types of Changes in Matter

Changes in matter can be classified into two main categories: physical changes and chemical changes.

Physical Changes

Physical changes are alterations that do not change the chemical composition of a substance. These changes can often be reversed. Examples include:

- Melting ice to water
- Boiling water to steam
- Crushing a can
- Dissolving sugar in water

In these instances, the substances retain their original properties even after the change occurs.

Chemical Changes

Chemical changes involve a transformation that alters the chemical composition of a substance, resulting in the formation of new substances. These changes are typically not reversible. Examples include:

- Rusting of iron
- Burning wood
- Cooking an egg
- Fermentation of sugar

Recognizing the signs of chemical changes, such as color changes, gas production, and temperature changes, is crucial for students to identify these processes in everyday life.

Assessment Strategies for Chapter 3

Assessing students' understanding of matter properties and changes can take various forms. Here are some effective strategies:

Quizzes and Tests

Regular quizzes and tests can help gauge students' grasp of key concepts. These assessments can include multiple-choice questions, true/false statements, and short answer questions.

Practical Experiments

Hands-on experiments allow students to observe the properties of matter and changes firsthand. For example, students can conduct an experiment to observe the melting of ice or the reaction between vinegar and baking soda to produce carbon dioxide gas.

Group Discussions and Presentations

Encouraging group discussions enables students to articulate their understanding and learn from their peers. Presentations on specific topics related to matter properties and changes can also reinforce learning.

Common Assessment Answers and Explanations

Here are some common assessment questions along with their answers and explanations to aid students in their studies.

Example Questions

1. What is the difference between a physical change and a chemical change?

Answer: A physical change is a change that does not affect the chemical composition of a substance, while a chemical change results in the formation of new substances with different properties.

2. What are the indicators of a chemical change?

Answer: Indicators of a chemical change can include a change in color, the production of gas, the formation of a precipitate, and changes in temperature.

3. How can you determine the density of a substance?

Answer: Density can be calculated using the formula: Density = Mass/Volume. By measuring the mass of a substance and its volume, you can find its density.

4. What happens to the molecules of a substance during a phase change?

Answer: During a phase change, the arrangement and energy of the molecules change. For example, when ice melts, the molecules gain energy and move more freely, transitioning from a solid to a liquid state.

Conclusion

Chapter 3 Matter Properties and Changes Assessment Answers play a pivotal role in solidifying students' understanding of essential scientific concepts. By mastering the properties of matter and the nature of physical and chemical changes, students can build a strong foundation for further studies in science. Utilizing various assessment strategies, including quizzes, practical experiments, and group discussions, can enhance learning outcomes. With the right tools and resources, students can confidently tackle assessments and develop a deeper appreciation for the world of matter around them.

Frequently Asked Questions

What are the main properties of matter discussed in Chapter 3?

The main properties of matter discussed include mass, volume, density, and state (solid, liquid, gas).

How does the density of a substance affect its ability to float or sink in a liquid?

An object will float in a liquid if its density is less than that of the liquid, and it will sink if its density is greater.

What are physical changes in matter as outlined in Chapter 3?

Physical changes are changes that affect one or more physical properties of a substance without altering its chemical composition, such as changes in state, shape, or size.

Can you provide an example of a chemical change discussed in Chapter 3?

An example of a chemical change is the rusting of iron, where iron reacts with oxygen to form iron oxide, altering its chemical structure.

What methods can be used to measure the properties of matter?

Properties of matter can be measured using various tools such as balances for mass, graduated cylinders for volume, and hydrometers for density.

What is the significance of understanding matter properties and changes in everyday life?

Understanding matter properties and changes helps in making informed decisions about materials and their uses in practical applications, such as cooking, construction, and manufacturing.

How do temperature changes affect the state of matter?

Temperature changes can cause matter to change states; for example, heating ice (solid) leads to melting (liquid), while cooling water (liquid) can result in freezing (solid).

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